

City of San Diego

CONTRACTOR'S NAME: Kiewit Infrastructure West Co.
ADDRESS: 3555 Farnam Street, Omaha, Nebraska, 68131
TELEPHONE NO.: (562) 946-1816 FAX NO.: _____
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M. Smoczynski / R. W. Bustamante / L. I. Russell

BIDDING DOCUMENTS



FOR

PURE WATER PROGRAM: NORTH CITY WATER RECLAMATION PLANT FLOW EQUALIZATION BASIN

BID NO.: K-21-1791-DBB-3-A
SAP NO. (WBS/IO/CC): B-21059
CLIENT DEPARTMENT: 2000
COUNCIL DISTRICT: 1
PROJECT TYPE: BO

THIS CONTRACT WILL BE SUBJECT TO THE FOLLOWING:

- PROJECT LABOR AGREEMENT
- PHASED-FUNDING.
- FEDERAL EQUAL OPPORTUNITY CONTRACTING REQUIREMENTS.
- PREVAILING WAGE RATES: STATE FEDERAL
- SKILLED AND TRAINED WORKFORCE.
- THIS IS A CASRF AND EPA FUNDED CONTRACT THROUGH THE STATE OF CALIFORNIA AND ENVIRONMENTAL PROTECTION AGENCY AND UNITED STATES ENVIRONMENTAL PROTECTION AGENCY UNDER THE FEDERAL WATER INFRASTRUCTURE FINANCE AND INNOVATION ACT (WIFIA), PROPOSITION 68, PROPOSITION 1 AND BUREAU OF RECLAMATION (BOR).

BID DUE DATE:

2:00 PM

JUNE 22, 2021

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

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

ENGINEER OF WORK

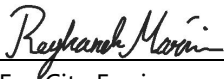
The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineers:

Mark Elliott
1) Registered Engineer

4/28/2021
Date



DIGITALLY SIGNED: 4/28/2021


2) For City Engineer

4/29/2021
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>

FEDERAL DOCUMENTS SUBMITTAL REQUIREMENTS

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
1.	Bid Bond (PDF via PlanetBids)	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 for Prime Contractors	At Time of Bid	ALL BIDDERS
5.	Debarment & Suspension Certification for Subcontractors, Suppliers & Mfgs	At Time of Bid	ALL BIDDERS
6.	Disclosure of Lobbying Activities	At Time of Bid	ALL BIDDERS
7.	Form 4500-3: DBE Subcontractor Performance Form	At Time of Bid	ALL BIDDERS
8.	Form 4500-4: DBE Subcontractor Utilization Form	At Time of Bid	ALL BIDDERS
9.	Commitment to Comply with Skilled and Trained Workforce Certification Form	At Time of Bid, See Notice Inviting Bids, Section 8	ALL BIDDERS
10.	Bid Bond (Original)	By 5PM, 3 Working Days After Bid Opening	ALL BIDDERS
11.	Federal Good Faith Documentation	By 5PM, 4 Working Days After Bid Opening	ALL BIDDERS

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
12.	Form AA61 – List of Work Made Available	By 5PM, 4 Working Days after Bid Opening With Good Faith Effort Documentation	ALL BIDDERS
13.	Form AA62 – Summary of Bids Received	By 5PM, 4 Working Days after Bid Opening With Good Faith Effort Documentation	ALL BIDDERS
14.	Form AA63 – Good Faith Effort List of Subcontractors Solicited	By 5PM, 4 Working Days after Bid Opening With Good Faith Effort Documentation	ALL BIDDERS
15.	Escrow Bid Document. See Attachment H	By 5PM, 4 Working Days after Bid Opening	ALL BIDDERS
16.	Phase Funding Schedule Agreement	Within 10 Working Days of receipt by the bidder of the Notice of Intent to Award	AWARDED BIDDER
17.	If the Contractor is a Joint Venture: <ul style="list-style-type: none"> • Joint Venture Agreement • Joint Venture License 	Within 10 Working Days of receipt By bidder of contract forms	AWARDED BIDDER
18.	OCIP Credit Worksheet. See Notice Inviting Bids, Section 16.	Within 10 Working Days of receipt by bidder of contract forms and Notice of Intent to Award	AWARDED BIDDER
19.	Payment & Performance Bond: Certificates of Insurance & Endorsements	Within 10 Working Days of receipt by bidder of contract forms and Notice of Intent to Award	AWARDED BIDDER
20.	Signed Contract Agreement Page	Within 10 Working Days of receipt by bidder of Contract Agreement	AWARDED BIDDER
21.	PLA Forms. See Attachment I	Within 10 Working Days of Notice of Intent to Award	AWARDED BIDDER

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
22.	OCIP Enrollment Forms. See Attachment E, Section 5-4.4, "Information to Be Provided by Successful Bidder After Contract Award".	Within 15 Working Days of Notice of Intent to Award	AWARDED BIDDER
23.	Skilled and Trained Workforce Certification Forms	Monthly. See Notice Inviting Bids, Section 8	AWARDED BIDDER
24.	Form UR-334: California State Revolving Funds (CASRF)	Annually. See Attachment D requirements.	AWARDED BIDDER
25.	Form 4500-2: DBE Subcontractor Participation Form	See Attachment D requirements.	AWARDED BIDDER

NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **North City Water Reclamation Plant Flow Equalization Basin**. 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 **\$10,590,000**.
4. **BID DUE DATE AND TIME ARE: JUNE 22, 2021 at 2:00 PM.**
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. **SPECIALTY LICENSE REQUIREMENTS:** All plumbing or pipefitting work that falls within the classification of a C-36 License shall be performed under a contract or subcontract with a contractor with a C-36 License. All electrical work that falls within the classification of a C-10 License shall be performed under a contract or subcontract with a contractor with a C-10 License.
7. **ESCROW BID DOCUMENT APPLY TO THIS CONTRACT:** Refer to Attachment H.
8. **SKILLED AND TRAINED WORKFORCE LABOR REQUIREMENTS:**
 - 8.1. The Contractor and its subcontractors at every tier shall use a skilled and trained workforce to perform all work on the project or contract that falls within an apprenticeable occupation in the building and construction trades, as set forth in California Public Contract Code section 2601, including the exceptions in sections 2601(d)(5) and 2601 (d)(6). Contractor shall provide to the City a report demonstrating compliance with this section on a monthly basis, to be included with monthly pay requests. The City may withhold progress payments or retention in accordance with California Public Contract Code section 2602(b) if the Contractor fails to provide the monthly report required by this section, provides a report that is incomplete, or provides a report that does not demonstrate compliance with this section. Payment may be withheld until the Contractor provides a plan to achieve substantial compliance with this section prior to completion of the contract that is acceptable to the City, with respect to the relevant apprenticeable occupation.

This section references provisions of the California Public Contract Code for convenience only. The City is not electing to incorporate other provisions of Chapter 2.9 of the California Public Contract Code not referenced herein, including but not limited to provisions for State enforcement. Instead, failure to comply with this section is considered a material breach of this contract which could affect the Contractor's ability to perform future work for the City pursuant to Chapter 2, Article 2, Division 8 of the San Diego Municipal Code regarding debarment.

8.2. Submittal Requirements

Contracts must submit proof of a Commitment to Comply with Skilled and Trained Workforce Requirements at bid due date. Contractor and its subcontractors at every tier will use a skilled and trained workforce to perform all work on the project or a contract that falls within an apprenticeship occupation in the building and construction trades in accordance with Chapter 2.9 (commencing with Section 2600) of Part 1 of Division 2 of the Public Contract Code. City will monitor Contractor's compliance with these requirements and Contractor, on behalf of itself and its subcontractors at every tier, shall provide on a monthly basis a Skilled and Trained Workforce Certification Form and Skilled and Trained Workforce Monthly Compliance Report demonstrating compliance. If the monthly Skilled and Trained Workforce Certification Form and Monthly Compliance Report are not provided within 30 days or if Contractor provides a report that is incomplete, City shall withhold further payments until a complete report is provided. If the Skilled and Trained Workforce Certification form does not establish compliance with Section 132354.7, City shall withhold further payments until Contractor provides a plan to achieve substantial compliance with the skilled and trained workforce requirements, with respect to the relevant apprenticeable occupation, prior to the completion of the project. Any withholding will be released for payment on the monthly estimate for partial payments next following the date that all the satisfactory compliance of the requirements for which the retention was made are submitted.

9. VETERANS OUTREACH:

Military veterans bring unique skills to City projects due to their mission-oriented training and experience, and dedication to the job. The City desires to facilitate the entry into the building and construction trades for veterans interested in careers in the industry. Within (30) days after notice that it is the apparent low bidder. Contractor shall contact "Helmets to Hardhats" or "UA Veterans in Piping" on behalf of itself and its subcontractors, for potential job referrals and employment of veterans on the project. Contractor may contact other veterans programs in its discretion, but if neither of the above referenced programs are contacted, the Contractor must receive prior written approval from the City that it is an equivalent veterans program. Contacting multiple veterans programs is highly encouraged, but not required. Within ninety (90) days after issuance of a Notice to Proceed for construction of the project. Contractor shall provide the City with a written report detailing the veterans programs contacted, opportunities offered by the Contractor and its subcontractors, applications received and for what construction trades, and how many veterans were hired through the programs. Hiring veterans to work on the project is not mandatory, but information received from the

Contractor may be used by the City in the future to develop a veteran’s outreach program for City contracting.

10. PROJECT LABOR AGREEMENT (PLA):

As a condition of final contract award, the Awarded Bidder must sign and execute a Letter of Assent to the Project Labor Agreement that the City has negotiated which is listed as “Attachment A” to the Project Labor Agreement. A copy of the Project Labor Agreement is attached as **Attachment I** to this Contract. See also Attachment E SSP Section 5-3.6, “Project Labor Agreement (PLA)”.

11. SUBCONTRACTING PARTICIPATION PERCENTAGES:

11.1. The City affirms that in any contract entered into pursuant to this advertisement, DBE firms will be afforded full opportunity to submit Bids in response to this invitation.

11.2. This Federally assisted project includes subcontracting participation percentages for DBE participation. DBE goal commitments and Good Faith Efforts (GFE) shall be made prior to bidding. DBE commitments and GFE made after the Bid opening will not be considered for the Award of Contract.

11.3. This project is subject to the federal equal opportunity regulations and the following requirements. The City reserves the right to audit the Contractor’s compliance with the federal requirements set forth below.

11.4. Following are federally subcontracting participation percentages for this contract. For the purpose of achieving the subcontractor participation percentage, Additive or Deductive, and Type II Allowance Bid Items will not be included in the calculation.

11.5. Environmental Protection Agency (EPA) - In accordance with EPA’s Program for Utilization of Small, Minority Disadvantaged and Women Business Enterprises in procurement under Federal assistance programs, the Contractor agrees to the applicable “fair share” objectives negotiated with EPA as follows:

California State Water Resources Control Board - Clean Water State Revolving Fund (CWSRF):

		MBE*	WBE*
1.	Construction	2%	1%
2.	Supplies	1%	1%
3.	Services	1%	1%
4.	Equipment (combined in above)	1%	1%

Note: MBEs and WBEs must be certified by EPA, SBA, DOT or by state, local, Tribal, or private entities whose certification criteria match EPAs in order to be counted toward MBE/WBE accomplishments. MBEs and WBEs are a part of the larger universe of DBEs.

11.6. If the Bidder fails any of the following conditions, the Bid **SHALL** be declared non-responsive:

1. Submission of GFE documentation, as specified in Attachment D.
 - a) Submit Good Faith Effort (GFE) documentation, saved in searchable Portable Document Format (PDF), demonstrating the Bidder made a good faith effort to **conduct** outreach to and include DBE Subcontractors as required in this solicitation by 5 PM **4 Working Days** after the Bid opening.

All submittals in searchable PDF shall be submitted electronically within the prescribed time identified in the contract documents via PlanetBids by invitation to the point of contact named in the bid provided by the Contract Specialist to all bidders.

- b) Due to circumstances related to Covid-19, until further notice, all submittals in searchable PDF shall be submitted electronically within the prescribed time identified in the contract documents via link provided by the Contract Specialist to all bidders.

2. Attending one of the Pre-Bid Meetings.

12. MANDATORY ONLINE PRE-BID MEETING VIA GOTOMEETING:

Bidders are required to attend a Pre-Bid Meeting. Two mandatory online pre-bid meetings will be held.

The First Meeting will be on: Thursday, May 20, 2021 at 11:00 AM at GoToMeeting.

Please join the pre-bid meeting from your computer, tablet or smartphone.

<https://global.gotomeeting.com/join/527357213>

You can also dial in using your phone.

United States: +1 (646) 749-3122

Access Code: 527-357-213

The Second meeting will be on: Wednesday, May 26, 2021 at 1:30 PM at GoToMeeting.

Please join the pre-bid meeting from your computer, tablet or smartphone.

<https://global.gotomeeting.com/join/806321693>

You can also dial in using your phone.

United States: +1 (646) 749-3122

Access Code: 806-321-693

New to GoToMeeting? Get the app now and be ready when your first meeting starts:

<https://global.gotomeeting.com/install/806321693>

Please Note: You will need to join the meeting with a computer, tablet or smartphone with the GoToMeetings App in place in order to sign in via the Chat feature as attendance at the meeting will be evidenced by the Chat sign-in. The Chat feature will also be used for attendees to ask any questions.

The purpose of the meetings is to discuss the scope of the project, submittal requirements, the pre-qualification process, the Project Labor Agreement requirements, OCIP requirements, and Equal Opportunity Contracting Program requirements and reporting procedures. **Failure to attend ONE of the Mandatory Pre-Bid Meeting may result in the Bid being deemed nonresponsive.**

Upon entering the meeting, all attendees must use the chat feature to sign in with the following:

Information: Name of firm, Attendee's name, Phone number, and Email address.

The GoToMeetings will open thirty minutes prior to the start times listed above to allow the attendees the opportunity to sign in by the deadline.

Bidders may not be admitted after the specified start time of the mandatory Pre-Bid Meeting.

13. **PRE-BID SITE VISIT:** Due to the current Covid-19 restrictions, the City of San Diego is unable to offer a formal site tour of the North City Water Reclamation Plant.

However, the City has prepared a site video to give potential bidders a better understanding of the current site conditions and highlight the key areas that will require work within the plant. Please use the following links below to access the site video, map and the corresponding narrative.

Site video:

<https://app.frame.io/reviews/0eb5bbbb-72de-4a45-a2e7-58845230e971/419abc2b-1412-409d-85d2-3b64469b9494>

Map and narrative: [Flow Eq. Tank Site Map and Video Narrative - Google Drive](#)

14. **AWARD PROCESS:**

14.1. 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.

14.2. 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.

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 by the City Attorney's Office.

- 14.4. The low Bid will be determined by the Base Bid alone.
- 14.5. Once the low bid has been determined, the City may, at its sole discretion, award the contract for the Base Bid alone.
15. **SUBMISSION OF QUESTIONS:**
- 15.1. The Director (or Designee) of the Engineering & Capital Projects 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:
- Juan E. Espindola at JEEspindola@sandiego.gov
- 15.2. Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 15.3. 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.
- 15.4. 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.
16. **PHASED FUNDING:** For Phased Funding Conditions, see Attachment B.
17. **OWNER CONTROLLED INSURANCE PROGRAM (OCIP):** The City has implemented an Owner Controlled Insurance Program (OCIP) for its Pure Water Projects. In this OCIP, the City furnishes Workers' Compensation, General, Excess, Pollution Liability and Builder's Risk insurance associated with construction of the Work, as detailed in Attachment E, Section 5 - LEGAL RELATIONS AND RESPONSIBILITIES. Bidders, as well as all of their subcontractors, with a subcontract amount of greater than one half of one percent of the Contractors bid amount shall complete OCIP credit worksheets. Bidders shall submit these OCIP credit worksheets, including OCIP credit worksheets obtained from all their subcontractors, within 10 Working Days of receipt by bidder of contract forms and Notice of Intent to Award. **Compliance with OCIP credit worksheet requirements shall be a condition for award.**

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 Engineering & Capital Projects Department 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/ecp/edocref/greenbook	2018	PWPI010119-02
City of San Diego Standard Drawings* https://www.sandiego.gov/ecp/edocref/standarddraw	2018	PWPI010119-03
Citywide Computer Aided Design and Drafting (CADD) Standards https://www.sandiego.gov/ecp/edocref/drawings	2018	PWPI010119-04
California Department of Transportation (CALTRANS) Standard Specifications https://dot.ca.gov/programs/design/ccs-standard-plans-and-standard-specifications	2018	PWPI030119-05
CALTRANS Standard Plans https://dot.ca.gov/programs/design/ccs-standard-plans-and-standard-specifications	2018	PWPI030119-06
California Manual on Uniform Traffic Control Devices Revision 5 (CA MUTCD 2014 Rev 5) http://www.dot.ca.gov/programs/safety-programs/camutcd/camutcd-rev5	2014	PWPI042220-09
<p>NOTE: *Available online under Engineering Documents and References at: https://www.sandiego.gov/ecp/edocref/</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,**

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 Engineering & Capital Projects Department, Contracts Division.
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. By 5PM, 3 working days after the bid opening date, all 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 by 5PM, 3 working days after the bid opening date shall cause the bid to be rejected and deemed **non-responsive**.

Due to circumstances related to Covid-19, until further notice, all original bid bond submittals must be received by 5 PM, 3 working days after bid opening.

Upon circumstances returning to normal business as usual, the original bid bond shall once again be due by 5 PM the day after bid opening.

Original Bid Bond shall be submitted to:
Engineering & Capital Projects Department, Contracts Division
525 B Street, Suite 750 (7th Floor)
San Diego, California, 92101
To the Attention of the Contract Specialist on the Front Page of this solicitation.

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 Site Video, 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 herein and in the Notice of Intent to 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:

Kiewit Infrastructure West Co., a corporation, as principal, and Travelers Casualty and Surety Company of America, 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 Eleven Million Eight Hundred Eighty Six Thousand Dollars and Zero Cents (\$11,886,000.00) for the faithful performance of the annexed contract, and in the sum of Eleven Million Eight Hundred Eighty Six Thousand Dollars and Zero Cents (\$11,886,000.00) for the benefit of laborers and materialmen designated below.

Conditions:

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

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

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

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

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

The Surety expressly agrees that the City of San Diego may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Principal.

The Surety shall not utilize the Principal in completing the improvements and work specified in the Agreement in the event the City terminates the Principal for default.

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

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By 

By 

Print Name: Claudia C. Abarca
Director
Purchasing & Contracting Department

Print Name: Bonny Hsu
Deputy City Attorney

Date: November 17, 2021

Date: 11/17/21

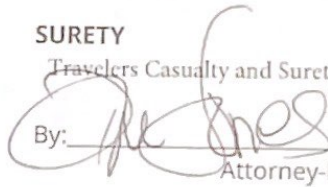
CONTRACTOR

Kiewit Infrastructure West Co.

SURETY

Travelers Casualty and Surety Company of America

By: 

By: 
Attorney-In-Fact

Print Name: Terrence L. Robinson
Senior Vice President

Print Name: Deanne Jones, Attorney-in-Fact

Date: November 2, 2021

Date: November 2, 2021

1550 Mike Fahey Street
Omaha, NE 68102

Local Address of Surety

(402) 271-2956

Local Phone Number of Surety

\$47,544

Premium

107473770

Bond Number



Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Philip G. Dehn, Tammy Pike, Paul A. Foss, Marie Huggins, Traci Sutton, and Deanne Jones of Omaha, Nebraska**, their true and lawful Attorney (s)-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in the, r business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this 21st day of April, 2021.



State of Connecticut

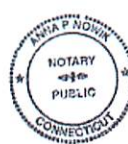
By: 
 Robert L. Raney, Senior Vice President

City of Hartford ss.

On this the 21st day of April, 2021, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the 30th day of June, 2026




 Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 2nd day of November, 2021.




 Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
 Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.

NOTARY ACKNOWLEDGMENT

STATE OF NEBRASKA
COUNTY OF DOUGLAS

I, Traci L. Sutton, a Notary Public in and for said County and State, do hereby certify that Deanne Jones, Attorney-in-Fact of Travelers Casualty and Surety Company of America, proved to me on the basis of satisfactory evidence to be the person who appeared before me, and acknowledged that she signed, sealed and delivered a said instrument, for and on behalf of Travelers Casualty and Surety Company of America for the uses and purposes therein set forth.

Given under my hand and notarial seal, the 2nd day of
November, 2021.



Traci L. Sutton, Notary Public



CALIFORNIA 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 Los Angeles }

On November 2, 2021 before me, Rozita Ah Kiong, Notary Public
Date Here Insert Name and Title of the Officer
personally appeared Terrence L. Robinson, Senior Vice President
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 Rozita Ah Kiong
Signature of Notary Public

Place Notary Seal and/or Stamp Above

OPTIONAL

Completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: Performance Bond, Labor and Material's Bond

Document Date: November 2, 2021 Number of Pages: 2

Signer(s) Other Than Named Above: No other signer(s)

Capacity(ies) Claimed by Signer(s)

Signer's Name: Terrence L. Robinson
 Corporate Officer – Title(s): Senior Vice President
 Partner – Limited General
 Individual Attorney in Fact
 Trustee Guardian of Conservator
 Other: _____
Signer is Representing: Kiewit Infrastructure West Co.

Signer's Name: _____
 Corporate Officer – Title(s): _____
 Partner – Limited General
 Individual Attorney in Fact
 Trustee Guardian of Conservator
 Other: _____
Signer is Representing: _____

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

1. **SCOPE OF WORK:** This project entails the construction of a new third Flow Equalization Basin at the North City Water Reclamation Plant.
 - A. The NCWRP is an active and operational water reclamation facility. It is required that the facility remain in operation at all times, except for City approved planned shutdown intervals during the cutover of new to existing systems.
 - i. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
 - ii. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
 - iii. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
 - iv. See the requirements under Section 01 31 13, Project Coordination.
 - B. The Project has specific milestones, constraints, testing periods, and completion requirements. In general, these include:
 - i. Milestone 1 – Completion and Early Acceptance for Beneficial Use of the Flow Equalization Basin.
 - ii. Milestone 2 - Substantial Completion – Occurs upon completing the prerequisites for substantial completion.
 - iii. Milestone 3 - Final Acceptance and Completion – After successful completion of substantial completion requirements, and all aspects of the Contract Closeout have been satisfactorily completed.
 1. Notice of Completion will follow the Final Acceptance and Completion.
 - C. The Scope of Work shall include the following and as shown on the drawings and in specifications:
 - a. Site Civil:
 - i. Storm drain piping.
 - ii. Bioinfiltration basin.
 - iii. Finish grading.
 - iv. Excavation.
 - b. Yard Piping:
 - i. Relocation of existing utilities or temporary relocation of existing utilities.
 - ii. Connection of yard piping between existing terminated lines and flow equalization basin.

- c. Electrical:
 - i. Relocation and/or protection of electrical duct banks, handholes, light poles.
 - ii. New handholes, duct banks and any associated electrical work with construction of the flow equalization basin.

D. Mechanical:

- i. All piping and valves associated with construction of the flow equalization basin.
- ii. Corrosion protection inside flow equalization basin

E. Instrumentation and Control:

- i. All instrumentation and control associated with the construction of the flow equalization basin.

F. Structural:

- i. Footings, foundations, walls, roofs, hatches for the flow equalization basin.
- ii. Equipment pads, pipe supports.

G. Architectural:

- i. Architectural finishes.
- ii. Any associated architectural components associated with the completion of the flow equalization basin.
- iii. Removal of existing translucent wall panels and replacement with new translucent wall panels.
- iv. Gate with bird screening.
- v. New stair, handrails and guard railing in existing stair tower.

H. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and the North City Water Reclamation Plant (NCWRP) Expansion and Influent Conveyance – Package 1 NCWRP Flow Equalization Plans numbered **40381-1001-D** through **40381-1121-D**, inclusive.

1.1.2. Package 1 Technicals Volume 1 – 3.

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

4949 Eastgate Mall, San Diego CA, 92121

ATTACHMENT B
PHASED FUNDING PROVISIONS

PHASED FUNDING PROVISIONS

1. PRE-AWARD

1.1. Within 10 Working Days of the Notice of Intent to Award, the Contractor must contact the Project Manager to discuss fund availability for each phase and shall also submit the following:

1.1.1. Construction Cost Loaded Schedule in accordance with 6-1, "CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK" and 7-3, "PAYMENT."

1.2. Contractor's failure to perform any of the following may result cancelling the award of the Contract:

1.2.1. Meeting with the City's Project Manager to discuss the Phased Funding Schedule.

1.2.2. Agreeing to a Phased Funding Schedule within **thirty** days of meeting with the City's Project Manager.

2. POST-AWARD

2.1. Do not start any construction activities for the next phase until the Notice to Proceed (NTP) has been issued by the City. The City will issue a separate NTP for each phase.

2.2. The City may issue the NTP for a subsequent phase before the completion of the preceding phase.

PHASED FUNDING SCHEDULE AGREEMENT

The particulars left blank below, such as the total number of phases and the amounts assigned to each phase, will be completed with funding specific information from the Pre-Award Schedule and Construction Cost Loaded Schedule submitted to and approved by the City.

BID NUMBER: K-21-1791-DBB-3-A

CONTRACT OR TASK TITLE: North City Water Reclamation Plant Flow Equalization Basin

CONTRACTOR: Kiewit Infrastructure West Co.

Funding Phase	Phase Description	Phase Start	Phase Finish	Not-to-Exceed Amount
1 (B-21059)	Submittals, Fabrication, Mobilization, Site Grading, Shoring, UG Piping and Electrical, Tank Construction, Bridge Construction	NTP	8/31/2022	\$7,001,882
2 (B-21059)	Tank Construction, AG Piping and Electrical, Testing/Commissioning, Demobilization	9/1/2022	Final Acceptance and Project Completion	\$4,884,118
Contract Total				\$11,886,000

CITY OF SAN DIEGO

PRINT NAME: Michael Marks
Construction Senior Engineer

Signature: 

Date: 9/28/21

PRINT NAME: Reyhaneh Martin
Design Senior Engineer


Signature: Reyhaneh Martin

Date: 9/28/2021

CONTRACTOR

PRINT NAME: Chris Lanferman

Title: PROJECT MANAGER

Signature: 

Date: 9-28-2021

ATTACHMENT C

RESERVED

ATTACHMENT D
FUNDING AGENCY PROVISIONS

CALIFORNIA STATE REVOLVING FUND (CASRF), STATE OF CALIFORNIA PROPOSITION 1 AND PROPOSITION 68, METROPOLITAN WATER DISTRICT 2014 LOCAL RESOURCES PROGRAM, AND ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIREMENTS:

CLEAN WATER STATE REVOLVING FUND (CWSRF)

DRINKING WATER STATE REVOLVING FUND (DWSRF)

WATER INFRASTRUCTURE FINANCE AND INNOVATION ACT (WIFIA)

FUNDING AGENCY PROVISIONS

IN THE EVENT THAT THESE REQUIREMENTS CONFLICT WITH THE CITY'S GENERAL EOC REQUIREMENTS, THE FUNDING AGENCY'S REQUIREMENTS WILL CONTROL.

1. **WATER INFRASTRUCTURE FINANCE AND INNOVATION ACT (WIFIA) PROGRAM, 2014 LOCAL RESOURCES PROGRAM, CALIFORNIA STATE REVOLVING FUND (CASRF), STATE OF CALIFORNIA PROPOSITION 1 AND PROPOSITION 68 REQUIREMENTS.**

The City anticipates receiving financial assistance from the Federal Government, the Metropolitan Water District of Southern California, and the State of California for this project. The following requirements are conditions of the receipt of financial assistance from the United States Environmental Protection Agency under the Federal **Water Infrastructure Finance and Innovation Act (WIFIA)**, the **Metropolitan Water District** under the **2014 Local Resources Program**, the State Water Resources Control Board under the **California Water State Revolving Fund (CASRF)** and **Proposition 68** Grant Programs, and the California Department of Water Resources under the Proposition 1 Grant Program. The firm contracting with the City (Contractor) shall comply with all of the following requirements. If there are other provisions in the Contract Documents that address the same subjects as this exhibit, Contractor shall comply with both provisions, with the more stringent requirements controlling. If there is a direct conflict between the Agreement and this exhibit, the requirements of this Exhibit shall control in order to preserve the City's eligibility to receive financial assistance.

1.1. **RECORDS.** Contractor shall maintain separate books, records and other material relative to the Project. Contractor shall also retain such books, records, and other material for itself and for each subcontractor who performed or performs work on this project for a minimum of thirty-six (36) years after Project Completion. Contractor shall require that such books, records, and other material are subject at all reasonable times (at a minimum during normal business hours) to inspection, copying, and audit by the State Water Board, the California State Auditor, the Bureau of State Audits, the United States Environmental Protection Agency (USEPA), the Office of Inspector General, the Internal Revenue Service, the Governor, or any authorized representatives of the aforementioned. Contractor shall allow and shall require its subcontractors to allow interviews during normal business hours of any employees who might reasonably have information related to such records. Contractor agrees to include a similar duty regarding audit, interviews, and records retention in any subcontract related to the performance of this Agreement. The provisions of this section shall survive the termination or expiration of this Agreement. (CWSRF Agmt. § 2.17(b); DWSRF Agmt. Ex. C § C.3.2(d)).

1.2. **BONDS.** For construction contracts of \$250,000 or more, Contractor shall not begin construction until after it has provided the City with performance and payment bonds each for 100% of the contract value. (CWSRF Agmt. § 4.3; DWSRF Agmt. Ex. C § C.3.6).

1.3. COMPLIANCE WITH LAWS AND REGULATIONS. Contractor shall, at all times, comply with and require its subcontractors to comply with all applicable federal and state laws, rules, guidelines, regulations, and requirements. Without limitation of the foregoing, to the extent applicable, Contractor shall:

- a) Comply with and require its subcontractors on the Project to comply with federal DBE requirements.
- b) Comply with and require its subcontractors to comply with the list of federal laws in this **Attachment D**. (CWSRF Agmt. § 4.5; DWSRF Agmt. Ex. C § C.3.8).

1.4. INDEMNIFICATION.

- a) Contractor shall defend, indemnify and hold harmless the State Water Quality Control Board, the State of California, the California Infrastructure and Economic Development Bank (Bank), and any trustee, and their officers, employees, and agents for the Bonds issued by the Bank, if any, to the same extent Contractor is obligated to defend, indemnify, and hold harmless the City under the Agreement. Contractor shall require its subcontractors to similarly defend, indemnify, and hold harmless the State Water Quality Control Board, the Bank, and any trustee, and their officers, employees, and agents for the Bonds issued by the Bank, if any, to the same extent its subcontractors are obligated to defend, indemnify, and hold harmless the Contractor. CWSRF Agmt. § 4.11; DWSRF Agmt. Ex. C § C.3.17).
- b) Except for the sole negligence or willful misconduct of the Metropolitan Water District of Southern California (Metropolitan), Contractor agrees at its sole cost and expense to protect, indemnify, defend, and hold harmless Metropolitan and its Board of Directors, officers, representatives, agents and employees from and against any and all claims and liability of any kind (including, but not limited to, any claims or liability for injury or death to any person, damage to property, natural resources or the environment, or water quality problems) that arise out of or relate to San Diego's approval, construction, operation, repair or ownership of the Project. Such indemnity shall include all damages and losses related to any claim made, whether or not a court action is filed, and shall include attorney fees, administrative and overhead costs, engineering and consulting fees and all other costs related to or arising out of such claim of liability, but shall exclude damages and losses that arise from the sole negligence or willful misconduct of Metropolitan. (LRP Agmt. § 8.2).

1.5. NON-DISCRIMINATION REQUIREMENTS.

- a) During the performance of this Agreement, Contractor and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religion, religious creed, national origin, sexual orientation, mental or physical disability (including HIV and AIDS), mental disability, medical condition, age, marital status, denial of family and medical care leave, or genetic information, gender, gender identity, gender expression, or military and veteran status.

- b) Contractor and its subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment.
 - c) Contractor and its subcontractors shall comply with the provisions of the Fair Employment and Housing Act and the applicable regulations promulgated thereunder. (Gov. Code, §12990, subds. (a)-(f) et seq.; Cal. Code Regs., tit. 2, § 7285 et seq.) Such regulations are incorporated into this Agreement by reference and made a part hereof as if set forth in full.
 - d) Contractor and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement. (CWSRF Agmt. § 4.15(e)-(h); DWSRF Agmt. Ex. C § C.3.21(e)-(h)).
- 1.6. INSURANCE.** For any policy of general liability insurance concerning the construction of the Project, Contractor will cause, and will require its subcontractors to cause, a certificate of insurance to be issued showing the State Water Quality Control Board, its officers, agents, employees, and servants as additional insured. (CWSRF Agmt. § 4.17; DWSRF Agmt. Ex. C § C.3.25).
- 1.7. EXCLUDED PARTIES.** Contractor shall not contract with any party who is debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which this funding is authorized. For any work related to this Agreement, Contractor shall not contract with any individual or organization on the State Water Board's List of Disqualified Businesses and Persons that is identified as debarred or suspended or otherwise excluded from or ineligible for participation in any work overseen, directed, funded, or administered by the State Water Board program for which funding under this Agreement is authorized. The State Water Board's List of Disqualified Businesses and Persons is located at:
http://www.waterboards.ca.gov/water_issues/programs/enforcement/fwa/dbp.shtm
(CWSRF Agmt. § 4.18; DWSRF Agmt. Ex. C § C.3.26).
- 1.8. PREVAILING WAGES.** Contractor shall comply with all California State and Federal prevailing wage laws. Contractor shall include in its subcontracts the full the language provided in this **Attachment D** regarding federal prevailing wages. (CWSRF Agmt. § 4.19; DWSRF Agmt. Ex. C § C.3.28).
- 1.9. SIGNAGE.** Upon the direction of the City, Contractor shall place a sign at least four feet tall by eight feet wide made of ¾ inch thick exterior grade plywood or other approved material in a prominent location on the Project site and shall maintain the sign in good condition for the duration of the construction period. The sign must include the following disclosure statement and color logos (available from the State Water Resources Control Board and Department of Water Resources):



"Funding for this \$[insert value] million [insert name] project has been provided in full or in part by California State Revolving Funds and Prop 68 Funds through agreements with the State Water Resources Control Board. California's State Revolving Funds are capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds."

The Project sign may include another agency's required promotional information so long as the above logos and disclosure statement are equally prominent on the sign. The sign shall be prepared in a professional manner. (CWSRF Agmt. Ex. A § 9; DWSRF Agmt. Ex. A § A.2.3).

Project funded through Prop 1 funds will include following language (available from the California Department of Water Resources):

"Funding for this \$[insert value] million [insert name] project has been provided in full or in part by California State Revolving Funds and Prop 1 Funds through agreements with the State Water Resources Control Board and California Department of Water Sources. California's State Revolving Funds are capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds."

See **Attachment E – Supplementary Special Provisions, Section 3-11.2, "Project Identification Sign"** for more information.

1.10. DISCLAIMER. Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board. California's State Revolving Funds are capitalized through a variety of funding sources, including grants from the United States Environmental Protection Agency and state bond proceeds. The contents of this document do not necessarily reflect the views and policies of the foregoing, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. (DWSRF Agmt. Ex. A § A.2.1).

1.11. FEDERAL AWARD CONDITIONS. Contractor shall comply with the following federal conditions:

1. **American Iron and Steel.** Unless the City has obtained a waiver from USEPA on file with the State Water Board or unless this Project is not a project for the construction, alteration, maintenance or repair of a public water system or treatment work, Contractor shall not purchase "iron and steel products" produced outside of the United States on this Project. Unless the City has obtained a waiver from USEPA on file with the State Water Board or unless this Project is not a project for the construction, alteration, maintenance or repair of a public water system or treatment work, Contractor shall ensure that all "iron and steel products" used in the Project were or will be produced in the

United States. For purposes of this section, the term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials. "Steel" means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. CWSRF Agmt. Ex. E § A(1); DWSRF Agmt. Ex. C § C.4.3.i; WIFIA Agmt. §§ 12(j), 14(l))

2. **Wage Rate Requirements (Davis-Bacon).** Contractor shall include in its subcontracts the full the language provided in **Attachment D**, Section 10, regarding federal prevailing wages. CWSRF Agmt. Ex. E § A(2); DWSRF Agmt. Ex. C § C.4.3.ii; WIFIA Agmt. §§ 12(j), 14(l)).
3. **Reserved.**
4. **Copyright and Patent.** USEPA and the State Water Board have the right to reproduce, publish, use and authorize others to reproduce, publish and use copyrighted works or other data developed pursuant to this Agreement. Where an invention is made with Project Funds, USEPA and the State Water Board retain the right to a worldwide, nonexclusive, nontransferable, irrevocable, paid-up license to practice the invention owned by Contractor. Contractor must utilize the Interagency Edison extramural invention reporting system at <http://iEdison.gov> and shall notify the State Water Board when an invention report, patent report, or utilization report is filed. (CWSRF Agmt. Ex. E § A(5)(e); DWSRF Agmt. Ex. C § C.4.3.i)
5. **Credit.** Contractor agrees that any reports, documents, publications or other materials developed for public distribution supported by this Agreement shall contain the following statement (CWSRF Agmt. Ex. E § A(5)(f)):

"This project has been funded wholly or in part by the United States Environmental Protection Agency and the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the State Water Resources Control Board, nor does the EPA or the Board endorse trade names or recommend the use of commercial products mentioned in this document."
6. **Trafficking in Persons.** Contractor, its employees, its subcontractors and their employees may not engage in severe forms of trafficking in persons during the term of this Agreement, procure a commercial sex act during the term of this Agreement, or use forced labor in the performance of this Agreement. Contractor must include this provision in its subcontracts under this Agreement. Contractor must inform the City immediately of any information regarding a violation of the foregoing. Contractor understands that failure to comply with this provision may subject the State Water Board to loss of federal funds, and the loss of funding for this Project. (CWSRF Agmt. Ex. E § A(5)(h); DWSRF Agmt. Ex. C § C.4.3.xiii).

1.12. **CIVIL RIGHTS OBLIGATIONS.** Contractor shall comply with the following federal non-discrimination requirements CWSRF Agmt. Ex. E § B; DWSRF Agmt. Ex. C § C.4.3.xv; WIFIA Agmt. Ex. E):

- a) Title VI of the Civil Rights Act of 1964, which prohibits discrimination based on race, color, and national origin, including limited English proficiency (LEP).
- b) Section 504 of the Rehabilitation Act, 29 USC 794, supplemented by EO 11914, 41 FR 17871, April 29, 1976 and 11250, 30 FR 13003, October 13, 1965, which prohibits discrimination against persons with disabilities.
- c) The Age Discrimination Act, 42 USC 6101 et seq, which prohibits age discrimination.
- d) Section 13 of the Federal Water Pollution Control Act Amendments of 1972, which prohibits discrimination on the basis of sex.
- e) 40 CFR Part 7, as it relates to the foregoing.
- f) Executive Order No. 11246. Contractor shall include in its subcontracts related to the Project the following provisions (41 CFR § 60-1.4(b)):

"During the performance of this contract, the contractor agrees as follows:

"(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the City setting forth the provisions of this nondiscrimination clause.

"(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

"(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an

employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

"(4) The contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the City advising the labor union or workers' representatives of the contractor's commitments under section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

"(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

"(6) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

"(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

"(8) The contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such, the contractor may request the United States to enter into such litigation to protect the interests of the United States."

- g) **Disadvantaged Business Enterprises (40 CFR Part 33).** Contractor agrees to comply with the requirements of USEPA's Program for Utilization of Small, Minority and Women's Business Enterprises. The DBE rule can be accessed at www.epa.gov/osbp. Contractor shall comply with 40 CFR Section 33.301, and retain all records documenting compliance with the six good faith efforts. The Contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the Contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies. (CWSRF Agmt. Ex. E § D(2); DWSRF Agmt. Ex. A § A.2.2.5; WIFIA Agmt. Ex. E, 40 CFR 33.302(i))

- 1.13. **PROCUREMENT PROHIBITIONS UNDER SECTION 306 OF THE CLEAN AIR ACT AND SECTION 508 OF THE CLEAN WATER ACT, INCLUDING EXECUTIVE ORDER 11738, ADMINISTRATION OF THE CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT WITH RESPECT TO FEDERAL CONTRACTS, GRANTS, OR LOANS; 42 USC § 7606; 33 USC § 1368.** Except where the purpose of this Agreement is to remedy the cause of the violation, Contractor may not procure goods, services, or materials from suppliers excluded under the federal System for Award Management: <http://www.sam.gov/>.
- 1.14. **Debarment and Suspension Executive Order 12549 (1986).** Contractor certifies that it will not knowingly enter into a contract with anyone who is ineligible under the 2 CFR part 180 and part 1532 to participate in the Project. Suspension and debarment information can be accessed at <http://www.sam.gov>. Contractor represents and warrants that it has or will include a term or conditions requiring compliance with this provision in all of its subcontracts under this Agreement. (WIFIA Agmt. Ex. E, Debarment and Suspension, Executive Order 12549.
- 1.15. **SECURE CONNECTION.** Contractor agrees that if its network or information system is connected to USEPA networks to transfer data using systems other than the Environmental Information Exchange Network or USEPA's Central Data Exchange, it will ensure that any connections are secure. (CWSRF Agmt. Ex. E § D(5); DWSRF Agmt. Ex. C § C.4.3.xxii).
- 1.16. **GEOSPATIAL DATA STANDARDS.** All geospatial data created pursuant to this Agreement that is submitted to the State Water Board for use by USEPA or that is submitted directly to USEPA must be consistent with Federal Geographic Data Committee endorsed standards. Information on these standards may be found at www.fgdc.gov. (CWSRF Agmt. Ex. E § E; DWSRF Agmt. Ex. C § C.4.3.xxiii)

1.17. FEDERAL LOBBYING RESTRICTIONS. Recipients of federal financial assistance may not pay any person for influencing or attempting to influence any officer or employee of a federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress with respect to the award, continuation, renewal, amendment, or modification of a federal grant, loan, or contract. These requirements are implemented for USEPA in 40 CFR Part 34, which also describes types of activities, such as legislative liaison activities and professional and technical services, which are not subject to this prohibition. Upon award of this contract, Contractor shall complete and submit to the City the certification and disclosure forms in Appendix A and Appendix B to 40 CFR Part 34. Contractor shall also require all subcontractors and suppliers of any tier awarded a subcontract over \$100,000 to similarly complete and submit the certification and disclosure forms pursuant to the process set forth in 40 CFR 34.110. (WIFIA Agmt. Ex. E, Section 319 of Pub. L. 101-121).

1.18. CHILD SUPPORT COMPLIANCE ACT. Contractor shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Family Code § 5200 et seq. In addition, the Contractor shall fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

2. NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246) located at 41 CFR § 60-4.2.

2.1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2.2. The goal and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, as follows:

	<u>Goal</u>
1. Minority Participation:	16.9%
2. Female Participation:	6.9%

2.3. These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs Work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the Work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both federally involved and non-federally involved Work.

2.4. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals.

- 2.5. The hours of minority and female employment and training shall be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.
- 2.6. The Contractor shall provide written notification to the Director the Office of Federal Contract Compliance Programs within 10 Working Days of award of any Subcontract in excess of \$10,000 at any tier for Work under the Contract resulting from this solicitation. The notification shall list the name, address and telephone number of the Subcontractor; employer identification number of the Subcontractor; estimated dollar amount of the Subcontract; estimated starting and completion dates of the Subcontract; and the geographical area in which the subcontract is to be performed. The "covered area" is the City of San Diego.

3. EQUAL OPPORTUNITY CLAUSES:

- 3.1. The following equal opportunity clauses are incorporated by reference herein:
 1. The equal opportunity clause located 41 CFR 60.1.4(a), which specifies the obligations imposed under Executive Order 11246.
 2. The equal opportunity clause located at 41 CFR 60-741.5, which contains the obligations imposed by Section 503 of the Rehabilitation Act of 1973.
 3. The "Equal Opportunity Clause" (Resolution No. 765092) filed on December 4, 1978, in the Office of the City Clerk, San Diego, California and incorporated in the "Standard Federal Employment Opportunity Construction Contract Specifications (Executive Order 11246 - Document No. 769023, filed September 11, 1984, in the Office of the City Clerk, San Diego, California) is applicable to all non-exempt City construction contracts and subcontracts of \$2,000 or more.
 4. Age Discrimination Act of 1975, Pub. L. 94-135.
 5. Title VI of the Civil Rights Act of 1964, Pub. L. 88-352.
 6. Section 13 of the Federal Water Pollution Control Acts Amendments of 1972, Pub. L. 92-5200 (the Clean Water Act).
 7. Section 504 of the Rehabilitation Act of 1973, Pub. L. 93-112 (Executive Orders 11914 and 11250).
 8. Women's Minority Business Enterprises, Executive Orders 11625, 12138 and 12432.
 9. Section 129 of the Small Business Administration Reauthorization and Amendment Act of 1988, Pub. L. 100-590.

4. STANDARD FEDERAL EQUAL EMPLOYMENT SPECIFICATIONS:

4.1. The Contractor is required to comply with the 15 “Standard Federal Equal Employment Specifications” in section 4.2 below and also located in 41 CFR 60-4.3 for federal and federally assisted construction contracts in excess of \$10,000.

4.2. Standard Federal Equal Employment Specifications.

1. As used in these specifications:

- a) Covered area” means the geographical area described in the solicitation from which this contract resulted;
- b) “Director” means **Director, Office of Federal Contract Compliance Programs, United States Department of Labor**, or any person to whom the Director delegates authority;
- c) “Employer identification number” means the Federal Social Security number used on the Employer’s Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- d) Minority” includes:
 - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor

or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in item 7, paragraphs "a" through "p", of this section below. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project.

The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities

- b) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
- c) Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
- d) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- e) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or

other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

- h) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
- k) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.
- l) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- n) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

- o) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- 8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (item 7, paragraphs "a" through "p", of this section). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under item 7, paragraphs "a" through "p", of this section that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
- 9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.
- 11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- 12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance

Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in item 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
 14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
 15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- 4.3. Segregated Facilities (41 CFR 60-1.8).** The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; Provided, That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

5. VIOLATION OR BREACH OF REQUIREMENTS:

- 5.1. If at any time during the course of the Contract there is a violation of the Affirmative Action or Equal Employment Opportunity requirements by the Contractor, or the Subcontractors, the City will notify the Contractor of the breach. The City may withhold any further progress payments to the Contractor until the City is satisfied that the Contractor and Subcontractors are in full compliance with these requirements.

6. MONTHLY EMPLOYMENT UTILIZATION REPORTS:

- 6.1. Refer to GENERAL EQUAL OPPORTUNITY CONTRACTING PROGRAM REQUIREMENTS, CONSTRUCTION CONTRACTOR REQUIREMENTS in The WHITEBOOK and the following:
1. Federal and Non-Federal Work in San Diego County. Submit an updated list only if work is complete or new contracts have been awarded during the span of this project.

7. RECORDS OF PAYMENTS TO DBEs:

- 7.1. The Contractor shall maintain records and documents of payments to DBEs for 5 years following the NOC. These records shall be made available for inspection upon request by any authorized representative of the City, funding agency, or both. The reporting requirement shall be extended to any certified DBE Subcontractor.

8. FEDERAL WAGE REQUIREMENTS FOR FEDERALLY FUNDED PROJECTS:

- 8.1. The successful Bidder's work shall be required to comply with Executive Order 11246, entitled "Equal Employment Opportunity," as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR chapter 60).
- 8.2. This Executive Order pertains to Equal Employment Opportunity regulations and contains significant changes to the regulations including new goals and timetables for women in construction and revised goals and time-tables for minorities in construction.
- 8.3. Minimum wage rates for this project have been predetermined by the Secretary of Labor and are set forth in the Decision of the Secretary and bound into the specifications book. Should there be any difference between the state or federal wage rates, including health and welfare funds for any given craft, mechanic, or similar classifications needed to execute the Work, it shall be mandatory upon the Contractor or subcontractor to pay the higher of the two rates.
- 8.4. The minimum wage rate to be paid by the Contractor and the Subcontractors shall be in accordance with the Federal Labor Standards Provisions (see below) and Federal Wage Rates (see Wage Rates below) and General Prevailing Wage Determination made by the State of California, Director of Industrial Relations pursuant to California Labor Code Part 7, Chapter 1, Article 2, Sections 1770, 1773 and 1773.1, whichever is higher.

- 8.5. A Contractor having 50 or more employees and its Subcontractors having 50 or more employees and who may be awarded a contract of \$50,000 or more will be required to maintain an affirmative action program, the standards for which are contained in the specifications.
- 8.6. To be eligible for award, each Bidder shall comply with the affirmative action requirements which are contained in the specifications
- 8.7. Women will be afforded equal opportunity in all areas of employment. However, the employment of women shall not diminish the standards of requirements for the employment of minorities.
9. **PREVAILING WAGE RATES:** Pursuant to San Diego Municipal Code section 22.3019, construction, alteration, demolition, repair and maintenance work performed under this Contract is subject to State prevailing wage laws. For construction work performed under this Contract cumulatively exceeding \$25,000 and for alteration, demolition, repair and maintenance work performed under this Contract cumulatively exceeding \$15,000, the Contractor and its subcontractors shall comply with State prevailing wage laws including, but not limited to, the requirements listed below.
- 9.1. **Compliance with Prevailing Wage Requirements.** Pursuant to sections 1720 through 1861 of the California Labor Code, the Contractor and its subcontractors shall ensure that all workers who perform work under this Contract are paid not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations (DIR). This includes work performed during the design and preconstruction phases of construction including, but not limited to, inspection and land surveying work.
- 9.1.1. Copies of such prevailing rate of per diem wages are on file at the City and are available for inspection to any interested party on request. Copies of the prevailing rate of per diem wages also may be found at <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>. Contractor and its subcontractors shall post a copy of the prevailing rate of per diem wages determination at each job site and shall make them available to any interested party upon request.
- 9.1.2. The wage rates determined by the DIR refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, then the published rate of wage shall be in effect for the life of this Contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the DIR, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this Contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this Contract, each successive predetermined wage rate shall apply to this Contract on the date following the expiration date

of the previous wage rate. If the last of such predetermined wage rates expires during the life of this Contract, such wage rate shall apply to the balance of the Contract.

- 9.2. **Penalties for Violations.** Contractor and its subcontractors shall comply with California Labor Code section 1775 in the event a worker is paid less than the prevailing wage rate for the work or craft in which the worker is employed. This shall be in addition to any other applicable penalties allowed under Labor Code sections 1720 – 1861.
- 9.3. **Payroll Records.** Contractor and its subcontractors shall comply with California Labor Code section 1776, which generally requires keeping accurate payroll records, verifying and certifying payroll records, and making them available for inspection. Contractor shall require its subcontractors to also comply with section 1776. Contractor and its subcontractors shall submit weekly certified payroll records online via the City's web-based Labor Compliance Program. Contractor is responsible for ensuring its subcontractors submit certified payroll records to the City.
 - 9.3.1. Contractor 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.
- 9.4. **Apprentices.** Contractor and its subcontractors shall comply with California Labor Code sections 1777.5, 1777.6 and 1777.7 concerning the employment and wages of apprentices. Contractor is held responsible for the compliance of their subcontractors with sections 1777.5, 1777.6 and 1777.7.
- 9.5. **Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on 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.
- 9.6. **Required Provisions for Subcontracts.** Contractor shall include at a minimum a copy of the following provisions in any contract they enter into with a subcontractor: California Labor Code sections 1771, 1771.1, 1775, 1776, 1777.5, 1810, 1813, 1815, 1860 and 1861.
- 9.7. **Labor Code Section 1861 Certification.** Contractor in accordance with California Labor Code section 3700 is required to secure the payment of compensation of its employees and by signing this Contract, Contractor certifies that "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract."

- 9.8. Labor Compliance Program.** The City has its own Labor Compliance Program authorized in August 2011 by the DIR. The City will withhold contract payments when payroll records are delinquent or deemed inadequate by the City or other governmental entity, or it has been established after an investigation by the City or other governmental entity that underpayment(s) have occurred. For questions or assistance, please contact the City of San Diego's Prevailing Wage Unit at 858-627-3200.
- 9.9. 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.
- 9.9.1.** A Contractor's inadvertent error in listing a subcontractor who is not registered pursuant to Labor Code section 1725.5 in response to a solicitation shall not be grounds for filing a bid protest or grounds for considering the bid non-responsive provided that any of the following apply: (1) the subcontractor is registered prior to bid opening; (2) within twenty-four hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5; or (3) the subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
- 9.9.2.** 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.
- 9.10. 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.
- 9.11. List of all Subcontractors.** The City may ask Contractor for the most current list of subcontractors (regardless of tier), along with their DIR registration numbers, utilized on this Agreement at any time during performance of this contract, and Contractor shall provide the list within ten (10) working days of the City's request. Additionally, Contractor shall provide the City with a complete list of all subcontractors utilized on this contract (regardless of tier), within ten working days of the completion of the

contract, along with their DIR registration numbers. The City shall withhold final payment to Contractor until at least 30 days after this information is provided to the City.

- 9.12. 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:

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

9.12.2. 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).

9.12.3. 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 9.11 above. (Labor code section 1773.3).

10. DAVIS-BACON WAGE RATES AND PROVISIONS:

10.1 WAGE RATES: This contract shall be subject to the following Davis-Bacon Wage Decisions:

General Decision Number: CA20210001 04/23/2021

Superseded General Decision Number: CA20200001

State: California

Construction Types: Building, Heavy (Heavy and Dredging), Highway and Residential

County: San Diego County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS; RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	01/08/2021
2	03/05/2021
3	03/19/2021
4	04/09/2021
5	04/23/2021

ASBE0005-002 07/06/2020

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 45.39	23.74
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 28.92	18.73

ASBE0005-004 07/01/2019

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)....	\$ 20.63	12.17

BOIL0092-003 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 46.03	38.81

BRCA0004-008 11/01/2019

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 39.60	18.05

BRCA0018-004 06/01/2019

	Rates	Fringes
MARBLE FINISHER.....	\$ 33.43	14.11
TILE FINISHER.....	\$ 28.23	12.65
TILE LAYER.....	\$ 40.07	18.36

BRCA0018-010 09/01/2020

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 33.66	14.20
TERRAZZO WORKER/SETTER.....	\$ 41.60	14.73

CARP0409-002 07/01/2016

	Rates	Fringes
Diver		
(1) Wet.....	\$ 712.48	17.03
(2) Standby.....	\$ 356.24	17.03
(3) Tender.....	\$ 348.24	17.03
(4) Assistant Tender.....	\$ 324.24	17.03

Amounts in "'Rates' column are per day

CARP0409-008 08/01/2010

	Rates	Fringes
Modular Furniture Installer.....	\$ 17.00	7.41

CARP0547-001 07/01/2018

	Rates	Fringes
CARPENTER		
(1) Bridge.....	\$ 42.34	19.17
(2) Commercial Building....	\$ 37.11	19.17
(3) Heavy & Highway.....	\$ 42.21	19.17
(4) Residential Carpenter..	\$ 29.69	19.17
(5) Residential Insulation Installer.....	\$ 18.00	8.16
MILLWRIGHT.....	\$ 42.71	19.17
PILEDRIVERMAN.....	\$ 42.34	19.17

CARP0547-002 07/01/2017

	Rates	Fringes
Drywall		
(1) Work on wood framed construction of single family residences, apartments or condominiums under four stories		
Drywall Installer/Lather...\$	22.95	18.85
Drywall Stocker/Scrapper...\$	12.50	12.27
(2) All other work		
Drywall Installer/Lather...\$	32.00	17.63
Drywall Stocker/Scrapper...\$	12.50	12.27

ELEC0569-001 06/01/2020

	Rates	Fringes
Electricians (Tunnel Work)		
Cable Splicer.....	\$ 51.38	3%+14.88
Electrician.....	\$ 50.63	3%+14.88

	Rates	Fringes
Electricians: (All Other Work, Including 4 Stories Residential)		
Cable Splicer.....	\$ 45.75	3%+14.88
Electrician.....	\$ 45.00	3%+14.88

ELEC0569-004 06/01/2020		

	Rates	Fringes
ELECTRICIAN (Sound & Communications Sound Technician).....	\$ 33.95	13.55
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.		

ELEC0569-005 06/01/2020		

	Rates	Fringes
Sound & Communications		
Sound Technician.....	\$ 33.95	13.55
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.		

SOUND TECHNICIAN: Terminating, operating and performing final check-out

ELEC0569-006 02/22/2021

Work on street lighting; traffic signals; and underground systems and/or established easements outside of buildings

	Rates	Fringes
Traffic signal, street light and underground work		
Utility Technician #1.....	\$ 35.17	9.01
Utility Technician #2.....	\$ 28.60	8.80

STREET LIGHT & TRAFFIC SIGNAL WORK:

UTILITY TECHNICIAN #1: Installation of street lights and traffic signals, including electrical circuitry, programmable controller, pedestal-mounted electrical meter enclosures and laying of pre-assembled cable in ducts. The layout of electrical systems and communication installation including proper position of trench depths, and radius at duct banks, location for manholes, street lights and traffic signals.

UTILITY TECHNICIAN #2: Distribution of material at jobsite, installation of underground ducts for electrical, telephone, cable TV land communication systems. The setting, leveling, grounding and racking of precast manholes, handholes and transformer pads.

ELEC0569-008 08/31/2020

	Rates	Fringes
ELECTRICIAN (Residential, 1-3 Stories).....	\$ 35.74	7.68

ELEC1245-001 06/01/2020

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 59.14	20.78
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	\$ 47.24	19.59
(3) Groundman.....	\$ 36.12	19.19
(4) Powderman.....	\$ 51.87	18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day,
 Independence Day, Labor Day, Veterans Day, Thanksgiving Day
 and day after Thanksgiving, Christmas Day

 ELEV0018-001 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 59.32	35.825+a+b

FOOTNOTE:

- a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
- b. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

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	Rates	Fringes
OPERATOR: Power Equipment (All Other Work)		
GROUP 1.....	\$ 48.25	27.20
GROUP 2.....	\$ 49.03	27.20
GROUP 3.....	\$ 49.32	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 48.96	25.25
GROUP 6.....	\$ 51.03	27.20
GROUP 8.....	\$ 51.14	27.20
GROUP 9.....	\$ 49.29	25.25
GROUP 10.....	\$ 51.26	27.20
GROUP 11.....	\$ 49.41	25.25
GROUP 12.....	\$ 51.43	27.20
GROUP 13.....	\$ 51.53	27.20
GROUP 14.....	\$ 51.56	27.20
GROUP 15.....	\$ 51.64	27.20
GROUP 16.....	\$ 51.76	27.20
GROUP 17.....	\$ 51.93	27.20
GROUP 18.....	\$ 52.03	27.20
GROUP 19.....	\$ 52.14	27.20
GROUP 20.....	\$ 52.26	27.20
GROUP 21.....	\$ 52.43	27.20
GROUP 22.....	\$ 52.53	27.20
GROUP 23.....	\$ 52.64	27.20
GROUP 24.....	\$ 52.76	27.20
GROUP 25.....	\$ 52.93	27.20

OPERATOR: Power Equipment
 (Cranes, Piledriving &
 Hoisting)

	Rates	Fringes
GROUP 1.....	\$ 49.60	27.20
GROUP 2.....	\$ 50.38	27.20
GROUP 3.....	\$ 50.67	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 51.03	27.20
GROUP 6.....	\$ 51.14	27.20
GROUP 7.....	\$ 51.26	27.20
GROUP 8.....	\$ 51.43	27.20
GROUP 9.....	\$ 51.60	27.20
GROUP 10.....	\$ 52.60	27.20
GROUP 11.....	\$ 53.60	27.20
GROUP 12.....	\$ 54.60	27.20
GROUP 13.....	\$ 55.60	27.20

OPERATOR: Power Equipment
 (Tunnel Work)

GROUP 1.....	\$ 50.10	27.20
GROUP 2.....	\$ 50.88	27.20
GROUP 3.....	\$ 51.17	27.20
GROUP 4.....	\$ 51.31	27.20
GROUP 5.....	\$ 51.53	27.20
GROUP 6.....	\$ 51.64	27.20
GROUP 7.....	\$ 51.76	27.20

PREMIUM PAY:

\$3.75 per hour shall be paid on all Power Equipment Operator work on the following Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: \$2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator (includes loed, lull or similar types under 5 tons; Generator operator; Generator, pump or compressor plant operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator); Concrete mixer operator-skip type; Conveyor operator; Fireman; Forklift operator (includes loed, lull or similar types over 5 tons; Hydrostatic pump operator; oiler crusher (asphalt or concrete plant); Petromat laydown machine; PJU side dum jack; Screening and conveyor machine operator (or similar types); Skiploader (wheel type up to 3/4 yd. without attachment); Tar pot fireman; Temporary heating plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar type (Skid steer); Equipment greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter radioman (ground); Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or similar type); Boring machine operator; Boxman or mixerman (asphalt or concrete); Chip spreading machine operator; Concrete cleaning decontamination machine operator; Concrete Pump Operator (small portable); Drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum); Equipment greaser (grease truck); Guard rail post driver operator; Highline cableway signalman; Hydra-hammer-aero stomper; Micro Tunneling (above ground tunnel); Power concrete curing machine operator; Power concrete saw operator; Power-driven jumbo form setter operator; Power sweeper operator; Rock Wheel Saw/Trencher; Roller operator (compacting); Screed operator (asphalt or concrete); Trenching machine operator (up to 6 ft.); Vacuum or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant engineer; Batch plant operator; Bit sharpener; Concrete joint machine operator (canal and similar type); Concrete planer operator; Dandy digger; Deck engine operator; Derrickman (oilfield type); Drilling machine operator, bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum); Drilling machine operator; Hydrographic seeder machine operator (straw, pulp or seed), Jackson track maintainer, or similar type; Kalamazoo Switch tamper, or similar type; Machine tool operator; Maginnis internal full slab vibrator, Mechanical berm, curb or gutter (concrete or asphalt); Mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar); Micro tunnel system (below ground); Pavement breaker operator (truck mounted); Road oil mixing machine operator; Roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck); Self-propelled

tar pipelining machine operator; Skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.); Slip form pump operator (power driven hydraulic lifting device for concrete forms); Tractor operator-bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (gunite work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bending machine operator; Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity): Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less tha 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth- moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self- loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote- control earth-moving equipment operator (operating a second piece of equipment: \$1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and

up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type

(over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator

(Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

ENGINEERS ZONES

\$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1S, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1, T17N, R14E, SBM

\$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point which is the SW corner of Section 34. T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a thin strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

\$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE 1/4 of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point

which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

 ENGI0012-004 08/01/2020

	Rates	Fringes
OPERATOR: Power Equipment (DREDGING)		
(1) Leverman.....	\$ 56.40	30.00
(2) Dredge dozer.....	\$ 50.43	30.00
(3) Deckmate.....	\$ 50.32	30.00
(4) Winch operator (stern winch on dredge).....	\$ 49.77	30.00
(5) Fireman-Oiler, Deckhand, Bargeman, Leveehand.....	\$ 49.23	30.00
(6) Barge Mate.....	\$ 49.84	30.00

 IRON0433-006 07/01/2020

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 34.58	24.81
Ornamental, Reinforcing and Structural.....	\$ 41.00	33.45

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

LABO0089-001 07/01/2020

	Rates	Fringes
LABORER (BUILDING and all other Residential Construction)		
Group 1.....	\$ 34.18	20.48
Group 2.....	\$ 34.86	20.48
Group 3.....	\$ 35.57	20.48
Group 4.....	\$ 36.37	20.48
Group 5.....	\$ 38.30	20.48
LABORER (RESIDENTIAL CONSTRUCTION - See definition below)		
(1) Laborer.....	\$ 30.82	18.80
(2) Cleanup, Landscape, Fencing (Chain Link & Wood).	\$ 29.53	18.80

RESIDENTIAL DEFINITION: Wood or metal frame construction of single family residences, apartments and condominiums - excluding (a) projects that exceed three stories over a garage level, (b) any utility work such as telephone, gas, water, sewer and other utilities and (c) any fine grading work, utility work or paving work in the future street and public right-of-way; but including all rough grading work at the job site behind the existing right of way

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete Screeding for Rought Strike-off; Concrete, water curing; Demolition laborer; Flagman; Gas, oil and/or water pipeline laborer; General Laborer; General clean-up laborer; Landscape laborer; Jetting laborer; Temporary water and air lines laborer; Material hoseman (walls, slabs, floors and decks); Plugging, filling of Shee-bolt holes; Dry packing of concrete; Railroad maintenance, Repair Trackman and road beds, Streetcar and railroad construction trac laborers; Slip form raisers; Slurry seal crews (mixer operator, applicator operator, squeegee man, Shuttle man, top man), filling of cracks by any method on any surface; Tarman and mortar man; Tool crib or tool house laborer; Window cleaner; Wire Mesh puling-all concrete pouring operations

GROUP 2: Asphalt Shoveler; Cement Dumper (on 1 yard or larger mixer and handling bulk cement); Cesspool digger and

installer; Chucktender; Chute man, pouring concrete, the handling of the concrete from ready mix trucks, such as walls, slabs, decks, floors, foundations, footings, curbs, gutters and sidewalks; Concrete curer-impervious membrane and form oiler; Cutting torch operator (demolition); Guinea chaser; Headboard man-asphalt; Laborer, packing rod steel and pans; membrane vapor barrier installer; Power broom sweepers (small); Rippap, stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Tank sealer and cleaner; Tree climber, faller, chain saw operator, Pittsburgh Chipper and similar type brush shredders; Underground laborers, including caisson bellower

GROUP 3: Buggymobile; Concrete cutting torch; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2 1/2 feet drill steel or longer; Dri Pak-it machine; High sealer (including drilling of same); Hydro seeder and similar type; Impact wrench, multi-plate; Kettlemen, potmen and men applying asphalt, lay-kold, creosote, line caustic and similar type materials (applying means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operators of pneumatic, gas, electric tools, vibrating machines, pavement breakers, air blasting, come-along, and similar mechanical tools not separately classified herein; Pipelayers back up man coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services; Rotary Scarifier or multiple head concrete chipping scarifier; Steel header board man and guideline setter; Tampers, Barko, Wacker and similar type; Trenching machine, handpropelled

GROUP 4: Asphalt raker, luterman, ironer, asphalt dumpman and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), Grinder or sander; Concrete saw man; cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Laser beam in connection with laborer's work; Oversize concrete vibrator operator 70 pounds and over; Pipelayer performing all services in the laying, installation and all forms of connection of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit, and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid, gas, air or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzleman), Porta shot-blast, water blasting

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller-all power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power.

LABO0089-002 11/01/2020

	Rates	Fringes
LABORER (MASON TENDER).....	\$ 33.00	19.23

LABO0089-004 07/01/2020

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
Laborers:		
Group 1.....	\$ 35.30	20.48
Group 2.....	\$ 35.76	20.48
Group 3.....	\$ 36.17	20.48
Group 4.....	\$ 37.01	20.48
Group 5.....	\$ 40.28	20.48

LABORER CLASSIFICATIONS

GROUP 1: Laborer: General or Construction Laborer, Landscape Laborer. Asphalt Rubber Material Loader. Boring Machine Tender (outside), Carpenter Laborer (cleaning, handling, oiling & blowing of panel forms and lumber), Concrete Laborer, Concrete Screeding for rough strike-off, Concrete water curing. Concrete Curb & Gutter laborer, Certified Confined Space Laborer, Demolition laborer & Cleaning of Brick and lumber, Expansion Joint Caulking; Environmental Remediation, Monitoring Well, Toxic waste and Geotechnical Drill tender, Fine Grader, Fire Watcher, Limbers, Brush Loader, Pilers and Debris Handlers. flagman. Gas Oil and Water Pipeline Laborer. Material Hoseman (slabs, walls, floors, decks); Plugging, filling of shee bolt holes; Dry packing of concrete and patching; Post Holer Digger (manual); Railroad maintenance, repair trackman, road beds; Rigging & signaling; Scaler, Slip-Form Raisers, Filling cracks on any surface, tool Crib or Tool House Laborer, Traffic control (signs, barriers, barricades, delineator, cones etc.), Window Cleaner

GROUP 2: Asphalt abatement; Buggymobile; Cement dumper (on 1 yd. or larger mixers and handling bulk cement); Concrete curer, impervious membrane and form oiler; Chute man, pouring concrete; Concrete cutting torch; Concrete pile cutter; driller/Jackhammer, with drill steel 2 1/2 feet or

longer; Dry pak-it machine; Fence erector; Pipeline wrapper, gas, oil, water, pot tender & form man; Grout man; Installation of all asphalt overlay fabric and materials used for reinforcing asphalt; Irrigation laborer; Kettleman-Potman hot mop, includes applying asphalt, lay-klold, creosote, lime caustic and similar tyhpes of materials (dipping, brushing, handling) and waterproofing; Membrane vapor barrier installer; Pipelayer backup man (coating, grouting, making of joints, sealing caulkiing, diapering including rubber basket joints, pointing); Rotary scarifier, multiple head concrete chipper; Rock slinger; Roto scraper & tiller; Sandblaster pot tender; Septic tank digger/installer; Tamper/wacker operator; Tank scaler & cleaner; Tar man & mortar man; Tree climber/faller, chainb saw operator, Pittsburgh chipper & similar type brush shredders.

GROUP 3: Asphalt, installation of all frabrics; Buggy Mobile Man, Bushing hammer; Compactor (all types), Concrete Curer - Impervious membrane, Form Oiler, Concrete Cutting Torch, Concrete Pile Cutter, Driller/Jackhammer with drill steel 2 1/2 ft or longer, Dry Pak-it machine, Fence erector including manual post hole digging, Gas oil or water Pipeline Wrapper - 6 ft pipe and over, Guradrail erector, Hydro seeder, Impact Wrench man (multi plate), kettleman-Potman Hot Mop includes applying Asphalt, Lay-Kold, Creosote, lime caustic and similar types of materials (dipping, brushing or handling) and waterproofing. Laser Beam in connection with Laborer work. High Scaler, Operators of Pneumatic Gas or Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs and similar mechanical tools, Remote-Controlled Robotic Tools in connection with Laborers work. Pipelayer Backup Man (Coating, grouting, m makeing of joints, sealing, caulking, diapering including rubber gasket joints, pointing and other services). Power Post Hole Digger, Rotary Scarifier (multiple head concrete chipper scarifier), Rock Slinger, Shot Blast equipment (8 to 48 inches), Steel Headerboard Man and Guideline Setter, Tamper/Wacker operator and similar types, Trenching Machine hand propelled.

GROUP 4: Any worker exposed to raw sewage. Asphalt Raker, Luteman, Asphalt Dumpman, Asphalt Spreader Boxes, Concrete Core Cutter, Concrete Saw Man, Cribber, Shorer, Head Rock Slinger. Installation of subsurface instrumentation, monitoring wells or points, remediation system installer; Laborer, asphalt-rubber distributor bootman; Oversize concrete vibrator operators, 70 pounds or over. Pipelayer, Prfefabricated Manhole Installer, Sandblast Nozzleman (Water Balsting-Porta Shot Blast), Traffic Lane Closure.

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Horizontal directional driller, Boring system, Electronic tracking, Driller: all power drills excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and all other types of mechanical drills without regard to form of motive power. Environmental remediation, Monitoring well, Toxic waste and Geotechnical driller, Toxic waste removal. Welding in connection with Laborer's work.

 LABO0300-005 03/01/2021

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 37.49	21.88

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

 LABO0345-001 07/01/2020

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 45.05	19.62
GROUP 2.....	\$ 44.10	19.62
GROUP 3.....	\$ 40.56	19.62

FOOTNOTE: GUNITE PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0"" above base level and which work must be performed in whole or in part more than 75'-0"" above base level, that work performed above the 75'-0"" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

LABO1184-001 07/01/2020

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 37.85	15.99
(2) Vehicle Operator/Hauler.	\$ 38.02	15.99
(3) Horizontal Directional Drill Operator.....	\$ 39.87	15.99
(4) Electronic Tracking Locator.....	\$ 41.87	15.99
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 39.06	19.01
GROUP 2.....	\$ 40.36	19.01
GROUP 3.....	\$ 42.37	19.01
GROUP 4.....	\$ 44.11	19.01

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

LABO1414-003 08/05/2020

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER.....	\$ 36.03	21.01
PLASTER TENDER.....	\$ 38.58	21.01

Work on a swing stage scaffold: \$1.00 per hour additional.

Work at Military Bases - \$3.00 additional per hour:
 Coronado Naval Amphibious Base, Fort Irwin, Marine Corps Air Station-29 Palms, Imperial Beach Naval Air Station, Marine Corps Logistics Supply Base, Marine Corps Pickle Meadows, Mountain Warfare Training Center, Naval Air Facility-Seeley, North Island Naval Air Station, Vandenberg AFB.

PAIN0036-001 07/01/2020

	Rates	Fringes
Painters: (Including Lead Abatement)		
(1) Repaint (excludes San Diego County).....	\$ 29.59	17.12
(2) All Other Work.....	\$ 33.12	17.24

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

PAIN0036-010 10/01/2020

	Rates	Fringes
DRYWALL FINISHER/TAPER		
(1) Building & Heavy Construction.....	\$ 36.69	18.90
(2) Residential Construction (Wood frame apartments, single family homes and multi-duplexes up to and including four stories).....	\$ 27.11	17.51

PAIN0036-012 10/01/2020

	Rates	Fringes
GLAZIER.....	\$ 45.55	18.06

PAIN0036-019 01/01/2021

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 33.52	17.59

PLAS0200-005 08/07/2019

	Rates	Fringes
PLASTERER.....	\$ 43.73	16.03

NORTH ISLAND NAVAL AIR STATION, COLORADO NAVAL AMPHIBIOUS
BASE, IMPERIAL BEACH NAVAL AIR STATION: \$3.00 additional
per hour.

PLAS0500-001 07/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
GROUP 1.....	\$ 26.34	21.12
GROUP 2.....	\$ 27.99	21.12
GROUP 3.....	\$ 30.07	21.12

CEMENT MASONS - work inside the building line, meeting the
following criteria:

GROUP 1: Residential wood frame project of any size; work
classified as Type III, IV or Type V construction;
interior tenant improvement work regardless the size of the
project; any wood frame project of four stories or less.

GROUP 2: Work classified as type I and II construction

GROUP 3: All other work

PLUM0016-006 09/01/2020

	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Camp Pendleton; Vandenberg Air Force Base.....	\$ 55.88	23.66
Work ONLY on new additions and remodeling of commercial buildings, bars, restaurants, and		

stores not to exceed 5,000 sq. ft. of floor space.....	\$ 50.70	23.73
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 38.73	22.06
All other work except work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space and work on strip malls, light commercial, tenant improvement and remodel work.....	\$ 52.28	24.71

PLUM0016-011 09/01/2020

	Rates	Fringes
PLUMBER/PIPEFITTER Residential.....	\$ 41.62	20.63

PLUM0345-001 09/01/2020

	Rates	Fringes
PLUMBR Landscape/Irrigation Fitter..	\$ 35.30	24.10
Sewer & Storm Drain Work....	\$ 39.39	21.48

ROOF0045-001 03/01/2021

	Rates	Fringes
ROOFER.....	\$ 36.25	9.49

* SFCA0669-001 04/01/2021

	Rates	Fringes
SPRINKLER FITTER.....	\$ 43.01	24.62

SHEE0206-001 07/01/2020

	Rates	Fringes
SHEET METAL WORKER Camp Pendleton.....	\$ 42.62	29.55
Except Camp Pendleton.....	\$ 40.62	29.55
Sheet Metal Technician.....	\$ 30.51	9.49

SHEET METAL TECHNICIAN - SCOPE:

- a. Existing residential buildings, both single and multi-family, where each unit is heated and/or cooled by a separate system
- b. New single family residential buildings including tracts.
- c. New multi-family residential buildings, not exceeding five stories of living space in height, provided each unit is heated or cooled by a separate system. Hotels and motels are excluded.
- d. LIGHT COMMERCIAL WORK: Any sheet metal, heating and air conditioning work performed on a project where the total construction cost, excluding land, is under \$1,000,000
- e. TENANT IMPROVEMENT WORK: Any work necessary to finish interior spaces to conform to the occupants of commercial buildings, after completion of the building shell

 TEAM0166-001 09/01/2019

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 18.90	34.69
GROUP 2.....	\$ 26.49	34.69
GROUP 3.....	\$ 26.69	34.69
GROUP 4.....	\$ 26.89	34.69
GROUP 5.....	\$ 27.09	34.69
GROUP 6.....	\$ 27.59	34.69
GROUP 7.....	\$ 29.09	34.69

FOOTNOTE: HAZMAT PAY: Work on a hazmat job, where hazmat certification is required, shall be paid, in addition to the classification working in, as follows: Levels A, B and C - +\$1.00 per hour. Workers shall be paid hazmat pay in increments of four (4) and eight (8) hours.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Fuel Man, Swamper

GROUP 2: 2-axle Dump Truck, 2-axle Flat Bed, Concrete Pumping Truck, Industrial Lift Truck, Motorized Traffic Control, Pickup Truck on Jobsite

GROUP 3: 2-axle Water Truck, 3-axle Dump Truck, 3-axle Flat Bed, Erosion Control Nozzleman, Dump Crete Truck under 6.5 yd, Forklift 15,000 lbs and over, Prell Truck, Pipeline Work Truck Driver, Road Oil Spreader, Cement Distributor or Slurry Driver, Bootman, Ross Carrier

GROUP 4: Off-road Dump Truck under 35 tons 4-axles but less than 7-axles, Low-Bed Truck & Trailer, Transit Mix Trucks under 8 yd, 3-axle Water Truck, Erosion Control Driver, Grout Mixer Truck, Dump Crete 6.5yd and over, Dumpster Trucks, DW 10, DW 20 and over, Fuel Truck and Dynamite, Truck Greaser, Truck Mounted Mobile Sweeper 2-axle Winch Truck

GROUP 5: Off-road Dump Truck 35 tons and over, 7-axles or more, Transit Mix Trucks 8 yd and over, A-Frame Truck, Swedish Cranes

GROUP 6: Off-Road Special Equipment (including but not limited to Water Pull Tankers, Athey Wagons, DJB, B70 Wuclids or like Equipment)

GROUP 7: Repairman

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts. Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier. Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

- 10.1. **CWSRF DAVIS BACON PROVISIONS.** Contractor shall include the following language in this section in all of its subcontracts for the Project. Contractor and all subcontractors working on the Project shall comply with any provisions herein applicable to contractors and subcontractors, respectively:

https://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/docs/davisbacon/davis-bacon_2020_cwsrf-governmental_entities_public.pdf

(1) Minimum wages.

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis- Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

- (ii) (A) The sub recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the sub recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the sub recipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an

hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The sub recipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in

section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the sub recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the sub recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/agencies/whd/government-contracts/construction/payroll-certification> or its successor site.

The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the sub recipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub recipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent

who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

- (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required

records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees

- (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or sub contractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and sub recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The sub recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

- (i) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less

than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(ii) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(iii) Withholding for unpaid wages and liquidated damages. The sub recipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(iv) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Sub recipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a

period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid.

Further, the Sub recipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The sub recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(3), all interviews must be conducted in confidence. The sub recipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The sub recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Sub recipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB.

Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The sub recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The sub recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the sub recipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Sub recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

- (d) The sub recipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

- (e) Sub recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/whd/america2.htm>.

11. AGENCY SPECIFIC PROVISIONS:

Note: Failure to comply with these specifications e.g., taking the specified steps prior to Bid opening and submitting the forms with the Bid, will lead to the Bid being declared **non-responsive** and, therefore, shall be rejected.

11.1. EPA Requirements:

1. Federal Disadvantaged Business Enterprise (DBE) regulations apply to this project. (Reference 40 Code of Federal Regulations Part 33 - Participation by Disadvantaged Business Enterprises in U.S. Environmental Protection Agency Programs).
2. The responsive Bid shall conform to GFE to increase DBE awareness of procurement opportunities through race and gender neutral efforts. Race and gender neutral efforts are ones which increase awareness of contracting opportunities in general, including outreach, recruitment and technical assistance.
3. Bidder agrees that it will cooperate with and assist the City in fulfilling the DBE Good Faith Effort Requirement achieving "fair share objectives" and will exercise GFE to achieve such minimum participation of small, minority and women owned businesses. In particular, in submitting a bid, the Bidder shall, in the selection of Subcontractors, and Suppliers for the procurement of equipment, supplies, construction, and services related to the project, at a minimum, undertake the affirmative GFE steps.
4. In accordance with EPA's Program for Utilization of Small, Minority Disadvantaged and Women Business Enterprises in procurement under Federal assistance programs, the Contractor agrees to the applicable "fair share objectives" as specified in **Attachment D**.
5. The provisions in the Contract Documents have been incorporated to prevent unfair practices that adversely affect DBEs.
6. If a DBE Subcontractor fails to complete the Work under the subcontract for any reason, the Contractor shall employ the 6 GFE if soliciting a replacement Subcontractor. The Contractor shall employ the 6 GFE described below even if the Contractor has achieved its fair share objectives.
7. Good Faith Efforts:
 - a) The Contractor shall demonstrate that efforts were made to attract DBEs on this contract. The "Good Faith" effort requires the Contractor and any Subcontractors to take the steps listed in these specifications to assure that DBEs are used whenever possible as sources of supplies, construction, equipment, or services even if the Contractor has achieved its fair share objectives.

- b) If the Contractor awards subcontracts, it shall require the Subcontractors to take the steps in these specifications.
- c) For the EPA defined GFE, see the steps below:
 - i. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
 - ii. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes posting solicitations for bids or proposals for a minimum of 30 Calendar Days (refer to 33 CFR 33.301) before the bid or proposal closing date.
 - iii. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process. Include with the GFE documentation a completed copy of the form AA61, "List of Work Made Available".
 - iv. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
 - v. Use the services and assistance of the U.S. Small Business Administration (SBA) and the Minority Business Development Agency (MDBA) of the Department of Commerce (DOC). See "DBE Potential Resources Centers" Section in a later part these specifications.
 - vi. If the Contractor awards Subcontracts, the Contractor shall take the steps in the paragraphs above.

11.2. California State Revolving Fund (CASRF) Requirements:

11.2.1. Refer to Subsection 11.1, "EPA Requirements" above and the following:

11.2.2. The Bidder shall take affirmative steps prior to Bid opening to assure that MBE's and WBE's are used whenever possible as sources of supplies, construction and services.

11.2.3. The affirmative steps are defined for contracts funded by the California State Water Resources Control Board as follows:

1. Utilization of US Small Business Administration and Minority Business Development Agency (MBDA) resources is required at no cost. These agencies offer several services, including Internet access to databases of DBEs.
2. For additional assistance, the Contractor can telephone the local offices of both agencies in their area (SBA Minority Enterprise Development Offices and DOC MBDA Regional Centers). The Internet web sites also include names, addresses, and phone or fax numbers of local SBA and MBDA centers. There are contact phone numbers listed in Step 3 that will assist you in reaching the 2 offices if the Internet is unavailable. Do not write to these sources.
3. The Contractor shall provide documentation that the local SBA/MBDA offices or web sites were notified of the contracting bid opportunity at least 30 Calendar Days prior to Bid opening and solicitation to DBE Subcontractors at least 15 Calendar Days prior to Bid opening. Documentation shall not only include the efforts to contact the information sources and list the Contract opportunity, but also the solicitation and response to the bid request.
4. Include qualified DBEs on solicitation lists and record the information. Solicitation shall be as broad as possible.
5. If DBE sources are not located, explain why and describe the efforts made.
6. The Contractor shall send invitations to at least 10 (or all, if less than 10) DBE vendors for each item of the Work referred by sources contacted. The invitations shall adequately specify the items for which bids are requested. The record of GFE shall indicate a real desire for a positive response, such as a certified mail receipt or a documented telephone conversation.
7. A regular letter or an unanswered telephone call is not an adequate "good faith" effort. A list of all Subcontractors, including the bidders not selected and non DBE Subcontractors, and bid amount for each item of the Work shall be submitted on Form AA62. If a low bid was not accepted, an explanation shall be provided.

11.2.4. See "DBE Potential Resources Centers" Section in a later part these specifications.

11.2.5. Annual DBE Utilization Reporting:

The Contractor shall report to the City on an annual basis, their utilization of Minority Business Enterprise and Women's Business Enterprise Subcontractors and Suppliers using California State Revolving Funds (CASRF) Form UR-334.

12. DBE POTENTIAL RESOURCES CENTERS:

- 12.1. Utilization of US Small Business Administration and Minority Business Development Agency (MBDA) resources is required at no cost. These agencies offer several services, including Internet access to databases of DBEs.
- 12.2. For additional assistance, the recipient or contractor can telephone the local offices of both agencies in their area (SBA Minority Enterprise Development Offices and DOC MBDA Regional Centers). The Internet web sites also include names, addresses, and phone or fax numbers of local SBA and MBDA centers. Do not write to these sources.
- 12.3. The Contractor shall provide documentation that the local SBA/MBDA offices or web sites were notified of the contracting bid opportunity at least 30 Calendar Days prior to Bid opening and solicitation to DBE subcontractors at least 15 Calendar Days prior to Bid opening. Documentation shall not only include the efforts to contact the information sources and list the Contract opportunity, but also the solicitation and response to the bid request.
- 12.4. Include qualified DBEs on solicitation lists and record the information on Form AA63. Solicitation shall be as broad as possible.
- 12.5. If DBE sources are not located, explain why and describe the efforts made.
- 12.6. The Contractor shall send invitations to at least 10 (or all, if less than 10) DBE vendors for each item of work referred by sources contacted. The invitations shall adequately specify the items for which bids are requested. The record of "good faith" efforts shall indicate a real desire for a positive response, such as a certified mail receipt or a documented telephone conversation.
- 12.7. A regular letter or an unanswered telephone call is not an adequate "good faith" effort. A list of all sub-bidders, including the bidders not selected and non DBE Subcontractors, and bid amount for each item of the Work shall be submitted on Form AA62. If a low bid was not accepted, an explanation shall be provided.
- 12.8. Federal Agencies (must be contacted and solicitations posted on their websites):

Name and Address	Telephone and Web Site
U.S. Small Business Administration	(415) 744-6820 Extension 0
455 Market Street, Suite 600	Dynamic Small Business Search: https://web.sba.gov/pro-net/search/dsp_dsbs.cfm ¹
San Francisco, CA 94105	Bid Notification: https://catalog.data.gov/dataset/subcontracting-network-subnet-system ²

RE: Minority Enterprise Development Offices	
U.S. Department of Commerce	909-315-3339
Minority Business Development Agency	Website:
177 East Colorado Blvd. Suite 200 Space 2054	https://www.mbda.gov/business-center/pasadena-mbda-business-center ³
Pasadena, CA 91105	RE: Business Development Centers

12.9. State Agencies (must be contacted):

Name and Address	Telephone and Web Site
California Department of Transportation	Mailing Address: PO Box 942874
(CALTRANS) Business Enterprise Program ⁴	Sacramento, CA 94274-0015
1820 Alhambra Blvd.	(916) 227-9599
Sacramento, CA 95816	<u>DBE Database:</u> https://dot.ca.gov/programs/civil-rights/dbe
CA Public Utilities Commission (CPUC)⁵	
505 Van Ness Avenue	<u>Directory:</u>
San Francisco, CA 94102-3298	https://sch.thesupplierclearinghouse.com/FrontEnd/SearchCertifiedDirectory.asp

Notes:

1. The Contractor shall use the SBA's Dynamic Business Search database to search for potential subcontractors, suppliers, and/or manufacturers. Bidder **must** provide a copy of all search records for items of work made available with GFE documentation.
2. Contractor shall use SUB-Net to post subcontracting opportunities. Contractor shall post Subcontractor opportunities at least 15 Working Days prior to bid opening. Small businesses can review this web site to identify opportunities in their areas of expertise. The web site is designed primarily as a place for large businesses to post solicitations and notices. Bidder **must** provide copy of the Display Solicitation Record identifying the date solicitation notice was posted with GFE documentation.
3. Contractor may use MBDA web portal to post subcontracting opportunities. If utilized, the Contractor shall post subcontractor opportunities at least 30 Calendar Days prior to Bid opening. Small businesses can review this web site to identify opportunities in their areas of expertise. The web site is designed primarily as a place for large businesses to post

solicitations and notices. Provide copy of the Offer Overview with the GFE documentation.

4. Based on the federal DBE program, CALTRANS maintains a database and provides directories of minority and woman-owned firms. Bidder **must** provide a copy of all search records for items of work made available with GFE documentation.
5. CPUC maintains a database of DBE-owned business enterprises and serves to inform the public. Bidder **must** provide a copy of all search records for items of work made available with GFE documentation.

13. GOOD FAITH EFFORT DOCUMENTATION SUBMITTALS:

13.1. The affirmative GFE steps documentation shall be submitted by **5 PM, 4 Working Days after the Bid Opening**. If this documentation is not submitted when due, the City will declare the Bid **non-responsive** and reject it.

13.2. The required documentation shall be submitted and logged in at the following address:

CITY OF SAN DIEGO
ENGINEERING & CAPITAL PROJECTS DEPARTMENT, CONTRACTS DIVISION
525 B STREET, SUITE 750
SAN DIEGO, CA 92101

SUBJECT: AFFIRMATIVE GOOD FAITH EFFORT DOCUMENTATION

BID NO. K-21-1791-DBB-3-A

13.3. The Contractor shall maintain the records documenting compliance with requirements including documentation of its GFE and data relied upon in formulating its fair share objectives.

14. FORMS:

14.1. The Contractor shall demonstrate that efforts were made to attract DBEs on this contract. The Contractor and Subcontractors shall take the steps listed in these specifications to assure that DBEs are used whenever possible as sources of supplies, construction, equipment, or services. In addition to the specified GFE documentation, the Bidder shall submit the following forms.

14.1.1. The Contractor shall demonstrate that efforts were made to attract DBEs on this contract. The Contractor and Subcontractors shall take the steps listed in these specifications to assure that DBEs are used whenever possible as sources of supplies, construction, equipment, or services. In addition to the specified GFE documentation, the Bidder shall submit the following forms.

14.1.1.1 The following form shall be submitted **with the Bid submittal**. Failure to include any of the forms shall cause the Bid to be deemed **non-responsive**.

1. Form 4500-3: DBE Subcontractor Performance Form
2. Form 4500-4: DBE Subcontractor Utilization Form

14.1.1.2 The following forms shall be completed and submitted within **4 Working Days after the Bid opening by 5PM**. Failure to include any of the forms shall cause the Bid to be deemed **non-responsive**.

1. Form AA61: List of Work Made Available
2. Form AA62: Summary of Bids Received
3. Form AA63: Good Faith Effort List of Subcontractors Solicited

14.1.2. The following additional forms shall be submitted annually in accordance with Section 11 "AGENCY SPECIFIC PROVISIONS".

1. Form UR-334: California State Revolving Funds (CASRF)

14.1.3. Bidder is to provide the following form to all DBE subcontractors participating on this contract. Submittal of form is dependent on DBE subcontractor and is to be forwarded to the DBE coordinator at any time during the project period of performance.

1. Form 4500-2: DBE Subcontractor Participation Form.

FUNDING AGENCY PROVISIONS

FORMS



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.


Subcontractor Name Atlas Integrated Systems, Inc.		Project Name NCWRP Flow Equalization Basin	
Bid / Proposal No. K-21-1791-DBB-3-A	Assistance Agreement ID No. (if known)	Point of Contact Nick Mocerri	
Address 6789 Quail Hill Parkway Ste. 405 Irvine, Ca. 92603			
Telephone No. 949-509-9605		Email Address nick@atlasintegratedsystems.com	
Prime Contractor Name Kiewit Infrastructure West Co.		Issuing/Funding Entity EPA / CASRF	


Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
	Fiber Optic Communications Turnkey Systems in Support of DCS and SCADA.	\$53,275
DBE Certified By: <input type="checkbox"/> DOT <input checked="" type="checkbox"/> SBA Other: _____		Meets/exceeds EPA certification standards? YES NO <u>Unknown</u>

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.2015 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
	Terrence L. Robinson
Title	Date
Senior Vice President	July 28, 2021

Subcontractor Signature	Print Name
 Digitally signed by Nick Mocerri III Date: 2021.07.27 09:35:12 -07'00'	Nick Mocerri III
Title	Date
President	7/25/21

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)



Certified Small Business Enterprise

Vendor Account Number: 176082

Mr. Nickolas Mocerri III
 Atlas Integrated Systems, Inc.
 85 Highland View
 Irvine, CA 92603

Thank you for submitting your Vendor Application seeking Small Business Enterprise recognition with the Coalition of Southern California Public Agencies. Per our evaluation of the Information you provided in your application and the North American Industry Classification System codes you identified, your status as a Small Business Enterprise (SBE) has been approved. This certification is recognized by the following organizations:

*Metropolitan Water District of Southern California
 Port of Long Beach
 San Diego County Water Authority
 Los Angeles Unified School District
 Los Angeles Community College District*

Metropolitan is pleased to issue this SBE Certificate subject to the terms and conditions identified below:

NAICS code(s) for which SBE status is recognized:

237130 - Power and Communication Line and Related Structures Construction
 238990 - All Other Specialty Trade Contractors
 515111 - Radio Networks
 541330 - Engineering Services
 541420 - Industrial Design Services
 541490 - Other Specialized Design Services
 541511 - Custom Computer Programming Services

SBE Certificate Effective Date: 07/01/19
SBE Certificate Expiration Date: 07/01/22

You have passed your company's recent random audit.

Work Performed by your firm that falls within the above-mentioned NAICS code(s) will be counted as SBE participation for work performed on contracts procured by the above agencies.

The agencies reserve the right to withdraw this certification if at any time it is determined that certification was knowingly obtained by false, misleading or incorrect information and reserve the right to audit all statements. If any firm attempts to falsify or misrepresent information to obtain certification, the firm may be disqualified from participation in any contracts for a period of up to five years.

SBE Certification is valid for a period of three (3) years. To maintain SBE status, firms must update their existing SBE Vendor Application on or before the expiration date mentioned above. All information is subject to verification.

If there are any changes in your status that may impact your certification, you are required to update your account information online. A copy of your information can be viewed by logging into your Vendor Profile, and visiting the Small Business Certification tab.

Sincerely,
 John J. Arena
 Metropolitan Water District of Southern California
 Business Outreach Program Manager

700 N. Alameda Street, Los Angeles, California 90012 Mailing Address: Box 54153, Los Angeles, CA 90054-0153
 Telephone (213) 217-7444



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

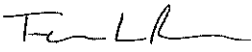
Subcontractor Name Sonco Construction Inc.		Project Name North City Water Reclamation Plant Flow Equalization Basin
Bid / Proposal No. K-21-1791-DBB-3-A	Assistance Agreement ID No. (if known) N/A	Point of Contact Richard Chico
Address 4927 Toronto Ave Fontana CA 92336		
Telephone No. 909-223-1280		Email Address Rich@soncoconstruction.com
Prime Contractor Name Kiewit Infrastructure West Co.		Issuing/Funding Entity City of San Diego


Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
	Linex	\$486,060
DBE Certified By: <input type="checkbox"/> DOT <input checked="" type="checkbox"/> SBA Other: CUCP		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

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² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
	Terrence L. Robinson
Title	Date
Senior Vice President	July 28, 2021

Subcontractor Signature	Print Name
	Richard Chico
Title	Date
President	7-28-2021

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)



Metro

Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net



CALIFORNIA UNIFIED CERTIFICATION PROGRAM

July 24, 2018

CUCP# 45750
Metro File #7885

Mr. Richard Chico
SONCO CONSTRUCTION INC
9155 Archibald Ave
#103
Rancho Cucamonga, CA 91730

Subject: Disadvantaged Business Enterprise Certification

Dear Mr. Richard Chico:

We are pleased to advise you that after careful review of your application and supporting documentation, the Los Angeles County Metropolitan Transportation Authority (Metro) has determined that your firm meets the eligibility standards to be certified as a Disadvantaged Business Enterprise (DBE) as required under the U.S. Department of Transportation (U.S. DOT) Regulation 49 CFR Part 26, as amended. This certification will be recognized by all of the U.S. DOT recipients in California. Your firm will be listed in the California Unified Certification Program (CUCP) database of certified DBEs under the following specific area(s) of expertise that you have identified on the NAICS codes form of the application package:

NAICS 238110; POURED CONCRETE FOUNDATION AND STRUCTURE CONTRACTORS

Your DBE certification applies only for the above code(s). You may review your firm's information in the CUCP DBE database which can be accessed at the CUCP website at www.californiaucp.org. Any additions and revisions must be submitted to Metro for review and approval.

In order to ensure your continuing DBE status, you are required to submit an annual update along with supporting documentation. If no changes are noted, then your DBE status remains current. If there are changes, Metro will review to determine continued DBE eligibility. Please note, your DBE status remains in effect unless Metro notifies you otherwise.

Also, should any changes occur that could affect your certification status prior to receipt of the annual update, such as changes in your firm's name, business/mailling address, ownership, management or control, or failure to meet the applicable business size standards or personal net worth standard, please notify Metro immediately. Failure to submit forms and/or change of information will be deemed a failure to cooperate under Section 26.109 of the Regulations.

Metro reserves the right to withdraw this certification if at any time it is determined that it was knowingly obtained by false, misleading, or incorrect information. Your DBE certification is subject to review at any time. The firm thereby consents to the examination of its books, records and documents by Metro.

Congratulations, and thank you for your interest in the DBE program. Should you have any questions, please contact us at (213) 922-2600. For information on Metro contracting opportunities, please visit our website at www.metro.net.

Sincerely,

Shirley Wong
Principal Certification Officer
Diversity & Economic Opportunity Department



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. A Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

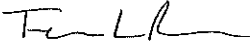
Subcontractor Name PGC Construction Inc		Project Name North City Water Reclamation Plant Flow Equalization Basin	
Bid / Proposal No. K-21-1791-DBB-3-A	Assistance Agreement ID No. (if known) N/A	Point of Contact Alan Johnson	
Address 42309 Winchester Rd #C Temecula, CA 92590			
Telephone No. 760-549-4121		Email Address alan@pgcconstruct.com	
Prime Contractor Name Kiewit Infrastructure West Co.		Issuing/Funding Entity City of San Diego	

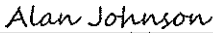
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
	Translucent Wall Panels, Aluminum Door, & Expansion Joint Covers	\$85,000.00
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: _____		Meets/exceeds EPA certification standards? YES NO Unknown

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² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
	Terrence L. Robinson
Title	Date
Senior Vice President	July 28, 2021

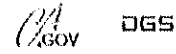
Subcontractor Signature	Print Name
	Alan Johnson
Title	Date
Estimator	7/28/21

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)

Certification Profile

State of California Certification



Certification ID: 2014141

Legal Business Name	Address
PGC CONSTRUCTION INC	27475 YNEZ RD
Doing Business As (DBA) Name1	STE 111
	TEMECULA
Doing Business As (DBA) Name2	CA 92591
	Email:
Office Phone Number	pgcconstruction1@gmail.com
760/549-4121	Total Number of Employees
Business Fax Number	8
760/560-1810	Business Types
Business Web Address	Construction , Service

Service Areas

Imperial , Los Angeles , Orange , Riverside , San Bernardino , San Diego , Santa Barbara

[View Keywords](#)

[View Classifications](#)

Active Certifications

[More Help](#)

Certification Type	Status	From	To	Row 1	Row 2
SB(Micro)	Approved	03/13/2019	03/31/2022		
SB-PW	Approved	03/13/2019	03/31/2022		

Certification History

[More Help](#)

Certification Type	Application Date	Status	Status Date/Time	From	To	Row 1	Row 2
SB(Micro)	03/13/2019	Cancelled	03/13/19 1:34PM				
SB-PW	03/13/2019	Cancelled	03/13/19 1:35PM				

[Return to Search](#)

[Print this Page](#)



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

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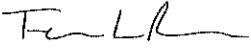
Subcontractor Name Whitson Contracting & Management		Project Name North City Water Reclamation Plant Flow Equalization Basin
Bid / Proposal No. K-21-1791-DBB-3-A	Assistance Agreement ID No. (if known) N/A	Point of Contact Mitch Whitson
Address 640 Alpine Way, Escondido, CA 92029		
Telephone No. 858-673-0966		Email Address mitch@whitsoncm.com
Prime Contractor Name Kiewit Infrastructure West Co.		Issuing/Funding Entity City of San Diego

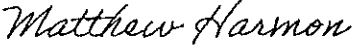
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
	Installation of Biofiltration basin (BMP #10)	\$11,218.60
DBE Certified By: <input checked="" type="checkbox"/> DOT <input checked="" type="checkbox"/> SBA Other: <u>DGS / City</u>		Meets/exceeds EPA certification standards? YES NO Unknown

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² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

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Prime Contractor Signature	Print Name
	Terrence L. Robinson
Title	Date
Senior Vice President	July 28, 2021

Subcontractor Signature	Print Name
	MATTHEW HARMON
Title	Date
Environmental Inspector	7/21/2021

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-3 (DBE Subcontractor Performance Form)

Printed on: 2/18/2021 10:51:35 AM

To verify most current certification status go to: <https://www.caleprocure.ca.gov>



Office of Small Business & DVBE Services

Certification ID: 37019

Legal Business Name:

WHITSON CONTRACTING & MANAGEMENT INC

Doing Business As (DBA) Name 1:

WHITSON CONTRACTING & MANAGEMENT INC

Doing Business As (DBA) Name 2:

Address:

11021 VIA FRONTERA, SUITE E

SAN DIEGO

CA 92127

Email Address:

mitch@whitsoncm.com

Business Web Page:

<http://www.whitsoncm.com>

Business Phone Number:

858/673-0966

Business Fax Number:

858/487-8355

Business Types:

Construction , Service

Certification Type	Status	From	To
SB(Micro)	Approved	05/29/2019	05/31/2022

Stay informed! KEEP YOUR CERTIFICATION PROFILE UPDATED!

-LOG IN at [CaleProcure.CA.GOV](https://www.caleprocure.ca.gov)

Questions?

Email: OSDSHELP@DGS.CA.GOV

Call OSDS Main Number: 916-375-4940

707 3rd Street, 1-400, West Sacramento, CA 95605

City of San Diego



**Small Local Business Enterprise (SLBE)
Program Certification**

**Whitson Contracting & Management, Inc.
Emerging Local Business Enterprise (ELBE)
General Construction**

(NAICS: 237110, 541620)
Certification Number: 12WC0668
Effective: 8/7/2020 - 8/7/2022

A handwritten signature in black ink, appearing to read "Christian Silva".

Christian Silva
Program Manager
Equal Opportunity Contracting



Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractor's² and the estimated dollar amount of each subcontract. A Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name Kiewit Infrastructure West Co.		Project Name North City Water Reclamation Plant Flow Equalization Basin	
Bid / Proposal No. K-21-1791-DBB-3-A	Assistance Agreement ID No. (if known) N/A	Point of Contact Terrence L. Robinson	
Address 10704 Shoemaker Avenue, Santa Fe Springs, CA 90670			
Telephone No. 562-946-1816		Email Address Terry.Robinson@kiewit.com	
Issuing/Funding Entity City of San Diego			

I have identified potential DBE certified subcontractors. YES NO
 If yes, please complete the table below. If no, please explain:

Subcontractor Name/ Company Name	Company Address / Phone / Email	Estimated Dollar Amount	Currently DBE Certified?
Sonco Construction	4927 TORONTO AVE FONTANA, CA 92336 909-223-1200 ; rich@soncoconstruction.com	\$486,860	Yes
Atlas Integrated Systems Inc	6789 Quail Hill Pkwy, STE 405 IRVINE, CA 92603 949-509-9605 ; mick@atlasintegratedsystems.com	\$53,275	Yes
PGC Construction		\$85,000	Yes

--Continue on back if needed--


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² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

FORM 4500-4 (DBE Subcontractor Utilization Form)

Revised 12/2016

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
	Terrence L. Robinson
Title	Date
Senior Vice President	July 28, 2021

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

FORM 4500-4 (DBE Subcontractor Utilization Form)

LIST OF WORK MADE AVAILABLE

List items of the Work the Bidder made available to DBE firms. Identify those items of the Work the Bidder might otherwise perform with its own forces and those items that have been broken down into economically feasible units to facilitate DBE participation. For each item listed, show the dollar amount and percentage of the Base Bid. The Bidder must demonstrate that enough work to meet the goal was made available to DBE firms.

SCOPE OF WORK MADE AVAILABLE	NAICS CODE	BIDDER NORMALLY PERFORMS ITEM (Y/N)	ITEM BROKEN DOWN TO FACILITATE PARTICIPATION (Y/N)	AMOUNT	PERCENTAGE OF BASE BID



**STATE WATER RESOURCES CONTROL BOARD – DIVISION OF FINANCIAL ASSISTANCE
DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION
CALIFORNIA STATE REVOLVING FUNDS (CASRF)
FORM UR-334**

1. Grant/Finance Agreement Number:		2. Annual Reporting Period 10/1/___ through 09/30/___		3. Purchase Period of Financing Agreement:	
4. Total Payments Paid to Prime Contractor or Sub-Contractors During Current Reporting Period: \$					
5. Recipient's Name and Address:			6. Recipient's Contact Person and Phone Number:		
7. List All DBE Payments Paid by Recipient or Prime Contractor During Current Reporting Period:					
Payment or Purchase Paid by Recipient or Prime Contractor	Amount Paid to Any DBE Contractor or Sub-Contractor For Service Provided to Recipient		Date of Payment (MM/DD/YY)	Procurement Type Code** (see below)	Name and Address of DBE Contractor of Sub-Contractor or Vendor
	MBE	WBE			
8. Initial here if no DBE contractors or sub-contractors paid during current reporting period:					
9. Initial here if all procurements for this contract are completed:					
10. Comments:					
11. Signature and Title of Recipient's Authorized Representative				12. Date	

Email Form UR-334 to:

DrinkingWaterSRF@waterboards.ca.gov OR CleanWaterSRF@waterboards.ca.gov

Questions may be directed to:

Barbara August, SWRCB
Barbara.August@waterboards.ca.gov
 Phone: (916) 341-6952
 Fax: (916) 327-7469

****Procurement Type:**

1. Construction
2. Supplies
3. Services (includes business services; professional services; repair services and personnel services)
4. Equipment



**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form**

A Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid / Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

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² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.

Please use the space below to report any concerns regarding the above funded project:

Subcontractor Signature	Print Name
Title	Date

The public reporting and record keeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Do not send the completed form to this address.

Send completed Form 4500-2 to:
 Mr. Joe Ochab, DBE Coordinator
 US EPA, Region 9
 75 Hawthorne Street
 San Francisco, CA 94105

FORM 4500-2 (DBE Subcontractor Participation Form)

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.

PART 0 – EQUAL OPPORTUNITY CONTRACTING PROGRAM (EOCP)

SECTION A – GENERAL REQUIREMENTS

0-12 CONTRACT RECORDS AND REPORTS. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall maintain records of all subcontracts and invoices from your Subcontractors and Suppliers for work on this project. Records shall show name, telephone number including area code, and business address of each Subcontractor, Supplier, and joint venture partner, and the total amount actually paid to each firm. Project relevant records, regardless of tier, may be periodically reviewed by the City.
2. You shall retain all records, books, papers, and documents pertinent to the Contract for a period of not less than 5 years after Notice of Completion and allow access to said records by the City's authorized representatives.
3. You shall submit the following reports using the web-based contract compliance software, LCP Tracker Online Payroll Reporting:
 - a) **Monthly Payment.** You shall submit Monthly Payment Reporting by the 10th day of the subsequent month. Incomplete and/or delinquent reporting may cause payment delays, non-payment of invoices, or both.
4. The records maintained under item 1, described above, shall be consolidated into a Final Summary Report, certified as correct by an authorized representative of the Contractor. The Final Summary Report shall include all subcontracting activities and be sent to the EOCP Program Manager prior to Acceptance. Failure to comply may result in assessment of liquidated damages or withholding of retention. The City will review and verify 100% of subcontract participation reported in the Final Summary Report prior to approval and release of final retention to you. In the event your Subcontractors are owed money for completed Work, the City may authorize payment to subcontractor via a joint check from the withheld retention.

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 their 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. The unused portion of the Field Order shall revert to the City upon Acceptance.
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** - An inspection the City uses to verify the completion of the Project or 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 **6:30 AM to 5:00 PM**. NOTE: Hours are subject to change and will be at the discretion of the Construction Manager.

To the “WHITEBOOK”, ADD the following:

108. **Acceptance** – When all of the Contract Work, including all Punchlist items, is deemed officially complete by the City Engineer.
109. **Beneficial Use** - The time at which the Work for a specific area or unit process has progressed to the point where, in the opinion of Owner and Construction Manager, the Work for the specific area or unit process is Substantially Complete, in accordance with the Contract Documents, so that the for the specific area or unit process can be utilized for the purposes for which it is intended.
110. **Construction Manager** - The authorized representative of the Owner, also referred to as the Owner’s Representative, who may be assigned to the site or any part thereof. All communication from the Contractor shall be through the Construction Manager. The responsibilities, authority, and limitations of the Construction Manager shall be as shown in the Contract Documents.

111. **Design Engineer** - The person, firm(s) or corporation(s) named as such below:
CH2M HILL Engineers, Inc. – Prime Design Engineer
Kleinfelder, Inc.
Marum Partnership.
Manuel Oncina Architects.
Lopez Engineering, Inc.
Kennedy Jenks Consultants, Inc.
O'Day Consultants, Inc.
PW Engineering, Inc.
RF Yeager Engineering, Inc.

The authorized Engineer of Record hired by the Owner. The responsibilities, authority, and limitations of the Construction Manager shall be as shown in the Contract Documents. This Design Engineer is also the individual(s) or entity(ies) named as such in the Contract Documents and established as the Engineer of Record.

112. **Final Completion** - Once Substantial Completion has been achieved, the following items are to be completed prior to the Final Completion by the Contractor:
- a) The Contractor shall complete punch list fix-up as approved by the Construction Manager prior to being provided with Final Completion.
 - b) All Work required under Section 01 77 00, Closeout Procedures shall have been completed.

Following Final Completion, the City Engineer shall provide Acceptance of the facilities and take over operation of the facilities

113. **Occupancy** – When the Owner deems a building is ready for use, the Building Official will issue a certificate of Occupancy in writing.

114. **Substantial Completion** –
- a) The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Owner and Construction Manager, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed”, as applied to all or part of the Work, shall refer to Substantial Completion thereof.
 - b) The time at which the Project’s operating facilities or systems is sufficient to provide Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and when all required

functional, performance, and acceptance or startup testing, and commissioning has been successfully demonstrated for all components, devices, equipment, and instrumentation and control to the satisfaction of the Owner and Construction Manager in accordance with the requirements of the Specifications.

- c) For Substantial Completion, the Contractor shall have completed all interior finish work, electrical, instrumentation and control, mechanical, HVAC, lighting, plumbing, civil, and final grading and paving, and also when, in the opinion of the Construction Manager and the Owner, the plant is essentially complete and ready for operation.

1-7.1.3 Requests for Information (RFI). To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. Should You discover a conflict, omission, errors in the Contract Documents, differences with existing field conditions, or have any questions concerning interpretation or clarification of Contract Documents, or when you propose deviations to the standards or design, you shall submit a Request for Information (RFI) to the City regarding your question or clarification within **1 Working Day**.
2. Your RFI shall meet the following requirements:
 - a) All RFIs, whether by You or your Subcontractor or supplier at any tier, shall be submitted by You to the City.
 - b) RFIs shall be numbered sequentially.
 - c) You shall clearly and concisely set forth the single issue for which interpretation or clarification is sought, indicate Specification Section numbers, Contract Drawing numbers, and details, or other items involved, and state why a response is required from the City.
 - d) RFIs shall be submitted within **1 Working Day** in order that they may be adequately researched and answered before the response affects any critical activity of the Work.
 - e) Should You believe that a response to an RFI causes a change to the requirements of the Contract, You shall, before proceeding, give written notice to the City, indicating that You believe that City response to the RFI to be a Change Order. Failure to give such written notice within **5 Working Days** of receipt of the City's response to the RFI shall waive Your right to seek additional time or cost.
3. The City will respond to RFIs within **5 Working Days** unless the City notifies You in writing that a response will take longer. The **5 Working Days** shall begin when the RFI is received and dated by the City. Responses from the City will not change any requirement of the Contract unless so noted by the City in the

response to the RFI. The City will not issue a Change Order for Extra Work or additional time when the issue raised in the RFI was due to your fault, neglect, or any unauthorized deviations from the project design or specifications.

4. If You proceed in resolving a conflict, omission, or any error in the Contract Documents without sending the City an RFI in accordance with the requirements stated above, the City may require You to remove such work at Your cost or back charge You the cost to remove this work.

1-7.2

Contract Bonds. To the “WHITEBOOK”, item 1, DELETE in its entirety and SUBSTITUTE with the following:

1. Before execution of the Contract, file payment and performance bonds with the City to be approved by the Board in the amounts and for the purposes noted. Bonds shall be executed by a responsible surety as follows:
 - a) If the Work is being funded with state or local money, consistent with California Code of Civil Procedure §995.670, the Surety shall be an “admitted surety” authorized by the State of California Department of Insurance to transact surety insurance in the State.
 - b) If the Work is being funded with federal money, the Surety shall be listed in the U.S. Treasury Department Circular 570 and shall be in conformance with the specified Underwriting Limitations.

To the “WHITEBOOK”, item 2, subsection “a”, subsection “i”, DELETE in its entirety and SUBSTITUTE with the following:

- i. A “Payment Bond” (Materials and Labor Bond) is optional. If no bond is submitted, no payment shall be made until 35 Calendar Days after Acceptance and any lien requirements have been fulfilled. If a bond is submitted, progress payments shall be made in accordance with these Specifications.

To the “WHITEBOOK”, item 2, subsection “d”, DELETE in its entirety and SUBSTITUTE with the following:

- d) For Contracts over \$100,000:
 - i. A “Payment Bond” (Materials and Labor Bond) for 100% of the Contract Price to satisfy claims of material Suppliers and of mechanics and laborers employed on the Work. You shall maintain the bond in full force and effect until Acceptance and until all claims for materials and labor are paid and shall otherwise comply with the Government Code.
 - ii. A “Faithful Performance Bond” for 100% of the Contract Price to guarantee faithful performance of Work, within the time prescribed and in a manner satisfactory to the City, that materials and workmanship shall be free from original or developed defects.

To the "WHITEBOOK", item 7, DELETE in its entirety and SUBSTITUTE with the following:

7. **You shall require the Surety to mail its standard "Bond Status" form to the Engineer at the following address:**

Deputy Director
Construction Management and Field Engineering Division
9573 Chesapeake Drive San Diego, CA 92123

SECTION 2 - SCOPE OF THE WORK

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

2. The City will obtain, at no cost to you, the following permits:
 - a) Building Permit
 - b) Site Development Permit

2-10.1.4 City's Final Determination. To the "WHITEBOOK", item 2, DELETE in its entirety and SUBSTITUTE with the following

2. If you disagree with the City's Final Determination, notify the Engineer in writing of your objection within 15 Working Days after receipt of the written determination in accordance with 2-10.2.1.4, "DRB Traditional Dispute Meeting".

2-10.2 Dispute Resolution Process. To the "WHITEBOOK", DELETE all sections and subsections in their entirety and SUBSTITUTE with the following:

2-10.2 Dispute Resolution Process

1. A mandatory Dispute Resolution Board process shall be established in accordance with 2-10.2.1, "Dispute Resolution Board (DRB)" prior to the mandatory mediation as described in 2-10.2.2, "Mandatory Non-binding Mediation".

2-10.2.1 Dispute Resolution Board (DRB).

1. The DRB is a 3-member board that you and the City establish prior to beginning work.

2-10.2.1.1 DRB Member Selection. Within 45 Working Days of Contract approval, you and the City shall select DRB members and establish the DRB using the following procedure:

2. You and the City will each nominate one DRB member candidate to participate on the DRB. The City has approved the use of the Caltrans DRB members list for this Project. Before being nominated to the project DRB, the prospective candidates will be contacted and provided with all available project details by

the City. The candidate will then need to confirm intent to participate in the DRB prior to nomination for the project board.

You can find Caltrans' approved DRB member's list at Caltrans' website:

<https://dot.ca.gov/programs/construction/drb-information-and-candidate-list/drb-candidates-list>

3. If you or the City nominates someone who is not on the Caltrans DRB list, the candidate shall:
 - a) Be knowledgeable in the type of construction and contract documents anticipated by the Contract.
 - b) Have completed training by the Dispute Resolution Board Foundation.
 - c) Have no prior direct involvement on this Contract.
 - d) Have no financial interest in the Contract or with the parties, subcontractors, suppliers, consultants, or associated legal or business services within 6 months before award and during the Contract, except for payments for City DRA or DRB services, or payments for retirement or pensions from either party not tied to, dependent on, or affected by the net worth of the party.
4. You and the City shall request a disclosure statement from each nominated DRB member candidate and must each furnish it to the other party. The statement shall include:
 - a) Resume of the candidate's experience.
 - b) Declaration statement that describes past, present, anticipated, and planned professional or personal relationships with each of the following:
 - i. Parties involved in the Contract
 - ii. Parties' principals
 - iii. Parties' counsel
 - iv. Associated subcontractors and suppliers
5. You and the City are allowed:
 - a) One-time objection to the other's candidate without stating a reason.
 - b) Objection to any of the other's subsequent candidates based on a specific breach of the candidate's responsibilities or qualifications under items 1 and 3 of this section.
6. If you or the City objects to the other's candidate, the party whose candidate was objected to must nominate another DRB candidate within 15 Working Days.
7. The 1st candidate from a party that receives no objection becomes that party's DRB member.

8. You and the City each provide written notification to your selected DRB member.
9. Within 15 Working Days of their notifications, the selected DRB members recommend to you and the City the 3rd DRB member candidate and provide that candidate's disclosure statement.
10. Within 15 Working Days of the recommendation, you and the City must each notify the first 2 DRB members whether you approve or disapprove of the recommended 3rd DRB member candidate.
11. If the 2 DRB members cannot agree on the 3rd DRB candidate, they will submit a list of candidates to you and the City for final selection and approval.
12. If the 2 DRB members do not recommend a 3rd DRB candidate within 15 Working Days of notification of their selections, or if you and the City do not agree on the 3rd DRB member candidate within 15 Working Days of the recommendation, or if you and the City do not agree on any of the candidates on the list provided by the first 2 selected DRB members, you and the City each must select 3 candidates from the current list of arbitrators certified by the Public Works Contract Arbitration Committee established by Pub Cont Code § 10245 et seq. who will be willing to serve as a DRB member. The first 2 selected DRB members must select the 3rd member in a blind draw of these 6 candidates.
13. The 3 DRB members then decide which of the three will act as the DRB chairman. If you and the City do not agree with the selected chairman, the 3rd member will act as the DRB chairman.

2-10.2.1.2 DRB Member Replacement.

1. The service of a DRB member may end at any time with a notice of at least 15 Working Days if any of the following occurs:
 - a) A member resigns
 - b) The City replaces its selected member
 - c) You replace your selected member
 - d) The City's and your selected members replace the 3rd member
2. Either you or the City replace any member for failing to comply with the required employment or financial disclosure conditions of DRB membership as described in the Contract and in the Dispute Resolution Board Agreement form.
3. Replacing any DRB member shall be accomplished by written notification to the DRB and the other party with substantiation for replacing the member.
4. A replacement DRB member is selected the same way as the original DRB member. Selecting a replacement must start upon determination of the need for a replacement and must be completed within 15 Working Days. The Dispute Resolution Board Agreement form shall be amended to reflect the change to the DRB.

2-10.2.1.3 DRB Progress Meetings.

1. You and the City shall periodically meet with the DRB and visit the job site so the DRB members can keep abreast of construction activities and develop familiarity with the work in progress.
2. The progress meetings shall occur at the start of the project and at least once every 4 months after that.
3. Both parties shall attend each progress meeting.
4. You and the City may agree to waive scheduled progress meetings when the only work remaining is plant establishment.

2-10.2.1.4 DRB Traditional Dispute Meeting.

1. If you disagree with the City's Final Determination, notify the Engineer and DRB in writing of your objection within 15 Working Days after receipt of the determination.
2. A DRB dispute meeting shall be held no sooner than 30 Calendar Days and no later than 60 Calendar Days after the DRB receives your written notice unless you and the City otherwise agree.
3. At least 15 Calendar Days before the scheduled dispute meeting, each party shall furnish the DRB documentation that supports its position and any additional information requested by the DRB.
4. If the DRB requests additional information within 10 Calendar Days after the dispute meeting, the party receiving the request shall furnish this information within 10 Calendar Days of receiving the request.
5. The DRB shall provide a written recommendation report within 30 Calendar Days of the dispute meeting unless you and the City agree to allow more time.
6. Within 10 Calendar Days of receiving the DRB's recommendation report, either you or the City may request clarification of any part of the report. Only one request for clarification from each party is allowed per dispute.
7. Within 30 Calendar Days after receiving the DRB's recommendation, each party shall furnish a written response to the DRB indicating acceptance or rejection of the recommendation. If a party rejects the recommendation and has new information that supports its position, the party may request reconsideration. The reconsideration request shall be made within 30 Calendar Days after receiving the DRB's recommendation. Only one request for reconsideration from each party is allowed per dispute.
8. If both you and the City accept the DRB's recommendation but cannot agree on the time or payment adjustment within 60 Calendar Days of accepting the recommendation, either party may request that the DRB recommend an adjustment.
9. If you reject the DRB's recommendation, notify the Resident Engineer and DRB in writing of your objection within 15 Working Days after receipt of the

DRB's recommendation and file a "Request for Mediation" in accordance with 2-10.2.2, "Mandatory Non-binding Mediation".

2-10.2.2 Mandatory Non-binding Mediation.

1. If a dispute arises out of or relates to the Contract, or the breach thereof, and if said dispute cannot be settled through contract provisions provided for the Dispute Resolution Board process, claim settlement, or negotiations, the parties agree to first endeavor to settle the dispute in an amicable manner, using mandatory mediation under the Construction Industry Mediation Rules of the American Arbitration Association or any other neutral organization agreed upon before having recourse in a court of law.

2-10.2.2.1 Mandatory Mediation Costs.

1. The expenses of witnesses for either side shall be paid by the party producing such witnesses. All other expenses of the mediation, including required traveling and other expenses of the mediator and the cost of any proofs or expert advice produced at the direct request of the mediator, shall be borne equally by the parties, unless they agree otherwise.

2-10.2.2.2 Selection of Mediator. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

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

2-10.2.2.3 Conduct of Mediation Sessions.

1. Mediation hearings shall be conducted in an informal manner and discovery shall not be allowed.
 - a) Discussions, statements, and/or admissions shall be confidential to the proceedings and shall not be used for any other purpose as it

relates to the party's legal position. The parties may agree to exchange any information they deem necessary.

2. Both parties shall have an authorized representative attend the mediation. Each representative shall have the authority to recommend entering into a settlement. Either party may have attorney(s), witnesses, or expert(s) present. Either party may request a list of witnesses and notifications of whether attorney(s) shall be present.
3. Any resulting agreements from mediation shall be documented in writing. Mediation results and documentation, by themselves, shall be "non-binding" and inadmissible for any purpose in any legal proceeding, unless such admission is otherwise agreed upon in writing by both parties. Mediators shall not be subject to any subpoena or liability and their actions shall not be subject to discovery.

2-10.2.3 Payment.

1. Pay each DRB member \$2,000 per day for DRB's participation at each on-site meeting
 - a) If a DRB member serves on more than one DRB, the \$2,000 shall be divided evenly among the contracts.
2. On-site meetings include:
 - a) Initial project meeting
 - b) Scheduled progress meetings for a project with a DRB
 - c) Dispute meetings
3. This payment includes full compensation for on-site time, travel expenses, transportation, lodging, travel time, and incidentals for each day or portion thereof that the DRB member is at a DRB meeting.
4. Before a DRB member spends any time reviewing plans and specifications, evaluating positions, preparing recommendations, or performs any other off-site DRB-related tasks, you and the City shall agree to pay for the tasks. Pay the DRB member \$200 per hour for these tasks. This payment includes full compensation for incidentals such as expenses for telephone, fax, and computer services.
5. The City shall reimburse you for 1/2 of the invoiced costs to the DRB and 1/2 of the costs of any technical services agreed to. Submit a change order bill and associated invoices with the original supporting documents in the form of a canceled check or bank statement to receive reimbursement. Do not add mark-ups to the change order bill.
6. The City will not pay for any DRB-related work performed after Contract acceptance.
7. The City will not pay your cost of preparing for and attending a dispute resolution meeting.

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.

3-3 SUBCONTRACTORS. To the “WHITEBOOK”, ADD the following:

6. When a Subcontractor fails to prosecute a portion of the Work in a manner satisfactory to the City, you shall remove such Subcontractor immediately upon written request of the City and shall request approval of a replacement Subcontractor to perform the Work in accordance with California Public Contract Code (PCC), Subletting and Subcontracting, Section 4107, at no added cost to the City.

3-4 AUTHORITY OF THE BOARD AND THE ENGINEER. To the “WHITEBOOK”, item 2, DELETE in its entirety and SUBSTITUTE with the following:

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

3-7.3.1 General. To the “WHITEBOOK”, ADD the following:

6. For additional requirements related to Red-lines and Record Documents, refer to Technical Specifications, Section 01 77 00 “Closeout Procedures”, Part 3 “Execution”.

3-8.1 General. To the “WHITEBOOK”, ADD the following:

3. For additional requirements related to submittals, refer to Technical Specifications, Section 01 33 00 “Submittal Procedures”.

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 of subsurface conditions at the Work Site:
 - a) Final Report of Geotechnical Investigation North City Water Reclamation Plant Expansion (AGE Project No. 44F1) dated January 17, 2018 by Allied Geotechnical Engineer’s Inc.

- b) North City Reclamation Plant Expansion Potholing Report No. X170059, dated June 9, 2017 by AirX Utility Surveyors Inc.

6. The reports listed above are available for review at the following link:

[PK 1 Flow Eq Tank Geotechnical Report - Google Drive](#)

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

3-10 SURVEYING (DESIGN-BID-BUILD).

3-10.1 General.

1. You shall provide all required site layout and general grade checking work not specified in 3-10.2, "Survey Services Provided by City".
2. Notify the City, in writing, at least 2 Working Days prior to requesting survey services provided by the City.

3-10.2 Survey Services Provided by City.

1. Unless otherwise noted, monument perpetuation, including mark-outs, will be performed by the City. Coordination of these services will be your duty, through the Resident Engineer. If, at any time, an existing survey monument is, or will be, destroyed or disturbed during the course of construction you shall notify the Resident Engineer so that the monument is preserved or perpetuated in accordance with state law.
2. The following surveying services, as defined in Cal. Bus. & Prof. Code §8726, shall be provided by the City:
 - a) Locating or establishing a minimum of 4 project geodetic survey control points that provide horizontal and vertical reference values for site feature and structure layout reference locations.
 - b) Locating, establishing, or reestablishing project site boundary lines, survey monuments, right-of-way lines, or easement lines.
 - c) Locating or establishing building design structure locations (building corners or envelope limits) sufficient for structure construction.

3-10.3 Payment.

1. The payment for site layout and general grade checking Work, coordination, and preservation of all survey related marks shall be included in the Contract Price.

3-11.2 Project Identification Sign. To the "WHITEBOOK", ADD the following:

4. The State Revolving Fund requires that the Contractor place (2) temporary signs at least four (4) feet tall by eight (8) feet wide made of three-fourths (3/4) inch thick exterior grade plywood or other approved material in a prominent locations approved by the Engineer. The Contractor shall fabricate, properly mount and maintain both signs. The image cast on the sign should be

resistant and protected from weathering. The signs should be mounted firmly and securely at the two sites with proper footing and post, as approved by the Resident Engineer. The Contractor is responsible for maintaining the signs in a manner approved by the Resident Engineer and will remove and dispose of upon completion. The sign shall include the full colored image that will be provided on a CD, at the pre-construction meeting.

Andrea Demich, Program Manager, ADemich@sandiego.gov

Monika Smoczynski, Project Manager, MSmoczynski@sandiego.gov

3-12.7 Drinking Water Discharges Requirements. To the "WHITEBOOK", ADD the following:

1. You shall record the results for each discharge event on the City's Drinking Water Discharge Monitoring form included as **Appendix G - Monthly Drinking Water Discharge Monitoring Form**.

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) If the Work includes installing an irrigation system, 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 any 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 within 5 Working Days of notification that 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 before the City will accept the Project.
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. If installed, 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.

3-15.2 Integration of the Work with Separate Contractors. To the "WHITEBOOK", ADD the following:

- 2. The list of Separate Contractors includes:
 - a) North City Pure Water Facility, Limits of Work- Work associated with this project is within the Pure Water Facility footprint, Contractor- Shimmick, City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager-Anthony Van (858) 292-6492.
 - b) North City Water Reclamation Plant (NCWRP) Expansion, Limits of Work- Work associated with this project is within the NCWRP footprint, Contractor- Kiewit Infrastructure West Co , City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager-Monika Smoczynski (858) 292-6455.
 - c) Morena Pump Station and pipeline construction packages (4 different construction packages)- Contractor- TBD, City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager- Juan Elli Bermudo (858) 614-5802.

3-15.3 Coordination. To the "WHITEBOOK", ADD the following:

- 2. Other adjacent City projects are scheduled for construction for the same time period in the vicinity of this project. See **Appendix E – Adjacent Projects Map** for the approximate location. Coordinate the Work with the adjacent projects as listed below:
 - 1. Project Title-North City Pure Water Facility, Limits of Work- Work associated with this project is within the Pure Water Facility footprint, Contractor- Shimmick, City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager-Anthony Van (858) 292-6492.
 - 2. Project Title-North City Water Reclamation Plant (NCWRP) Expansion, Limits of Work- Work associated with this project is within the NCWRP footprint, Contractor- Kiewit Infrastructure West Co., City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager-Monika Smoczynski (858) 292-6455.

3. Morena Pump Station and pipeline construction packages (4 different construction packages)- Limits of Work Contractor- TBD, City Lead Project Manager: Reyhaneh Martin (858) 243-5036, City Project Manager- Juan Elli Bermudo (858) 614-5802.

SECTION 4 - CONTROL OF MATERIALS

**ADD:
4-1.1**

American Iron and Steel (AIS).

1. The Consolidated Appropriations Act, 2014, includes an “American Iron and Steel (AIS)” requirement in section 436 that requires this project, funded via the Clean Water State Revolving Loan Fund (CWSRF) and/or the Drinking Water State Revolving Loan Fund (DWSRF) to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system.
2. You acknowledge to and for the benefit of the City of San Diego and the State Water Resource Control Board that you understand the Work under this Contract is being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel” that requires all of the iron and steel products used for construction to be produced in the United States including iron and steel products to be provided by you. You hereby warrant to and for the benefit of the City and the State that:
 - a) You have reviewed and understand the American Iron and Steel Requirement,
 - b) All of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement with required certification (for sample certification letters, refer to **Appendix H**), unless a waiver of the requirement is approved, and;
 - c) You will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the City or the State.
3. The additional information below is being provided for reference and guidance to ensure that you comply with all requirements set forth by the CWSRF and/or DWSRF Loans:
 - a) Refer to the following EPA website:

<http://www.epa.gov/cwsrf/state-revolving-fund-american-iron-and-steel-ais-requirement>

- b) The United States Environmental Protection Agency's Memorandum dated March 20, 2014 entitled, "Implementation of American Iron and Steel Provisions of P.L. 113-76, Consolidated Appropriations Act, 2014":

<https://www.epa.gov/sites/production/files/2015-09/documents/ais-final-guidance-3-20-14.pdf>

4. Your failure to comply with this provision shall permit the City or State to recover damages against you for any loss, expense, or cost (including without limitation attorney's fees) incurred by the City or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the City). Although you have no direct contractual privity with the State, as a lender to the City for the funding of this project, you and the City agree that the State is a third-party beneficiary and neither this provision (nor any other provision of this Contract necessary to give this provision force or effect) shall be amended or waived without the prior written consent of the State.
5. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or the EPA to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or the EPA resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the EPA or any damages owed to the EPA by the Purchaser). While the Contractor has no direct contractual privity with the EPA, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the EPA is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the EPA.

4-3.4 Special Inspection. To the "WHITEBOOK", ADD the following:

2. No special inspection shall be performed by the Contractor. The Contractor is not required to pay for special inspection unless due to the circumstances detailed in Technicals, Section 01 45 33.

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 later than 5 Working Days after the determination of the Apparent Low Bidder** and on the City's Product Submittal Form available at:

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

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITIES

5-3.3 Payroll Records. To the “WHITEBOOK”, item 2, DELETE in its entirety and SUBSTITUTE with the following:

2. You and your Subcontractors shall submit weekly certified payrolls reflecting the wages of all yours and Subcontractors’ employees engaged in the Work using the web-based contract compliance software, LCP Tracker Online Payroll Reporting.

ADD:

5-3.6 Project Labor Agreement (PLA). The Contractor and all subcontractors agree to be bound by the Project Labor Agreement (which is attached as Attachment I and incorporated by this reference) by submitting a Letter of Assent to the City’s Labor Coordinator. The Contractor shall submit its Letter of Assent as a condition of award and all subcontractors shall submit their Letter of Assent before commencing any Work on the Project.

5-4 OWNER-CONTROLLED INSURANCE PROGRAM.

5-4.1 General Requirements.

1. The City has implemented an Owner-Controlled Insurance Program (OCIP) for its Pure Water Projects. In this OCIP, the City furnishes Workers’ Compensation, General, Excess, Pollution Liability and Builder’s Risk insurance associated with construction of the Work. Insurance furnished under the OCIP covers the City, the Contractor, and the Contractor’s subcontractors of all tiers with exceptions stated below. As detailed in Section 5-4.17 and 5-4.18, Contractor and subcontractors still provide some insurance coverage under the OCIP.
2. Bidders, as well as their subcontractors with a subcontract amount of greater than one half of one percent of the Contractors bid amount, shall exclude from bids the costs of insurance for risks covered under the OCIP.
3. Bidders, as well as their subcontractors with a subcontract amount of greater than one half of one percent, shall determine the OCIP coverage credit by utilizing the OCIP Credit Worksheets attached herein under **Section 6. CERTIFICATIONS AND FORMS.**
4. OCIP enrollment is mandatory for contractors/subcontractors with contracts valued at \$10,000 or greater or onsite labor of three days or more. For contracts under \$10,000 in value, should there be any potential for additive change orders thereby increasing the contract value to \$10,000 or greater, the contractor/subcontractor must enroll in the OCIP.
5. Bidders, as well as all of their subcontractors, with a subcontract amount of greater than one half of one percent of the Contractors bid amount, shall complete OCIP credit worksheets provided as part of the bid documents attached herein. Bidders shall submit these OCIP credit worksheets, including OCIP credit worksheets obtained from all their subcontractors, within 10 Working Days of receipt by bidder of contract forms and Notice of Intent to

Award. Compliance with OCIP credit worksheet requirements shall be a condition for award.

6. Contractor shall still maintain minimum insurance outside of OCIP as defined in Section 5-4.17.
7. The payment for obtaining and maintaining non-OCIP insurances and coordination of all OCIP requirements, including safety requirements, shall be included in the Contract Price.
8. OCIP related manuals mentioned in Section 5-4 and 5-7 can be downloaded from the following link:

<https://drive.google.com/file/d/1bHgAkna4ws7vL229rEO75ITpr2wQ4qNM/view>

5-4.2

OCIP Definitions.

1. The following definitions apply to the OCIP program:
 - a) Claim – A covered loss asserted under the OCIP insuring policy(s).
 - b) OCIP Deductible Assessment – The amount the Enrolled Contractor is responsible for paying as its contribution for settlement of any loss that is chargeable to the Contractor, or its subcontractors. The deductible shall be paid in a proportional amount between the Contractor and subcontractor, as determined by responsibility of the party causing the loss, by the OCIP insurance carrier.
 - c) Enrolled Contractors – The Contractor and any Subcontractor who have submitted all necessary enrollment information and have received confirmation letter, as well as certificates of insurance evidencing OCIP coverage as issued from the OCIP administrator. Enrollment date shall be established by the date on the certificate of insurance.
 - d) Excluded Parties: - The following parties shall not be enrolled in the OCIP:
 - i) Heavy or structural demolition utilizing wrecking balls or explosives
 - ii) Hazardous materials remediation, removal or transport companies and their consultants.
 - iii) Architects, surveyors, engineers, soil testing engineers and their respective consultants.
 - iv) Vendors, suppliers, fabricators, materials dealers, truckers, haulers, drivers and others who merely transport, pickup, deliver, or carry materials, personnel, parts or other equipment to and from the Job Site.
 - v) Any parties or entities not specifically designated by the City at its sole discretion, even if otherwise eligible.

- vi) Subcontractors work with a value of less than \$10,000, unless their work extends to be greater than three days of work or more
- e) Insured Party - Contractor, the Contractor's subcontractors, officers, employees and agents, the City and the City's officers, employees, contractors and agents as enrolled in the OCIP, except any Uninsured Party.
- f) OCIP Administrator - The person or insurance broker firm designated by the City with responsibility for administration of the OCIP, including claims.
- g) OCIP Coverage - the insurance coverages generally described in Sections 5-4.3, through 5-4.10 of this Section and set forth more fully in the policies of insurance or forms of policies of insurance on file with the City's Public Utilities Department.
- h) Uninsured Party - Any person, partnership, corporation, or other business entity performing work under the Contract that is not an Insured Party under the OCIP.

5-4.3 OCIP Insurance Provided By The City.

1. Before commencement of the work, the City will obtain OCIP insurance coverage. Insured Parties will be enrolled in the OCIP according to the policies of OCIP insurance coverage.
2. The Contractor and the Contractor's subcontractors, officers, employees and agents, except for Excluded Parties as defined in Section 5-4.2 (d), will be Insured Parties with OCIP Coverage solely as to risks at the job site.
3. The City assumes no obligations to provide insurance other than OCIP Coverage.
4. The City does not warrant or represent that the OCIP Coverages constitute an insurance portfolio that adequately addresses all of the Contractor's risks under the contract documents. Nothing in this Section shall be construed to relieve the Contractor of any risk or obligation under the contract documents.
5. The OCIP Coverages are set forth in full in the respective policy forms and are on file with the City's Public Utilities Department. Nothing in this section is intended to alter or amend any provision of the OCIP Coverage policies. In the event of an actual conflict between the descriptions of coverage contained in this Section and the coverage provided under the policies, the provisions of the policies shall govern.

5-4.4 Information To Be Provided By Successful Bidder After Contract Award.

1. Within 15 working days from the mailing date of the Notice of Intent to Award of Contract, the successful bidder shall complete and return to the OCIP Administrator the "OCIP Insurance Enrollment Form," and provide such other information as the Project Manager or OCIP insurance carriers deem necessary. Each subcontractor shall complete the OCIP Insurance Enrollment Form and return such forms to the successful bidder for submission with, and attachment to, its form.

2. Each subcontractor shall complete the OCIP Insurance Enrollment Forms and submit to the successful bidder for submission to the OCIP Administrator not less than two weeks before the date they are scheduled to begin work. Failure to submit the information within the time required may delay the subcontractor's ability to commence work.
3. Contractor shall ensure that each subcontractor on the Work site for whom OCIP coverage is provided has received confirmation of such coverage from the OCIP Administrator before commencement of the subcontractor's work.
4. The City will review the OCIP documents submitted by the Contractor within 15 days of their submittal. Any deficiencies noted shall be corrected by the Contractor within five days of its receipt of the returned documents. The City will endeavor to issue a Limited Notice to Proceed within 60 working days of the mailing date of the Notice of Award however, failure to complete and return the documents identified in this paragraph within the time provided may delay the City's issuance of the Limited Notice to Proceed, or result in forfeiture of the successful bidder's bid bond and award of contract to the next lowest bidder.

5-4.5 OCIP Workers' Compensation Insurance And Employers Liability.

1. Coverage for workers' compensation insurance will comply with statutory limits of the workers' compensation laws of the State of California, with Coverage B - Employer's Liability, to limits of not less than one million dollars (\$1,000,000) each accident, one million dollars (\$1,000,000) each employee for bodily injury by disease, and one million dollars (\$1,000,000) policy limit for bodily injury by disease covering operations of the insured parties at the Work site. Coverage under the Broad Form All States extension is also included. This insurance is primary for all occurrences at the jobsite only.
 - a) Named Insured: Contractor and subcontractors of all tiers Enrolled in OCIP
 - b) Insurer Zurich
 - c) A.M. Best Rating: AXV
 - d) Policy Term: Per Effective Date of each Enrolled Contractor, as defined above, to the earliest of each Enrolled Contractor Work completion, or at 12:01 AM, 7/21/25
 - e) Policy Form: Per CA statutory requirements

5-4.6 OCIP General And Excess Liability Insurance.

1. General and Excess liability will be provided under Commercial General Liability insurance policy(s) and covering the insured parties in connection with the performance of the work at the jobsite, that includes hazards of operations (including explosion, collapse, and underground coverage), elevators, independent contractors, employees as additional insureds, completed operations with a ten (10) year extended discovery period after substantial completion of the work, contractual liability coverage (for contracts related to the work), personal injury liability coverage, and excess Employer's Liability coverage for claims arising out of the work hereunder, for personal injury, bodily

injury, and property damage, in policies of insurance such that the total available limits to all insureds combined will not be less than one hundred fifty four million dollars (\$154,000,000) combined single limits for each occurrence and aggregates, as applicable.

- a) Named Insured: City, Contractor and subcontractors of tiers Enrolled in OCIP.
- b) Insurer: HDI
- c) A.M. Best Rating: AXV
- d) Policy Term: July 21, 2019 to July 21, 2025, Plus 10 years Completed Operation Coverage
- e) Policy Form: Occurrence
- f) Limits: General Liability

Coverage	Limit
Per Occurrence	\$2,000,000
Personal & Advertising Injury Limit	\$2,000,000
General Annual Aggregate*	\$4,000,000
Completed Operations Term Aggregate**	\$4,000,000

NOTE: * All aggregate limits reinstate annually.

** 10 year Completed Operations has single aggregate

EXCESS LIABILITY

- g) Coverage: Follow form excess liability (terms and conditions, exclusions, etc.) of the underlying Commercial General Liability and Employers Liability policy wording.
- h) Named Insured: City, Contractor and subcontractors of tiers Enrolled in OCIP.
- i) Insurer(s): See Below
- j) A.M. Best Rating: AXV
- k) Policy Term: 7/21/19 to 7/21/25
- l) Policy Form: Follow - Form
- m) Limits: Layered to \$154M.

Layer No.	Insurer	Policy Number	Shared Limit by all Enrolled Contractors	Cumulative Limits
1	AWAC		\$10M excess \$2M/\$4M	\$12M Each Occurrence \$14M Aggregate

Layer No.	Insurer	Policy Number	Shared Limit by all Enrolled Contractors	Cumulative Limits
2	CHUBB		\$15M excess \$27M/\$29M	\$27M Each Occurrence \$29M Aggregate
3	Liberty		\$25M excess \$27M/\$29M	\$52M Each Occurrence \$54M Aggregate
4	Great American		\$50M excess \$52M/\$54M	\$102M Each Occurrence \$104M Aggregate
5	Zurich		\$50M excess \$102M/\$104M	\$152M Each Occurrence \$154M Aggregate

5-4.7 Contractors Pollution Liability.

Contractor’s pollution liability shall include contractual liability coverage for liability arising out of cleanup, removal, storage, or handling of hazardous or toxic chemicals, materials, substances or any other pollutants resultant from the worksite.

1. Named Insured: City, Contractor and subcontractors of tiers Enrolled in OCIP.
2. Insurer: Ironshore
3. A.M. Best Rating: AXV
4. Policy Term: July 21, 2019 to July 21, 2025
5. Policy Form: Occurrence
6. Limits: \$50,000,000 per occurrence and Aggregate

5-4.8 OCIP Deductibles – General/ Excess And Pollution Liability.

1. Notwithstanding the actual policy deductibles per occurrence, the Contractor shall be liable for a \$15,000 (fifteen thousand) dollar deductible for each occurrence, to the extent losses payable are attributable to the Contractor’s acts or omissions or the acts or omissions of Contractor’s officers, employees, subcontractors or agents, or Uninsured Parties providing equipment, materials, supplies or services for the Work. The Contractor's deductible shall encompass the costs of investigation and defense, including court costs and attorneys' fees.
2. Any deductible amount will be invoiced to the Contractor by separate billing. If not paid within 30 calendar days of notice, the amount will be withheld from the next progress payment. Any payment of a deductible amount per occurrence by the Contractor shall not be compensable to Contractor by the City.

3. Each claim, without regard to the amount claimed, shall be reported by the Contractor to the Project Manager, OCIP administrator and the insurance company. The insurance company will adjust the claim on behalf of the Insured Parties. Insurance company will determine if there is proportional responsibility for the loss between the contractor and subcontractor, and such determination will provide the basis for payment of the deductible between the contractor and subcontractor.

5-4.9 OCIP Builder's Risk Insurance.

1. OCIP Coverage for builder's risk will provide coverage on an all-risk basis, including coverage against fire, flood, lightning, wind damage, hail, explosion, collapse, offsite storage and in-transit, and installation risks of equipment to be installed as part of the work. Earthquake coverage is not included. The policies for such insurance will be secured and maintained by the City in a form and amount consistent with such coverage commonly purchased for large construction projects. The Contractor's coverage for Builder's Risk shall be per contract value with no aggregate.
2. Coverage shall include materials, supplies, and equipment that are intended for specific installation in the work while such materials, supplies, and equipment are located at the jobsite, in transit, or while temporarily located away from the Work site for the purpose of repair, adjustment, or storage at the risk of one of the insured parties.
3. Except as otherwise provided in Subsection 5-4.9 (2), this insurance will not include coverage for tools or clothing of workers, or Contractor's equipment.
4. The Builder's Risk policy will be endorsed waiving the carrier's rights of recovery under subrogation against the other Insured Parties.

5-4.10 OCIP Builders Risk Deductibles.

1. Notwithstanding the actual policy deductible, the Contractor shall be liable for the first \$50,000 (fifty thousand) of loss for each occurrence. Flood/Water and LEG3 deductible is \$50,000 (fifty thousand) The Contractor may insure deductible risk at the Contractor's discretion and cost.
2. Each claim without regard to the amount claimed shall be reported by the Contractor to the OCIP Administrator and the insurance company. The insurance company will adjust the claim on behalf of the Insured Parties. Insurance company will determine if there is proportional responsibility for the loss between the contractor and subcontractor, and such determination will provide the basis for payment of the deductible between the contractor and subcontractor.
3. Any deductible amount will be invoiced to the Contractor by separate billing. If not paid within 30 calendar days of notice, the amount will be withheld from the next progress payment. Any payment of a deductible amount per occurrence by the Contractor shall not be compensable to Contractor by the City.
4. Payments by the insurer for all losses covered under the All Risk Builder's Risk policy will be made to the City. The City will make the proceeds from the Builder's

Risk policy covered losses available to the Contractor for rebuilding work damaged by covered perils.

5-4.11 No Waiver of Contract Obligations.

1. Nothing contained herein or in any document referenced herein shall relieve, limit, or be construed to relieve or limit the Contractor from any liability or obligations otherwise imposed by the contract documents.

5-4.12 Change Orders.

1. Change orders shall include the removal of OCIP provided insurance costs from the Contractor's costs associated with the change order. Contractor shall specifically identify the OCIP insurance costs associated with the change order.
2. Contractor is solely responsible for ensuring that its subcontractors remove the cost of OCIP insurance coverage associated with the change order.

5-4.13 The City's Right To Audit OCIP.

The Contractor hereby warrants to the City the accuracy of the information provided on the OCIP Insurance Enrollment Form and OCIP Credit Worksheets, and agrees that the City, its officers, agents, insurance carriers, and the OCIP Administrator may audit the records of the Contractor and its subcontractors to confirm the accuracy of information provided, including the accuracy of all estimated payrolls, and to ascertain any effect on insurance resulting from changes in the work. The audit will be held during the Contractor's normal business hours at the office of the Contractor or at another mutually agreeable location. This provision is supplemental to 2018 Whitebook Section 6-10, "RIGHT TO AUDIT".

1. The City shall be entitled to credits in OCIP insurance premiums that may accrue as a result of the audit. The Contractor shall also be entitled to any credits as a result of the audit for any OCIP premiums paid in excess of their OCIP Credit Worksheets.
2. The Contractor shall maintain or cause to be maintained sufficient records as may be necessary to audit its compliance and its subcontractors' compliance with the requirements of the OCIP.

5-4.14 Assignment.

1. The Contractor and each of its subcontractors shall assign to the City all return premiums, premium refunds, dividends, and other monies due in connection with the insurance provided by the City. The Contractor and its subcontractors shall execute such other further documentation as may be required by the City to effect this assignment.

5-4.15 OCIP Claims.

1. The Contractor, its subcontractors, and uninsured parties shall assist the City, its agents, and the OCIP Administrator and shall provide the utmost cooperation in the adjustment of claims arising out of the operations conducted under, or in connection with, the work and shall cooperate with the City's insurance carriers

in claims and demands that arise out of the work and that the insurance carriers are called upon to adjust or resist.

2. The Contractor and its subcontractors shall make every effort to provide modified work for injured workers who have been placed on modified duty status as a result of a Workers' Compensation injury or illness covered under this OCIP.

5-4.16 Limit of OCIP Coverages.

1. The City does not warrant or represent that the OCIP coverages constitute an insurance portfolio that adequately addresses the risk faced by the Contractor or its subcontractors. The Contractors and its subcontractors shall satisfy themselves as to the existence, extent, and adequacy of the OCIP coverages before the commencement of work under the Contract.
2. The OCIP coverages referred to above are set forth in full in the respective policy forms, and the foregoing descriptions of such policies are not intended to be complete, or to alter or amend any provision of the actual policies. In the event of an actual conflict between the foregoing descriptions of policies with such instruments, the provisions of the insurance policies shall govern.

5-4.17 Contractor Provided Insurance That Is Not Covered By The OCIP Insurance.

1. The OCIP does not provide the insurance policies for auto liability coverage and aircraft liability coverage. In addition, the City requires that any excluded party under OCIP who is performing work to have the required insurance listed in this section. The Contractor shall procure and maintain during the period of performance of this Contract and for 12 months following completion, insurance from insurance companies authorized to do business in the State of California, as set forth in this Section. These policies shall be primary insurance as to the City so that any other coverage held by the City shall not contribute to any loss under the Contractor's insurance. Coverage may be provided by a combination of primary and excess insurance policies, provided all insurers meet the requirements of this Section.
2. The Contractor shall obtain and maintain insurance following insurance coverages in the amounts as follows:
 - a) General Commercial Liability -- \$5,000,000 for any excluded party, any subcontractor who fails or losses enrollment in the OCIP. Coverage at least as broad as ISO form CG 00 01 10 01 or its equivalent, with no exclusion endorsements.
 - b) Automobile Liability -- \$5,000,000 Coverage at least as broad as ISO form CA 00 01 10 01, for "any auto," including owned, non-owned and hired vehicles
 - c) Aircraft Liability: If aircraft is used by the Contractor, its subcontractors, or anyone else on their behalf, the Contractor or its subcontractor shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury, or property damage arising from aircraft

owned, used, operated or hired in connection with the work by the Contractor, subcontractor, or anyone else in limits of not less than ten million dollars (\$10,000,000) combined single limit for each occurrence, for each aircraft.

- d) Workers' compensation and employer's liability: Coverage shall comply with the laws of the State of California, but an employer's liability limit of less than \$1,000,000 is not permitted. The Contractor may satisfy this requirement by proof of an approved self-insurance program under California law.
3. Any insurance policy utilizing a self-insured retention is subject to approval by the City. Contractor shall be solely responsible for the payment of any self-insured retention, however, any self-insured retention policy obtained by either the contractor, or any tier of sub-contractor, shall be endorsed to provide that the self-insured retention may be satisfied by either the named, additional insured, or City covered under the policy.
4. The insurance policies shall be endorsed as follows:
- a) For general commercial liability and automobile insurance, as well as excess or umbrella insurance covering risks within the scope of that type insurance, the City, its Council Members, officers, employees and agents are included as additional insureds with regard to liability and defense of suits or claims arising from the operations, products and activities performed by or on behalf of the Named Insured. The Contractor's insurance applies separately to each insured, including insureds added pursuant to this paragraph, against whom claim is made or suit is brought except with respect to the policy limits of liability. The inclusion of any person or entity as an insured shall not affect any right which the person or entity would have as a claimant if not so included. Any failure of the named insured to comply with reporting provisions of the policy or breaches or violations of warranties shall not affect coverage provided to the insureds added pursuant to this paragraph. The additional insured endorsement shall provide coverage at least as broad as ISO form CG 20 10 11 01 and CG 20 37 10 01
 - b) The Contractor's insurance shall be primary. Any other insurance or self-insurance available to the City or persons stated in paragraph (1) shall be in excess of and shall not contribute to the Contractor's insurance.
 - c) The Contractor's insurance shall not be canceled or materially reduced in coverage except after 30 days prior written notice has been given to the City, except 10 days' notice shall be allowed for non-payment of premium.
 - d) The workers' compensation and employer's liability insurance, and any property insurance shall be endorsed to include a waiver by the insurer all rights of subrogation against the City and other persons specified in paragraph (1) for losses paid under the terms of the insurance policy.

Any of the Contractor's off-site insurance requirements shall not have the provision of naming the City as loss payee.

5. Unless otherwise specified by supplemental condition, the insurance shall be provided by an acceptable insurance provider, as determined by the City, which satisfies the following minimum requirements: An insurance carrier authorized to do business in California and maintaining an agent for process within the state. Such insurance carrier shall maintain a current A.M. Best rating classification of "A- (A minus)" or better and a financial size of \$50 million to \$100 million (Class VII) or better, or a Lloyds of London program provided by syndicates of Lloyds of London and other London insurance carriers, providing all participants are qualified to do business in California and the policy provides for an agent for process in the state and the program assures a financial capability at least equal to the required classification and size for authorized insurers. Workers' compensation and employer's liability insurance may be provided the California State Compensation Fund.
6. Certificates of insurance and endorsements shall be provided by the Contractor and approved by the City before execution of the Contract.

5-4.18 Subcontractors Proof of Insurability Requirement Under OCIP.

1. As a requirement of the OCIP Program, all subcontractors shall demonstrate insurability to the satisfaction of the OCIP Administrator as follows:
 - a) Commercial General Liability -- \$1,000,000
 - b) Automobile Liability - \$1,000,000
 - c) Workers' Compensation and employer's liability – as required by California law with employer's liability of not less than \$1,000,000
2. The Contractor shall be responsible for obtaining proof of insurability from its subcontractors and providing the information to the OCIP Administrator, as well as for assuring that all its subcontractors comply with the requirements of the OCIP Program.

5-4.19 Notices, Costs, And Losses – OCIP.

1. Before the date on which the Contractor or any subcontractor begins performance of its part of the work, the Contractor shall cause to be furnished to the OCIP Administrator certificates of insurance for insurance required to be maintained by the Contractor and its subcontractors as provided herein. The Contractor shall not be allowed and shall not allow subcontractors on the jobsite for the performance of work until appropriate certificates of insurance are issued by the OCIP Administrator.
2. The City will pay the cost of the OCIP insurance premiums for the insurance described above as being provided by the City, and the City will receive or pay, as the case may be, all adjustments in such costs, whether by way of dividends or otherwise. All enrolled Contractors, and Subcontractors, shall assign to the City all adjustments, premium discounts, dividends, costs or other monies due for the OCIP insurer(s).

3. The cost of losses sustained because of clauses that specify the Contractor deductible amounts in any of the insurance policies furnished by the City shall be paid by the Contractor. If the City-provided OCIP policies described in Sections 5-4.6., 5-4.7 and 5-4.9 have deductible amounts greater than the Contractor-deductible amounts, such excess amounts will be paid by the City provided that the Contractor shall be responsible for losses greater than OCIP policy limits.
4. Require its subcontractors to waive the rights of recovery in the same manner as waived in the employees, and Contractors rendering services at the Work site, the Contractor, other Project contractors, and their subcontractors regardless of tier.

5-4.20 Contractor Obligations Under OCIP.

1. The Contractor shall:
 - a) Provide OCIP Coverage enrollment information as required by the City. Furnish to the OCIP Administrator and the insurance carriers all information and documentation that the OCIP Administrator may require from time to time in connection with the issuance of policies under this Contract, in such form and substance as the OCIP Administrator may prescribe.
 - b) Furnish to the OCIP Administrator monthly payroll reports on the form provided by OCIP Administrator, and payroll records as required.
 - c) Segregate their respective reports relating to the work for which OCIP coverage is herein provided from their records relating to other work for which such coverage is not provided.
 - d) Promptly comply with the policy requirements of the OCIP insurance carriers as submitted through the Project Manager.
2. The Contractor shall not violate or knowingly permit any subcontractor to violate any conditions of the policies of insurance provided by the City under the terms of the Contract and shall at all times satisfy the requirements of the insurance companies issuing them.
3. The Contractor shall assure that all OCIP requirements imposed upon and to be performed by the Contractor shall likewise be imposed upon, assumed, and performed by each of its subcontractors and uninsured parties with whom it or its subcontractors have a contractual relationship.
4. The Contractor shall furnish each bidding and negotiating subcontractor, vendor, supplier, material dealer, or other person or business entity that may provide goods or services in connection with the work a copy of this Section describing the insurance requirements for the Contractor and its subcontractors shall require each to impose the same requirement in their subcontracting and procurement procedures.
5. If the Contractor or any of its subcontractors should fail to comply with the requirements of this Section, the City may withhold payments due to the

Contractor or suspend the work until such time as the Contractor and its subcontractors have performed such obligations to the reasonable satisfaction of the Project Manager.

6. The Contractor shall include in the bid price the cost of complying with the OCIP as herein described.
7. Failure of the Contractor to enroll any sub-contractor of any tier in the OCIP, or to allow any sub-contractor to begin work on-site without proof of enrollment, shall constitute a breach of the OCIP insurance requirements. As such, all work performed by the sub-contractor, or any accident or injury as a result of the sub-contractor's activity, shall be considered an uninsured risk under the OCIP coverage. No OCIP insurance coverage of any line of insurance described in this document, shall extend coverage to the conditions described above.

5-4.21 OCIP Insurance Manual.

1. The OCIP Administrator will provide an OCIP Insurance Manual that will describe procedures relevant to the OCIP to the Contractor. The Contractor and its subcontractors are required to comply with the procedures therein described.

5-4.22 Alternative Insurance.

1. In the event the City is unable to furnish, or after commencement of work elects not to furnish or to continue to furnish the OCIP coverage herein described, and upon 30 days written notice from the City, the Contractor shall secure insurance as required under the Section 5-4.17 with limits as specified below (2). The Contractor shall be allowed a change order for increased costs of insurance that were excluded from the bid as required by this Supplemental Condition.
2. The coverage limits for insurance required pursuant to paragraph (a), and also for coverage not provided by OCIP Coverage such as automobile liability, shall be as follows:
 - a) Commercial General Liability - \$5,000,000 annual aggregate renewal
 - b) Contractors Pollution Liability - \$2,000,000 annual aggregate
 - c) Automobile Liability - \$5,000,000
 - d) Workers' Compensation and employer's liability - as required by California law with employer's liability of not less than \$1,000,000
 - e) Builder's Risk - Contract Value
 - f) Aircraft Liability: If aircraft is used by the Contractor, its subcontractors, or anyone else on their behalf, the Contractor or its subcontractor shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury, or property damage arising from aircraft owned, used, operated or hired in connection with the work by the

Contractor, subcontractor, or anyone else in limits of not less than \$10,000,000 combined single limit for each occurrence, for each aircraft.

5-4.23

Accident Reports And Claims.

1. Contractor shall immediately report (as soon as feasible, but not more than 24 hours after occurrence) to the City any accident or other occurrence causing injury to persons or property during the performance of this Contract. If required by the City's Risk Management Department, the report shall be made in writing and shall include, at a minimum:
 - a) the names, addresses, and telephone numbers of the persons involved,
 - b) the names, addresses and telephone numbers of any known witnesses,
 - c) the date, time and description of the accident or other occurrence.
2. All claims for damages, losses, expenses and other costs, received by the Contractor or the City, arising out of or resulting from or in connection with the performance of the Work shall be acknowledged by the Contractor by sending written notice to the claimant within 10 days of the Contractor's receipt of the claim. The written notice shall either:
 - a) confirm the Contractor's responsibility for damages and losses, and intent to pay or settle claim directly with the claimant; or
 - b) confirm the Contractor's responsibility for prompt investigation and processing of the claim, including identifying the Contractor's insurance carrier and claims adjuster, describing the Contractor's or insurance carrier's procedure for investigating and processing of the claim, and providing a name and telephone number for contacting the representative of the Contractor. A copy of the written notice of claim shall be delivered to the Project Manager. Should the Contractor state his intent to pay or settle the claim directly with the claimant, payment or settlement shall be made within 45 working days of receipt of the claim. Claims to be submitted to the Contractor's insurance carrier shall be forwarded to the insurance carrier within 30 calendar days of receipt of the claim. Failure by the Contractor to send the written notice of claim, or to notify the Project Manager of any claim, shall be cause for the City to withhold payments to the Contractor.
3. The City shall have full authority to compromise or otherwise settle any claim related to the Contract at any time. The City will notify the Contractor of the receipt of any third-party claim arising from or relating to the Work within 14 working days of the receipt of the claim by the City. The City shall be entitled to recover its reasonable costs incurred in providing the Contractor timely notification of third-party claims. Neither this Section nor the City's failure to give notice shall limit the City's ability to compromise or settle any claim.

5-4.24

Additional Insurance Provisions.

1. Nothing in Section 5-4 shall be construed to limit or qualify the liabilities and obligations otherwise assumed by the Contractor pursuant to this Contract, including but not limited to the provisions relating to indemnity and warranty.
2. The City may require the Contractor to provide complete copies of all insurance policies required by Section 5-4.
3. If at any time, the Contractor fails to maintain in full force any insurance required by the Contract, the City may acquire the necessary insurance for the Contractor and deduct the cost thereof from any payment due the Contractor.

PURE Program OCIP – Insurance Coverage by Project Segment Summary

Project Name: PWP NCWRP Flow Equalization Basin

Owner Controlled Insurance Program Insurance coverage provided for Contractor			Contractor/Sub-Contractor Insurance Requirements by type of insurance and limits still required under OCIP		
Type	Limit	Deductible	Contractor	Limit	Self-Insured Retention
General Liability	\$150M	\$15K	General Liability	\$5M	Needs Approval
Automobile Liability**	N/A	N/A	Automobile Liability	\$5M	Needs Approval
Workers Compensation	CA Statutory - \$1M employers Liability	N/A	Workers Compensation	CA Statutory - \$1M employers Liability	
Pollution Liability*	\$50M		Pollution Liability*	N/A	N/A
Builders Risk***	Contract Value	\$25K	Builders Risk*	N/A	N/A
*Indicates shared limit among all Pure projects, per project limit applies **N/A indicates not provided by OCIP coverage *** AOP deductible per occurrence with no aggregate – deductible limit for Flood/Water and LEG3 is \$50K			Sub-Contractor	Limit	Self-Insured Retention
			General Liability	\$1M	Needs Approval
			Automobile Liability	\$1M	Needs Approval
			Workers Compensation	CA Statutory - \$1M employers Liability	
			Pollution Liability*	N/A	N/A
			Builders Risk*	N/A	N/A
			* Coverage provided by OCIP		

Contractor Insurance Required if OCIP is unavailable at commencement of work or cancelled after construction has begun			General Notes – Pure Water OCIP Coverage PWP NCWRP Flow Equalization Basin
Type	Limit	Self-Insured Retention	1) Contractor obligation for payment of the deductible under the OCIP coverage is triggered by insurance carrier acceptance of claim. 2) At issuance of the Notice to Proceed, the shared OCIP coverage limits remain at 100% of the values stated above.
General Liability	\$5M	Needs Approval	
Automobile Liability	\$5M		
Workers Compensation	CA Statutory - \$1M employers Liability		
Pollution Liability	\$2M		
Builders Risk	Contract Value	Needs Approval	

Notes: OCIP will utilize a per-occurrence deductible program. If Contractor utilizes Self-Insured retention insurance, it will require approval of the self-insurance retention amount the contractor declares.

ADD:

5-7.2.1.1 Safety, Sanitation, Medical, And Drug And Alcohol Requirements.

1. The Contractor shall have ultimate responsibility for the health and safety of its employees. These specifications shall not be construed to limit the Contractors liability nor to assume that the City, its employees, agents, or designates shall assume any of the Contractors liability associated with its safety performance.
2. The Contractor shall promptly and fully carry out the safety, sanitary, and medical requirements as stated in the contract documents and as may from time to time be prescribed by the Engineer, to the end that proper work shall be done, and the safety and health of the employees and of the public are preserved and safeguarded. In case such regulations and orders are not observed by the Contractor, they may be enforced by the Engineer at the Contractor's expense. The Contractor shall summarily dismiss and shall not again engage, except with the written consent of the Engineer, any employee or subcontractor who knowingly and willingly violates the safety, sanitary, or medical requirements. Such discharge shall not be the basis of any claim for compensation or damages from the Contractor against the City, its OCIP Insurance, or any of its officers, employees, consultants or agents.
3. Appropriate first aid facilities and supplies shall be kept at the site of the Work, and the Contractor shall provide and maintain all measures required by the Construction Safety Orders issued by the Division of Industrial Safety of the State of California.

4. The Contractor shall prohibit the use or possession of intoxicating liquors or controlled substance at the jobsite or in any vehicle or equipment used in performance of the Work. This prohibition shall not apply to use or possession of prescription or non-prescription medication in accordance with prescribed directions.
5. Employ a “competent person” as defined by Cal OSHA. The “competent person” shall monitor, educate, and facilitate safety related jobsite activities. This individual shall be on the jobsite during all work hours identified in Section 6.7, Paragraph (b), or as authorized in writing by the Engineer.
6. When trenching, place your name and emergency telephone number adjacent to the Work at intervals and locations approved by the Engineer. The method of marking shall be approved by the Engineer.
7. The City shall not assume any role in determining the adequacy of the Contractors Safety and Health Plan.

ADD:

5-7.2.1.2

Contractor's Safety And Health Representatives

1. The Contractor shall provide a qualified and experienced full-time, on-site Safety Professional to serve as their Safety and Health Representative. Qualifications shall include at least 10 years of construction related safety experience as the lead site safety representative (only duty) and experience in developing and implementing accident prevention programs for construction projects. If the Contractors Safety and Health Representative has less than 10 years construction related safety experience, or equivalent level of education and experience, the Contractors Safety and Health Representative must be approved by The City of San Diego. This individual shall be assigned only to this project and whose sole duty is monitoring and supervising the Contractor’s and Subcontractors’ Safety, Health, and Environmental Program, and who shall be on-site when any work is in progress. In the event the Contractor’s Safety Representative gives notice of separation of employment or is transferred from the Contractor’s work site, the Contractor shall ensure that the incumbent Safety Representative remains on site for a minimum of two weeks after giving notice, and that the Contractor’s replacement Safety Representative receives a minimum of two weeks safety orientation on the construction site before being allowed to assume the full duties as the Contractor’s Safety Representative. This requirement may be waived upon written approval by the City. The Contractor’s Safety and Health Representative shall support and Implement the OCIP Safety Program, or its equivalent and shall coordinate and require the Contractor’s and Subcontractor’s foremen to participate in the OCIP Program and conduct and submit the required audits as described in the Safety Programs section of the OCIP Construction Safety Procedures Manual. In the event the Contractor fails to comply with the above safety professional requirements, the Engineer shall obtain the services of a Safety Professional, and charge all costs associated with the services to the Contractor.

2. The Contractor's safety and health representatives shall be responsible for, and have the authority to, direct the required safety and health programs, correct unsafe conditions and unsafe practices, and stop work in areas containing unsafe conditions or practices until such unsafe conditions or practices are correct.
3. The Contractor's safety and health representatives shall be charged with the responsibility of daily on-site safety and health coordination and inspections and shall record the results of the inspections and corrective actions, if any, on a report form provided by the City.
4. The weekly report shall be submitted to the Engineer not later than the first working day following the workweek covered by the report.
5. Contractor's Safety and Health representatives shall participate in weekly progress meetings and report out on safety conditions at the worksite.

5-7.2.1.3 Submittals.

1. Submit, within 30 days of the Notice of Award and before execution of the Contract or at a later time as directed by the Engineer a Project-specific safety and health program conforming to applicable laws and regulations that includes the following:
 - a) A Project-specific Injury and Illness Prevention Program covering work performed by or for the Contractor at the site.
 - b) The resume of qualification and experience for the Contractor's on-site safety representative responsible for safety and health.
 - c) A written Hazard Communication Program covering work performed by or for the Contractor at the site.
 - d) A written Emergency Action and Fire Protection Plan and a written Fire Prevention Plan covering work performed by or for the Contractor at the site. The Contractor shall have the Fire Protection Plan reviewed and approved by the jurisdictional fire protection agency. The Contractor's Fire Protection Plan shall include:
 - i. Dedication of an on-site 2,000 gallon or greater water truck fitted with a one and one half inch fire hose that shall have the ability to access all on-site construction operations.
 - ii. Fire watch on-site during construction operations. This role may be filled by the Contractor's safety representative.
 - iii. Contractor shall check in daily with CAL FIRE for an update on fire conditions and to determine if any fire restrictions have been ordered. This information shall be included on the Contractor's Daily Report to the Engineer.

- iv. Contractor shall cease brush clearing, cutting, or chipping operations when a red flag fire day is declared by the jurisdictional fire agency.
 - v. Contractor shall have tailgate meetings daily to communicate fire conditions and fire prevention measures necessary for the daily work.
- e) A written hazard safety analysis of the project conditions. The Contractor shall perform a comprehensive site analysis before commencement of work to determine any existing hazards and shall abate these hazards or inform the Engineer and all affected employees of these hazards and how to protect themselves from them.
 - f) In addition to the reports that the Contractor is required to file under the provisions of California Workers' Compensation law and other applicable laws, submit a report to the Engineer on or before the 10th day of each month giving:
 - i. The total force employed on the contract in workdays during the previous calendar month.
 - ii. The number and character of all accidents resulting in loss of time, medical treatment and first aid treatment.
 - iii. Any other information or classification of employee injuries incurred on the Project and disabilities resulting there from that may be required by the Engineer.
 - g) Obtain and keep copies of the Material Safety Data Sheets of all hazardous materials brought to and stored at the site.

5-7.2.1.4 Emergency Procedures.

1. Designate responsible personnel to make emergency calls. Should an emergency occur, the Contractor shall:
 - a) Immediately secure the area and implement the Emergency Action Plan. Preserve the site for investigation until released by OSHA, the Engineer or OCIP Insurance Provider.
 - b) Notify the Construction Management Team or another representative previously designated by the Engineer in writing.
 - c) Provide information regarding the emergency to the appropriate authorities and authorized City representatives only. Questions from others including the press and media shall be referred to the Engineer.
2. Emergency procedures shall ensure that the Contractor's Safety Representative or the most qualified senior supervisor present takes charge and directs the handling of the emergency. The Contractor shall ensure proper handling of all Subcontractor related emergencies per the Contractor's and OCIP Emergency Procedures.

3. All Incidents, whether causing injury, environmental impacts or unauthorized property damage or not, shall be investigated by the Contractor and documented on forms provided by the OCIP and as required by the OCIP Construction Procedures Safety Manual. Instruct and require supervisors that, except for rescue or other emergency measures, the Incident site shall be secured until investigation has been completed and the scene has been released by both the Contractor and the Engineer, and as appropriate, the insurance company/OSHA.
4. Injuries which require medical attention shall be reported to the Engineer or Construction Management Team immediately after summoning medical help and securing the scene to prevent further injury. Injuries which meet the Cal/OSHA, Title 8 requirement as reportable shall also be reported to Cal/OSHA immediately. The Contractor shall investigate and generate a report which identifies the root causes and corrective actions for all accidents and incidents. This report shall be on the OCIP Incident form or an equivalent form approved by the Engineer. The Construction Management Team will also investigate all accidents and incidents to identify means to prevent further occurrences
5. For incidents that caused or had the potential to cause injury or significant losses, the Engineer or Construction Management Team may request a post Incident review. In such cases, the Contractor, Subcontractor, or other entity shall send an appropriate Manager to present the facts of the incident and provide information how future similar incidents will be prevented.
6. Immediately notify the Engineer or OCIP Safety Manager of any unabated hazardous conditions and take action to guard or control access to these conditions until correction has been accomplished. Notify the Engineer of any property or equipment found at the work site that is not under the Contractor's control. However, it shall be the Contractor's responsibility to take necessary precautions to prevent injury to persons or damage to property from such hazardous conditions until corrected by the responsible party.

5-7.2.1.5 Safety And Health.

1. Have and implement a written site-specific IIPP and Code of Safe Work Practices covering site work to be performed under the contract.
 - a) If not a part of the IIPP, the following procedures shall also be implemented:
 - i. Stress the importance of, and conduct a thorough hazard safety analysis at the start of the project.
 - ii. Participate to develop and ensure all key staff are aware of the project hazards and keep staff informed of existing and developing safety hazards.
 - iii. Encourage all suppliers to visit the project site to assess hazards before the delivery of materials.

- b) Foremen and superintendents shall provide written Job Task Analysis for all tasks. The JTA shall include all hazards that might be encountered while performing the task and methods for assuring that each employee will be protected from the hazard.
- c) Utilize supervisory and craft employees to conduct and document a jobsite Safety Survey each week. Each survey shall include subcontractor activities. Utilize the results of each survey to inform Contractor and Subcontractor employees and other affected jobsite individuals of hazards on the job and how to protect themselves from these identified hazards. Survey shall be submitted to the Engineer for review and comment. Identify upcoming jobs and associated hazards and notify affected employees and individuals.
- d) Before authorization or start of construction, the Contractor shall prepare a Spill Prevention and Contingency Plan for review and approval of the appropriate jurisdictional agency and all construction crew members shall be trained in the requirements of the Spill Prevention and Contingency Plan. The Plan will include information on storage of hazardous materials, emergency response procedures, employee training requirements, fire safety, first-aid procedures, hazardous materials release containment/control procedures, and release reporting requirements. The Contractor shall integrate this SP&CP into the IIPP.
- e) All persons shall be required to wear American National Standards Institute approved hard hats while at the Work site; no bump caps will be permitted. Each employee's hard hat shall identify the employee's name and employer. Steel toed shoes shall be worn when in active construction zone. Safety vest or equivalent shall be worn in addition to hard hat when in active construction zone.
- f) When sufficient time is available, notify the City in advance of safety inspections by Cal/OSHA, the fire department, or other governmental agencies. When regulatory agencies arrive on-site for unannounced inspections, the Contractor shall immediately inform the Engineer and the Construction Management Team and shall escort the inspector(s) for the entire duration of their time on-site. When the Engineer is not present during a safety inspection, immediately report to the Engineer that an inspection has taken place, and describe any violations, or citations, and the Contractor's abatement actions or salient events arising from the inspection.
- g) The Contractor shall be responsible to ensure compliance with the specific policies and procedures established in the OCIP Construction Safety Procedures Manual. To ensure Contractor and Subcontractor compliance with the IIPP's and applicable laws, contractor specifications, and the Owner Controlled Insurance Program, the Engineer or Construction Management Team Representative will use a Schedule Driven Safety Program and a Managing Safety

Performance or equivalent program(s) as approved by the Engineer to gauge the Contractor's compliance and adherence to its site-specific IIPP and applicable laws and regulations. Such monitoring and audits by the Construction Management Team or the Engineer will not relieve the Contractor of any safety and health obligations.

- h) Eating and drinking shall not be permitted in areas containing hazardous materials.
- i) Equipment shall be maintained in a proper state of operation as per the manufacturer's specifications. Equipment service records will be maintained and be available for inspection to ensure compliance.
- j) Reduce harmful combustion engine emissions to the greatest extent feasible by conducting preventive maintenance on construction equipment and, whenever possible, limit equipment idling time by such means as turning engines off while vehicles are in loading and unloading queues; use clean and low sulfur fuels and use electric motors to drive conveyor belts, pumps, compressors, and other equipment.
- k) All personnel shall wear appropriate Personal Protective Equipment in accordance with the Contractor's IIPP, regulatory requirements, and the OCIP Construction Safety Procedures Manual. All personnel in active construction areas shall be required to wear approved hard hats, eye protection, safety vests with reflective stripes, steel toed work shoes, long pants, and shirts with sleeves. Gloves, hearing protection, and additional eye protection may be required as appropriate.
- l) No asbestos- or PCB-containing materials shall be used.
- m) At the beginning of the Project, the Contractor shall post at the entrance to the construction site a sign of size and wording approved by the Engineer listing the general rules, regulations, attire, and PPE requirements.

5-7.2.1.6 Safety And Health Training.

1. The Contractor's safety and health representatives shall conduct training classes before commencement of the Work and on a monthly basis, or more often if needed, on safety and health, emergency procedures, first aid, fire prevention, and other areas applicable to the Work. The Contractor may seek input from the Engineer.

5-7.2.1.7 First Aid.

1. The Contractor is responsible to provide initial emergency care and to notify Emergency Responders by calling 911 when required. The contractor is also responsible to arrange for transportation of sick or injured persons off the job site when other than emergency transport is appropriate.

5-7.2.1 General. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

5-7.2.1 Regulatory Requirements.

1. You shall have copies of the following at the Work site. The required information shall be made available to the Construction Management Team and the Engineer for review upon request.
 - a) A complete copy of the California Code of Regulations, Title 8.
 - b) Material Safety Data Sheets for all hazardous materials being used or stored at the site.
 - c) Permits required for the Work
 - d) All records and information required by the Construction Safety Procedures Manual

5-10 COMMUNITY OUTREACH. To the "WHITEBOOK", DELETE all sections and subsections in its entirety and SUBSTITUTE with the following:

5-10.1 General.

1. To ensure consistency with the City's community outreach plan for the project, the City shall work with you to inform the public (which includes, but shall not be limited to, property owners, renters, homeowners, business owners, business patrons, recreational users, and other community members and stakeholders) of construction impacts, including when, where, and how long the impacts will last. Your efforts to mitigate construction impacts by communicating with the public require close coordination and cooperation with the City. Community outreach will be led by the Owner's Outreach team and supported by the Contractor.
2. You shall perform the community outreach activities required throughout the Contract Time. You shall assign a staff member from your construction team who shall perform the required community outreach services as a point of contact for the Owner's Outreach team and Construction Manager/Resident Engineer.
3. You shall closely coordinate with the Owner's Outreach team and work with the businesses, institutions, residents, and property owners impacted by the Project.
4. Your example duties include working with the Owner's Outreach team to notify businesses, institutions, and residents of the commencement of construction activities not less than five (5) days in advance, coordinating access for vehicular and pedestrian traffic to businesses, institutions, and residences impacted by the Project, reporting activities at all Project progress meetings scheduled by the Engineer, attending the Project Pre-construction

meeting, attending up to eight (8) community meetings, attending one-on-one meetings with businesses and stakeholders as needed, participating in facility tours as needed, and supporting responses to community questions and complaints related to your activities.

5. All members of your crew shall participate in outreach meetings, including an initial orientation meeting, led by the City and Owner's Outreach team to discuss expectations for and participation in outreach tasks throughout the Contract Time.
6. The assigned staff member responsible for performing required community outreach services shall maintain an outreach materials kit provided and updated by the Owner's Outreach team.
7. You shall execute the Information Security Policy (ISP) Acknowledgement Form - For Non-City Employees within 15 Days of the award of the Contract if any of the following apply:
 - a) Your contact information is made available on any outreach materials.
 - b) Contractor will be the primary point of contact to resolve project related inquiries and complaints.
8. Electronic Communication.
 - a) All inquiries and complaints shall be sent to the Owner's Outreach team to be logged in to the City's internal public contact tracking system within 24 hours of receipt of inquiries and complaints.
 - b) Any updates or a resolution of inquiries and complaints shall be sent to the Owner's Outreach team to be documented in the City's internal public contact tracking system within 24 hours.
 - c) Copies of email communications shall be saved individually on to the City's internal public contact tracking system in an Outlook Message Format (*.msg).
 - d) All graphics, photos, and other electronic files associated with inquiries and/or complaints shall be provided to the Owner's Outreach team to be saved into the individual records, located within the City's internal public contact tracking system.

5-10.1.1 Quality Assurance.

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

- c) Have the interpersonal skills to effectively, professionally, and tactfully represent you, the project, and the City to the public.

5-10.1.2 Submittals.

1. All public notifications and outreach materials will be prepared by the Owner's Outreach team and shall be delivered/distributed by you. After distributing, you shall submit verification of delivery and any copies of returned notices to the Owner's Outreach team. Submit a PDF copy of the approved letters and notices to the Owner's Outreach team.
2. You shall provide the required information to the Owner's Outreach team for the creation and distribution of newsletters, e-newsletters, website updates, etc., for a project including: a written update on the progress of Work, 3 week look-ahead schedules, contact names and phone numbers, and any other information which may be of interest to the public for this purpose.
3. You shall identify and summarize communications (via phone, in person, and email) with the public within 24 hours of receipt, even if your response to the individual is still incomplete, to the Owner's Outreach team for inclusion in the City's internal public contact tracking system. You shall submit copies of all written, electronic, and verbal communications and conversations with the public to the Owner's Outreach team for reporting to the City's internal public contact tracking system.

5-10.1.3 Weekly Updates Recipients.

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

5-10.2 Community Outreach Services.

5-10.2.1 Public Notice by Contractor.

1. Post Project Identification Signs in accordance with 3-11.2., "Project Identification Signs".
2. No less than 5 Working Days in advance of Project construction activities and utility service interruptions, you shall coordinate with the Owner's Outreach team to notify all critical facilities, businesses, institutions, property owners, residents, or any other impacted stakeholders within a minimum 300-foot (90 m) radius of the Project. Verbal and written notifications shall be sent to critical facilities (including but not limited to police stations, fire stations, hospitals, and schools). A copy of written notifications sent to any critical facility shall also be sent to the Resident Engineer. You shall coordinate with the Outreach team to keep records of the people contacted, along with the dates of notification, and shall provide the record to the Engineer upon request. You shall identify all other critical facilities that need to be notified.

3. Distribute public notices in the form of door hangers using the City's format to all occupants and/or property owners along streets:
 - a) Where Work is to be performed at least Working 5 Working Days before starting construction or survey activities or impacting the community as approved by the Resident Engineer.
 - b) Additional notifications (five (5) Days in advance and on the day of impact) shall be distributed to properties where driveways will be closed for any period of time or where there will be a water shut-off for a period of time.
 - c) Within five (5) Days of the completion of your construction activities where Work was performed, Contractor shall distribute public notices in the form of door hangers, which outlines the anticipated dates of road repairs and specifies between Asphalt Resurfacing or Slurry Seal.
 - d) 72 hours in advance of scheduled resurfacing.
4. Leave the door hanger notices on or at the front door of each dwelling and apartment unit and at each tenant of commercial buildings abutting each of the street block segments. Where the front doors of apartment units are inaccessible, distribute the door hanger notices to the apartment manager or security officer.
5. Door Hanger Material: Contractor shall use Blanks/USA brand, Item Number DHJ5B6WH, 1¼ inch (31.8 mm) Holes (removed), 2-up Jumbo Door Hanger in Bristol White, or approved equal.
6. Mailed Notice Material: Contractor shall use Cougar by Domtar, Item Number 2834, or approved equal.
7. For all Work on private property, contact each owner and occupant individually a minimum of 15 Days prior to the Work. If the Work has been delayed, re-notify owners and occupants of the new Work schedule, as directed by the Resident Engineer. All contacts shall be documented and provided to the Owner's Outreach team to ensure inclusion in the City's internal public contact tracking system.
8. A Sample of Public Notice is included in the Contract, see **Appendix K**.

5-10.2.2 Communications with the Public.

1. Coordinate access for vehicular and pedestrian traffic to businesses, institutions, and residences impacted by the Project.
2. You shall provide updates on construction impacts to the Resident Engineer and the Owner's Outreach team. You shall notify the Resident Engineer in advance about time-sensitive construction impacts and may be required to distribute construction impact notices to the public on short notice.
3. You shall incorporate community outreach activities related to construction impacts in the baseline schedule and update the Resident Engineer and the

Owner's Outreach team with each week's submittal of the Three-Week Look Ahead Schedule.

4. At the request of the Resident Engineer or the Owner's outreach team, you shall attend and participate in project briefings at community meetings and one-on-one meetings with businesses and/or stakeholders.
5. You shall coordinate with the Resident Engineer and Owner's Outreach team on all responses and actions taken to address public inquiries and complaints within the 24 hours that they are received.

5-10.2.3 Communications with Media.

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

5-10.3 Project Webcams.

1. Provide and maintain two (2) pole mounted high definition web cameras at locations identified by the City to allow users to remotely view the project on a secure connection.
2. Manufacturer: TrueLook or approved equal.
3. Requirements:
 - a) Thermostatically controlled enclosure with heater and blower.
 - b) Powder coated aluminum housing with stainless steel fittings for padlocks.

- c) Impact resistant viewing window.
 - d) Two UL rated compression glands, gas spring lid, and adjustable camera sled.
 - e) Canon digital SLR camera with 12.2 megapixel images (4272x2828 pixels), APS-C Imager or approved equal.
 - f) Angle of view: wide 63 degree horizontal – 44 degree vertical, full zoom 22 degree horizontal – 15 degree vertical.
 - g) EF-S, or approved equal, 18mm-55mm f/3.5-5.6 Image Stabilization lens.
 - h) Compression: JPEG/RAW.
 - i) Auto Features: ISO speed, metering mode, white balance, and focus
 - j) 4GB onboard storage.
 - k) 120VAC or 12 VDC Solar Power with battery sufficient for minimum 48 hours of overcast weather.
 - l) Communications: 10base-T/100base-TX Ethernet, IP Addressing: Dynamic or Static.
 - m) Wireless cellular modem EVDO REV.A, or approved equal, with full duplex transceiver with GPS and exterior outdoor antenna.
4. Online Web Interface: The Web Camera will function via a web based interface to allow the viewing of all High Definition still images captured and stored from any location without internet access.
5. The Online Web Interface shall include:
- a) City logo and project name.
 - b) Multiple tabs option for accession multiple cameras from one page.
 - c) Digital Pan, Tilt, and Zoom capability within a High Definition image.
 - d) Easy navigation with intuitive image calendar control.
 - e) Automated image geotagging with camera location.
 - f) Downloadable up-to-date high quality time-lapse movies with embed code for adding the time-lapse to websites.
 - g) Image Comparison Tool for overlaying two images from different dates and times for comparison.
 - h) Share Image Tool for saving and emailing.
 - i) Local weather data.
 - j) Google Maps integration of GPS data showing camera location.
 - k) The system shall capture and upload images every 30 minutes, 24 hours per day.

- l) The System Vendor will maintain images on their servers for reference available at all times during the life of the project. All images will be protected on secure fully redundant servers at multiple locations owned and operated by the System Vendor.
- 6. In coordination with the City, the System Vendor shall provide an embed code or web interface link with Contractor's project details for unlimited public or private access.
- 7. The Contractor shall provide a fixed pole (minimum 40 feet height and three inches minimum diameter) as per System Vendor's instruction. The Contractor shall supply all equipment required for safe and secure access to the camera location, including building access, bucket truck and/or lift, for technicians performing installation and maintenance services.
- 8. Contractor shall pay for cellular service for both cameras until Final Completion of the Work. City will pay for website services and shall have full control over content and security.

Following completion of the project, Contractor shall turn over cameras, poles and other related equipment to the City.

5-10.4 Payment.

- 1. The payment for these community outreach services shall be included in the Contract Price.

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

- 1. PM Web shall be used on this Contract. See Technicals Section 01 33 22 Web Based Construction Document Management.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

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

- e) Monthly progress payments are contingent upon the submittal of an updated Schedule to the Engineer. The Engineer may refuse to process the whole or part of any monthly payment if you refuse or fail to provide an acceptable schedule.
- 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/ecp/edocref/>

6-1.1.2 Contracts More Than \$500,000 In Value. To the “WHITEBOOK”, item 1, DELETE in its entirety and SUBSTITUTE with the following:

1. Provide the Schedule to the Engineer in accordance with 6-1.1, “Construction Schedule” and 6-1.2, “Commencement of the Work”.

To the “WHITEBOOK”, item 2, DELETE in its entirety.

6-1.2 Commencement of the Work. To the “WHITEBOOK”, ADD the following:

5. You shall submit a Cost Loaded Construction Schedule in accordance with 6-1.1, “Construction Schedule” at the scheduled pre-construction meeting.
6. If a Cost Loaded Construction Schedule is not provided, the pre-construction meeting will still be held. The Contract Time shall commence at issuance of the NTP, but you shall be limited to the following activities until the Cost Loaded Construction Schedule has been submitted to the Resident Engineer with no exceptions taken:
 - a) Mobilization of your trailers, associated utility setup, and grading for trailer area
 - b) Permit Procurement
 - c) Fencing and temporary utilities for your storage areas
 - d) Submittal of anticipated critical path submittals

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 as provided here:
 - a) Activities that disrupt plant operations are prohibited during the summer, unless otherwise approved in writing by the Owner.

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:

1. 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 an **Environmental Impact Report/ Environmental Impact Statement (EIR/EIS)** for the Pure Water San Diego Program, North City Project, **SCH#2016081016/PTS #499621**, for Pure Water Phase 1, which includes the North City Water Reclamation Plant Expansion and Flow Equalization Basin and is incorporated into this Contract and this document may be obtained at the following web link:

<https://www.sandiego.gov/public-utilities/sustainability/pure-water-sd/reports>

2. You shall comply with all requirements of the **Environmental Impact Report (EIR)** Mitigation Measures as set forth in **Appendix A**.
3. In addition, Pure Water Phase 1 has obtained environmental documents and permits listed below that the Contractor shall comply with:

ENVIRONMENTAL DOCUMENTS
Site Development Permit
Record of Decision
Federal Aviation Administration Determination of No Hazard
Air Pollution Control District Authority to Construct
County Department of Environmental Health Hazardous Materials Questionnaire

These documents can be obtained at the following link:

https://drive.google.com/drive/folders/1yuDScR_xf7kJRZKojWmR7K9awALpQ1hY?usp=sharing

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

6-6.2.1 Archaeological and Native American Monitoring Program. To the “WHITEBOOK”, ADD the following:

4. The City will retain a qualified archaeologist and Native American Monitor for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the archaeologist and Native American monitor. Notify the Engineer before noon of the Working Day before monitoring is required. See 3-5, “INSPECTION” for details.

6-6.2.2 Paleontological Monitoring Program. To the “WHITEBOOK”, ADD the following:

3. The City will retain a qualified paleontologist for this Contract. You shall coordinate your activities and Schedule with the activities and schedules of the paleontologist monitor. Notify the Engineer before noon of the Working Day before monitoring is required. See 3-5, “INSPECTION” for details.

6-9 LIQUIDATED DAMAGES. To the “WHITEBOOK”, ADD the following:

3. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Contract Times in the Scope of Work. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), the Contractor shall pay the following amounts for each Milestone for each day that expires after the time specified herein until the Work is substantially complete. If the Work of multiple Milestones are simultaneously not completed by the times specified, the Contractor shall pay the highest amount among the Milestones not completed.

Milestone No.	Milestone Description	Required Completion Date	Amount of Liquidated Damages
Milestone 1	Completion and Early Acceptance for Beneficial Use of the Flow Equalization Basins Facility 12	413 Working Days after Notice to Proceed	\$3,200/Calendar Day
Milestone 2	Substantial Completion	477 Working Days after Notice to Proceed	\$3,200/Calendar Day
Milestone 3	Final Acceptance and Completion	530 Working Days after Notice to Proceed	\$3,200/Calendar Day

SECTION 7 – MEASUREMENT AND PAYMENT

7-3.1 General. To the “GREENBOOK” and “WHITEBOOK”, paragraph (8), DELETE in its entirety and SUBSTITUTE with the following:

If, within the time fixed by law, a properly executed notice to stop payment is filed with the City, due to your failure to pay for labor or materials used in the Work, all money due for such labor or materials will be withheld from payment in accordance with applicable laws.

To the “WHITEBOOK”, ADD the following:

1. Unless specified otherwise, the Contract Price includes use, consumer, and other taxes mandated by applicable legal requirements.
2. As provided in §7105 of the California Public Contract Code, if the Contract is not financed by revenue bonds, you are not responsible for the cost of repairing or restoring damage to the Project when damage was proximately caused by an act of God, in excess of 5% of the Contract Price, if the following occur:
 - a) The Project damaged was built in accordance with the Contract requirements.
 - b) There are no insurance requirements in the Contract for the damages.

7-3.2 Partial and Final Payment. To the “WHITEBOOK”, item 1, DELETE in its entirety and SUBSTITUTE with the following:

1. The Final Payment, which is the release of Retention, shall be paid to you after you have successfully submitted the following required documents:
 - a) An affidavit that payrolls and bills for materials, equipment, and other indebtedness connected with the Work for which the City or the City's property might be responsible for or encumbered by.
 - b) A certificate evidencing that insurances required by the Contract Documents shall remain in force after Final Payment is currently in effect and shall not be canceled or allowed to expire until at least a 30 Calendar Days prior written notice has been given to the Engineer.
 - c) Consent of Surety to Final Payment.
 - d) If required by the Engineer, other data establishing payment or satisfaction of obligations such as receipts, releases and waivers of liens, claims, and security interests or encumbrances arising out of the Contract Documents. If a Subcontractor refuses to furnish a release or waiver required by the City, you may furnish a bond satisfactory to the Engineer to indemnify the City against such lien.
 - e) If required in the Contract Documents, the successful completion and submittal of the required reports such as construction demolition, waste recycling, and hydrostatic discharge reports.

- f) Required EOCF Final Summary Report in accordance with Section 0-12, "Contract Records and Reports", record drawings, operations manuals, test reports, warranty documentation, and UL labels shall be submitted before requesting the release of retention.
- g) Acceptance of the completed Project by the asset owning Department.

To the "WHITEBOOK", ADD the following:

- 2. Submit an invoice for payment after you successfully complete the required documents and the City will pay the invoice within 30 Calendar Days. The City will pay 6% annually for late retention payments.

7-3.2.1 Application for Progress Payment. To the "WHITEBOOK", item 3, DELETE in its entirety and SUBSTITUTE with the following:

- 3. The City shall not pay progress or partial payments until you submit to the Engineer an acceptable updated Schedule. It is solely your responsibility to prepare and submit the Schedule updates.

7-3.2.2 Amount of Progress Payments. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

- 1. The City will pay 6% annually for late progress payments.
- 2. Progress payments will be considered "late" if the following occur:
 - a) The City does not pay the contractor within 30 Calendar Days from receipt of an undisputed and properly submitted invoice. A properly submitted payment invoice means that the City has approved for payment the entire invoice amount or if the Resident Engineer has not disputed any portion of the application within 7 Calendar Days of the date of submission.
 - b) The application for payment does not require signing of a Contract Change Order.
- 3. The Engineer may withhold payment for any of the following reasons:
 - a) Defective or incomplete Work.
 - b) Not providing an updated and accurate Cost Loaded Construction Schedule in accordance with 6-1.1, "Construction Schedule".
 - c) Stop notices, wage orders, or other withholdings required by Applicable Law. Your failure to comply with 5-3.3, "Payroll Records" and the Contractor Registration and Electronic Reporting System requirements of the Contract Documents.
- 4. The Engineer may back charge the contract for any of the following reasons:
 - a) Defective or incorrect Work not remedied.
 - b) Damage to City property or a third party's property that was caused by you.
 - c) Liquidated Damages.

7-3.2.3 Waiver of Claims at Final Payment. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. Your acceptance of Final Payment constitutes a waiver of affirmative Claims by you, except those previously made in writing and identified as unsettled at the time of Final Payment.

7-3.2.4 Withholding of Payment and Back Charge. To the "WHITEBOOK", DELETE in its entirety.

7-3.5.1 General. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. Unit Bid prices shall not be subject to adjustment regardless of quantity used, or if none is used, for the following Bid items:
 - a) imported backfill
 - b) shoring
 - c) water services
 - d) house connection sewers
 - e) water pollution control items
2. Upon discovery and prior to the Work, you shall notify the Resident Engineer if there is a change in Bid item quantity that increases the total Contract Price by 5% or \$100,000 or more, whichever is less.

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.

7-4.3 Markup. To the "WHITEBOOK", item 4, DELETE in its entirety and SUBSTITUTE with the following:

4. When a Subcontractor is performing Extra Work, the allowance for overhead and profit shall be applied to the labor, materials, and equipment costs of the Subcontractor as follows:
 - a) Regardless of the number of a Subcontractor's tasks for Extra Work, you may only apply 10% for the first \$50,000 of the Subcontractor's portion of accumulated total cost then 5% for any remaining costs. You shall not apply 10% to any costs after the first \$50,000 of accumulated total costs from performing Extra Work.
 - b) If the accumulated costs of single or subsequent tasks exceed the \$50,000 threshold, you shall instead only apply 5% to any amounts in excess of the \$50,000.
 - c) Regardless of the number of hierarchical tiers of Subcontractors, you may only markup a Subcontractor's Work once.

SECTION 209 – PRESSURE PIPE

209-1.1.1 General. To the "WHITEBOOK", ADD the following:

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

3. Refer to AWWA C900-16 for all references to AWWA C905.

SECTION 212 –WATER AND SEWER SYSTEM VALVES AND APPURTENANCES

212-10.6.3 Polymer Concrete Water Meter Boxes. To the “WHITEBOOK”, DELETE in its entirety and SUBSTITUTE with the following:

1. Boxes and covers shall be in accordance with the Water Approved Materials List or approved equal.
2. Boxes and covers to be installed in all areas shall have a reinforced polymer concrete frame and cover designed for AASHTO H-20 traffic loading.
3. Covers shall have a logo reading “CITY SD WATER” as well as the manufacturer’s name or logo cast in the polymer concrete surface. A cover selected at random shall be tested.
4. Covers shall be solid per SDW-136, sheet 1 only. Reader lids shall not be installed.

SECTION 402 – UTILITIES

402-2 PROTECTION. To the “WHITEBOOK”, item 2, ADD the following:

- g) Refer to **Appendix L - Advanced Metering Infrastructure (AMI) Device Protection** for more information on the protection of AMI devices.

402-7.2 Pipe Separations. To the “WHITEBOOK”, item 1, subsection “a”, DELETE in its entirety and SUBSTITUTE with the following:

- a) You shall notify the Engineer immediately if:
 - i. 1 foot (0.3 m) vertical separation as measured from the outside of pipe wall to the outside of pipe wall between sewer and water mains cannot be maintained.
 - ii. 10 feet (3.0 m) horizontal separation as measured from the outside of pipe wall to the outside of pipe wall between sewer and water mains cannot be maintained.
 - iii. 6 inches (152.4 mm) vertical separation as measured from the outside of pipe wall to the outside of pipe wall between utilities other than sewer and water mains cannot be maintained.
 - iv. 3 feet (0.9 m) or more of cover over the top of the water main cannot be maintained.
 - v. 5 feet (1.5 m) or more of cover over the top of the recycled water main cannot be maintained.

601-2.1.2 Engineered Traffic Control Plans (TCP). To the "GREENBOOK", ADD the following:

5. Determining the means and methods for access, mobilization, and haul routes shall be your responsibility. If applicable, coordination with Caltrans may require Engineered TCP (2 foot x 3 foot size) for the following areas:
 - a) Miramar Road

601-3.6 Channelizing Devices. To the "WHITEBOOK", item 4, Barricades, ADD the following:

- h) You shall place "OPEN TRENCH" signs (C27(CA)) on Type 3 Barricade within the construction Work zone, ahead of any Work areas with open trenches that are greater than 3 inches in depth, in accordance with California MUTCD SECTION 6F.103 (CA). The barricades shall be placed in a continuous manner and shall prevent pedestrian, vehicular, and biker access to the open trench area.

SECTION 700 – MATERIALS

700-5.1 Vehicle Detectors. To the "WHITEBOOK", item 1, DELETE in its entirety and SUBSTITUTE with the following:

1. Loop wire shall be Type 2. Loop detector lead-in cable shall be Type "B". Slots shall be filled with elastomeric sealant, epoxy sealant, or hot-melt rubberized asphalt sealant, except asphaltic emulsion loop sealant and cold tar loop sealant are acceptable if the pavement surface will receive an asphaltic concrete overlay.

SECTION 802 – NATIVE HABITAT PROTECTION, INSTALLATION, MAINTENANCE, AND MONITORING

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

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

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 **SWPPP**.

1001-2.10 BMP Inspection, Maintenance, and Repair. To the "WHITEBOOK", ADD the following:

5. Maintenance activities shall be documented by the QSP or QSD in the Construction BMP Maintenance Log for projects subject to SWPPP requirements. See **Appendix I - SWPPP Construction BMP Maintenance Log**.

1001-3.7 Payment. To the "WHITEBOOK", item 3, subsection "g", DELETE in its entirety and SUBSTITUTE with the following:

- g) BMP Inspection, Maintenance, Repair, and Construction BMP Maintenance Log.
-

TECHNICALS (VOLUME 1)

PURE WATER PROGRAM
FOR
GREATER SAN DIEGO, CALIFORNIA

BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS

for the construction of the

SAN DIEGO NCWRP EXPANSION AND
NCPWF INFLUENT PUMP STATION AND PIPELINE

PACKAGE 1
FLOW EQUALIZATION

DIVISION 01 GENERAL REQUIREMENTS

Issued for Construction

CH2M HILL

San Diego, CA

March 2021

Project No. 684476

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END OF SECTION

**SECTION 01 29 00
PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 WORK REQUIRED OF THIS SECTION

- A. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor and services, operations, and incidentals appurtenant to the items of Work being described here and within the plans, specifications, and Contract Documents, as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the Contract Price.
- B. Work shall include all electrical, mechanical, HVAC, plumbing, instrumentation and control, structural, coatings, and architectural work required to support each Bid Item.

1.02 RELATED SECTIONS

- A. The Work of the following Section applies to Work of this Section. Other Sections of the Work not referenced below shall also apply to the extent required for proper performance of the Work.
 - 1. Bid Schedule.
 - 2. Section 01 32 00, Construction Progress Documentation.
 - 3. Section 01 33 22, Web Based Document Management.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. Schedule of Values: Submit based on a roll up of the cost-loaded schedule described in Section 01 32 00, Construction Progress Documentation.
 - 2. Schedule of Estimated Progress Payments: Submit based on current approved Schedule of Values.

3. Record Drawing Red-lines: Update and deliver monthly as required by Section 01 77 00, Closeout Procedures, and per Construction Manager.
4. Application for Payment.
5. Final Application for Payment.

1.04 ALLOWANCES

- A. Allowances will be administered in accordance with the Contract requirements.
- B. Submit, with application for payment, invoice showing the date of purchase, labor costs, expenses, and the total price for all allowance items.
- C. Allowances shall be paid based on actual work performed up to the amount listed in the Bid Schedule. The Owner shall authorize the use of the allowances on an as needed basis.
- D. Allowances are further described as:
 1. Storm Water Pollution Prevention Plan Permit Fee.
 2. Contingency (Field Orders).
 3. Building Permit Fees.

1.05 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement, using the Cost ID activity code specified in Section 01 32 00 Construction Progress Documentation.
- B. Upon request of Construction Manager, provide documentation to support the accuracy of the Schedule of Values.
- C. Limitations:
 1. The values of the activities listed below are limited as indicated. The limit is the percent of the Total Bid Amount.

Activity	Limit
Mobilization	2.0 percent maximum
Contractor Quality Control Program	0.25 percent minimum
180-day Schedule Approval	0.25 percent
Baseline Schedule Approval	0.5 percent
O&M Data (Manuals)	1.0 percent minimum

Activity	Limit
Functional Testing	1.5 percent minimum
Performance Testing	1.0 percent minimum
Project Record Documents	0.5 percent minimum
Demobilization	0.25 percent minimum

2. Mobilization:
 - a. Payment for mobilization will be prorated until all the following items have been completed. Mobilization includes:
 - 1) Project Manager on site full time.
 - 2) Plant and construction equipment for activities for first month on site.
 - 3) Field office setup with utilities.
 - 4) Fire protection established.
 - 5) Construction yard setup with storage and maintenance facilities and utilities setup.
 - 6) Safety Plan submitted and required notices posted.
 - 7) Initial Quality Control Plan submitted.
 - 8) QC Manager on site full time.
3. Contractor Quality Control Program: Payment for Contractor Quality Control will be prorated based on progress towards project completion.
4. 180-Day Schedule Approval: Payment will be made upon approval of the 180-day schedule as specified in the Section 01 32 00, Construction Progress Documentation.
5. Baseline Schedule Approval: Payment will be made on approval of the Baseline schedule as specified in Section 01 32 00, Construction Progress Documentation.
6. O&M Data (Manuals):
 - a. The Contractor and Construction Manager shall meet to determine the total number of O&M Data (Manuals) for the Contract. The value of the O&M Data shall be distributed equally across the total number of O&M Data for the Contract.
 - b. A Draft, Draft-Final and Final submittal is required for each O&M Data (Manual). The Draft, Draft-Final and Final submittals will be assigned 50 percent, 25 percent, and 25 percent, respectively of the calculated value for each Manual. Payment will be made upon acceptance of each submittal.
7. Functional Testing: Payment will be prorated based upon completion of the functional testing activities. See Section 01 91 14, Testing, Integration, and Startup, and equipment specifications for details on functional testing activities.

- 8. Performance Testing: Payment will be pro-rated based upon completion of all performance testing activities as described in the Section 01 91 14, Testing, Integration, and Startup.
- 9. Project Record Documents:
 - a. Progress payments for project record (as-built) documentation will be made based on the estimated percent complete of the quantity of documents submitted in accordance with weighting established as follows:

No.	Project Record Categories	Drawing Weight
1.	Electrical interconnects and referenced drawings	10
2.	Loop drawings and referenced drawings, process and instrumentation	9
3.	Control and logic drawings, schedules and PLC documents; both Design Engineer and Contractor supplied	7
4.	Electrical and instrumentation, Area Control Center connection drawings; both City and Contractor supplied	5
5.	Process and Piping Schematic, Power, single and three-line	3
6.	All other Contract Drawings	1

- 10. Demobilization:
 - a. Submittal of warranties.
 - b. Removal of plant and construction equipment.
 - c. Removal of field office, construction yards and related facilities, utilities and project signs.
 - d. Cleanup and disposal of materials, supplies, equipment and debris.
 - e. Restoration of areas, roads and other facilities damaged or altered as a result of the Work.

- D. An unbalanced or front-end loaded schedule will not be acceptable. Acceptable Schedule of Values will be required prior to submittal of first Application for Payment.

- E. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- F. Use Schedule of Values Form provided by Owner.
- G. Schedule of Values shall correlate with cost-loaded schedule.

1.06 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.
- B. Use detailed Application for Payment Form provided by Owner.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Construction Manager.
- F. Preparation:
 - 1. Round values to nearest dollar.
 - 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Construction Manager.
- G. Progress payments do not constitute acceptance of the Work or a waiver of any terms or conditions of the Contract.

1.07 PAYMENT - GENERAL

- A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- B. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor and

services, operations, and incidentals appurtenant to items of Work being described here and within the plans, specifications, and Contract Documents, as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the Contract price.

C. Payment for Procured Equipment:

1. Payment for procured equipment is divided into two types of equipment: Major Equipment and all other procured equipment.
2. Major Equipment will be paid according to the following milestones:
 - a. Purchase Order equals 5 percent. An executed purchase order must accompany the payment request.
 - b. Submittal Acceptance equals 5 percent. Approval of the equipment submittal is required prior to payment of this amount.
 - c. Fabrication equals 65 percent. Fabrication, including factory testing, may be paid in part provided adequate documentation is presented and accepted at the monthly Schedule Preview Meeting.
 - d. Delivery equals 10 percent. Proof of onsite delivery (or proper handling of stored materials) must accompany the payment request.
 - e. Pre-Operational Checkouts/Installation Certification equals 10 percent. Proof of Installation Certification by the Manufacturer must accompany the payment request.
 - f. Operational Checkouts/Performance Verification equals 5 percent. Documentation of successful operational checkouts/performance verification must be provided.
 - g. The sum of items listed above shall not exceed the documented quotation amount or invoice amount.
3. All other equipment (i.e., non-Major Equipment) will be paid upon submittal and acceptance of the required documents, including:
 - a. Paid invoices and proof of payment for materials on hand.
 - b. Proof of proper storage or stored materials.
 - c. Quantity verification (load tickets, etc.).
 - d. Any required certifications.

1.08 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for following:
1. Loading, hauling, and disposing of rejected material.
 2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
 3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
 4. Material not unloaded from transporting vehicle.
 5. Defective Work not accepted by Owner.
 6. Material remaining on hand after completion of Work.

1.09 RETENTION

- A. The Owner shall retain a percentage of each progress payment in accordance with Section 7-3.2 Partial and Final Payment. The retained amount is available for the protection and payment of the person(s), mechanics, subcontractors, or materialmen who perform labor upon the Contract or Work thereunder, and the persons who supply such person(s), or subcontractors with components and supplies for carrying on such Work.
- B. Pursuant to Section 22300 of the Public Contract Code of the State of California, the Contractor has the option, at their expense, to deposit securities with an Escrow Agent as a substitute for retention earnings required to be withheld by the City. Securities eligible for such substitution are bank or savings and loans certificates of deposit or such securities which are eligible for investment pursuant to Government Code Section 16430. As to any such security or securities so substituted for monies withheld, the Contractor shall be the beneficial owner of same and shall receive any interest thereon. Such security shall, at the request and expense of the Contractor, be deposited with the City or with a State or Federally Chartered bank as the escrow agent who shall pay such monies to the Contractor upon notification by the City that payment can be made. Such notification will be given at the expiration of 35 days from the date of acceptance of the work, or as prescribed by law, provided however, that there will be a continued retention of the necessary securities to cover such amounts as are required by law to be withheld by properly executed and filed notices to stop payment, or as may be authorized by the Contract to be further retained.

1.10 PHASE FUNDING

- A. The Contract conditions and requirements for Phase Funding are contained in Section 6-1.4 Construction Schedule and Commencement of Work, and

Section 7-3.2 Phase Funding of Part 1 Special Provisions – General of the
Contract Documents.

1.11 BID ITEMS

- A. Bonds (Payment and Performance Not to Exceed 2.5 Percent) – Lump Sum:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item for the Bonds required under this Contract and shall be made as the lump sum price named in the Bid Schedule. Refer to Whitebook for requirements.
- B. Mobilization and Demobilization - Lump Sum:
1. No measurement shall be made for this Item.
 2. Payment for this Item shall be made as a Lump Sum amount named in the Bid Schedule.
- C. Dispute Resolution Board – Allowance:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item from the allowance for one-half the cost of support as described in the SSP. Payment for this Item shall be made as an allowance amount named in the Bid Schedule.
- D. Sheeting, Shoring, and Bracing – Lump Sum:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item for temporary sheeting, shoring, and bracing or equivalent method and shall be made at the lump sum price named in the Bid Schedule, which price shall constitute full compensation for completion of all planning, design, engineering fees, furnishing and constructing, and removal and disposal of such temporary sheeting, shoring, and bracing as a lump sum item, complete, as required for the prosecution of the Work, required for temporary or permanent support of any structures, pipelines or utilities and required under the provisions of any permits, and in accordance with the requirements of OSHA and the Construction Safety Orders of the State of California, pursuant to the provisions of Section 6707 of the California Labor Code.
- E. Site Civil Grading, Excavation, and Stormwater Piping - Lump Sum:
1. No measurement shall be made for this Item.
 2. General: All site civil grading, excavations, demolition, and stormwater drainage infrastructure.

3. Payment is made for this Item for the following:
 - a. All site civil grading, site civil work, excavations, backfill, demolition, and storm water infrastructure shown on Drawings and as specified.
 4. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.
- F. Yard Piping – Lump Sum:
1. No measurement shall be made for this Item.
 2. General: All yard piping.
 3. Payment is made for this Item for the following:
 - a. All yard piping shown on Drawings and as specified.
 4. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.
- G. Storm Water Pollution Prevention Plan (SWPPP) – Permit Fee – Allowance:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item as an allowance towards the SWPPP Permit Fee to the NCWRP Expansion. Refer to Whitebook Section 1001-3.7 for requirements. Payment for this Item shall be made for actual fees paid from the allowance amount named in the Bid Schedule. Other incidental costs shall be included in the Contract price.
- H. Storm Water Pollution Prevention Plan (SWPPP) – Implementation – Lump Sum:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item for the implementation of the SWPPP measures required under this Contract and shall be made as the lump sum price named in the Bid Schedule. Payment for this Item shall include the items described in these specifications and Section 1001-3 of the Whitebook and shall include any modifications made to the SWPPP during construction.
- I. Site Electrical – Lump Sum:
1. No measurement shall be made for this Item.
 2. General: The Work shall include site and facility electrical, and instrumentation shown on the Drawings and as specified.
 3. Payment is made for this Item for all site and facility electrical and instrumentation requirements for the Work such that the facilities and equipment is complete and operational. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.

- J. Traffic Control – Lump Sum:
1. No measurement shall be made for this Item.
 2. General: The Work shall include all traffic control required during construction and coordination with the Construction Manager for compliance.
 3. Payment is made for this Item for all traffic control, preparation and submittal of traffic control plans to the governing regulatory agency, and adherence to the traffic control plan during construction. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.
- K. Bioretention Basins and Appurtenances – Lump Sum:
1. No measurement shall be made for this Item.
 2. General: The Work shall include any bioretention basins and associated appurtenances and ancillary facilities required for the bioretention basins shown on Drawings and as specified.
 3. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.
- L. Construction of the NCWRP Flow Equalization Basin – Lump Sum:
1. No measurement shall be made for this Item.
 2. Payment is made for this Item for the construction the construction of the North City Water Reclamation Plant Flow Equalization Basin. This Item shall include a complete and operational flow equalization basin and all other appurtenant work necessary including testing, startup, commissioning and system support during integration, all in accordance with the special provisions, plans numbered 40381-1001 through 1132, and associated technical specifications. Payment under this bid item shall be made as the lump sum price named in the Bid Schedule.
 3. Payment is made for all building permit fees as an allowance.
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this Item from the allowance for Building Permit fees paid by the Contractor to the City in order to obtain and pull the permits associated with the NCWRP Flow Equalization Basin Work at site address 4949 Eastgate Mall. Payment for this Item shall be made for actual fees paid from the allowance amount named in the Bid Schedule. Incidental costs shall be included in the Contract price.
- M. NCWRP Flow Equalization Basin Field Orders – Allowance:
1. No measurement shall be made for this Item.

2. Payment is made for this Item as an allowance towards field orders and contingencies that may occur during the course of the Work. Payment for this Item shall be made as an allowance amount named in the Bid Schedule. Field Order limits shall conform to Whitebook 7-3.9.

N. Security Guard – Allowance:

1. No measurement shall be made for this Item.
2. Payment is made for this Item as an allowance towards one security guard staffing requirements as coordinated with the Owner and Construction Manager throughout the course of the Work. Payment for this Item shall be made as an allowance amount named in the Bid Schedule.

1.12 SUPPLEMENT

- A. The supplement listed below, following “End of Section,” is part of this Specification.
 1. NCWRP Flow Equalization Basin Major Equipment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NCWRP FLOW EQUALIZATION BASIN MAJOR EQUIPMENT	
Specification Section	Specific Product
26 14 13	Switchboards

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 GENERAL

- A. Surveying will be performed by a surveyor contracted with the City or Construction Manager. The Contractor will not be responsible for performing surveying. Contractor will be responsible for identifying surveying needs and coordinating those needs with the Construction Manager. The surveying requirements indicated in the contract documents are intended to provide information and background for the Contractor.

1.02 SUBMITTALS

A. Informational:

1. Statement of Qualification (SOQ) for land surveyor or civil engineer.
2. Maintenance of Plant Operations Plan (MOPO Plan).
3. Photographs:
 - a. Digital Images: Submit one copy of DVD disc containing images within 5 days of being taken. Each image is to have a minimum file size of 1.4 Mb (1,400 Kb) so viewed resolution is high quality. The production of larger file sizes with higher resolution is encouraged.
4. Video Recordings: Submit one copy, including updated copy of project video log, within 5 days of being taken.
5. Utility Location, Pothole, Conflict, and Resolution Plan: Field verify, locate, identify, and pothole all utilities, grounding wires and grids, and any buried infrastructure prior to excavation activities and prior to furnishing materials for construction. Submit results and identify conflicts and discrepancies with Drawings, as well as proposed resolutions to conflicts and discrepancies, a minimum of 20 working days prior to excavation activities or furnishing materials for construction. Obtain approval from Construction Manager and Design Engineer prior to excavation activities and prior to furnishing materials for construction.

1.03 RELATED WORK AT SITE

A. General:

1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
 - a. Contract 2: San Diego NCWRP Expansion.
 - b. Contract 3: North City Pure Water Facility Influent Pump Station and Conveyance.
 - c. Contract 4: Early Site Work and Ozone/BAC Relocation.
 - d. NCWRP Renewable Energy Project.
2. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed by others.
 - a. North City Pure Water Pipeline/Pure Water Dechlorination Facility.
 - b. North City Pure Water Facility Package 1, Mass Grading and Clearing.
 - c. North City Pure Water Facility Package 2.
 - d. Morena Pump Station and Conveyance Project.
3. Coordinate the Work of these Contract Documents with work of others as specified.
4. Include sequencing constraints specified herein as a part of Progress Schedule.

B. Applications Software Development:

1. Application software for the Distributed Control System (DCS) will be performed by the Owner. The Owner will provide hardware and perform programming of the DCS applications software for certain portions of Process Instrumentation and Control Subsystem (PICS). Refer to Section 40 90 00, Instrumentation and Control, and related Sections, for detailed information pertaining to DCS hardware and application software programming.
2. Allowance for interruptions to the Work because of testing by Owner of Owner-developed applications software:
 - a. During Functional Testing and Performance Testing, Contractor shall plan for interruption of testing of the Work to allow Owner to investigate software problems, make software configuration changes, and conduct additional testing.
 - b. Allowance for Interruptions: 10 days total.
 - c. When applications software testing is delayed because of altered equipment interfaces or receipt of incorrect Shop Drawing

information, duration of delay will be excluded from interruption allowance, unless notified otherwise by Owner.

1.04 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.
1. Electricity Company: San Diego Gas & Electric.
 - a. Contact: Cathy Cavaletto.
 - b. Telephone: (848) 636-5786.
 2. Telephone Company: Chris Porter.
 - a. Telephone: (858) 208-8375.
 3. Public Utilities Department: City of San Diego.
 - a. Contact Person: Monika Smoczynski.
 - b. Telephone: (858) 292-6455.
 4. Gas Department: San Diego Gas & Electric.
 - a. Contact Person: Cathy Cavaletto.
 - b. Telephone: (848) 636-5786.
 5. Building Department: City of San Diego.
 - a. Contact Person: Colette Redon.
 - b. Telephone: (619) 446-5402.

1.05 PROJECT MILESTONES

- A. Project Milestones:
1. Generally described in the Contract Document. The following is a detailed description of each:
 - a. Milestone 1: Completion and Early Acceptance for Beneficial Use of the Flow Equalization Basins Facility 12.
 - b. Milestone 2: Substantial Completion – Occurs upon completing the prerequisites for substantial completion.
 - c. Milestone 3: Final Completion – After successful completion of Substantial Completion requirements, and all aspects of the Contract Closeout have been satisfactorily completed.

1.06 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.

- B. The Contractor shall be solely responsible for maintaining continued and uninterrupted operation of all facilities in the project area, and shall prepare all required Maintenance of Plant Operation (MOPO) plans for all facilities affected by its work. The MOPO Plan shall detail how, but not limited to, the following elements that will allow the water reclamation plant to function continuously with appropriate capacity during construction: sequence of construction activities, temporary works and bypassing.
- C. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
- D. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
- E. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Construction Manager. Such authorization will be considered within 48 hours after receipt of Contractor's written request.
- F. The construction of the new Flow Equalization Basin shall be done with the other Flow Equalization Basins in operation.
- G. The new Flow Equalization Basin construction area can be accessed from Road J. Periodically, roads within the site may be out of service for construction work by others. During construction, Road J can be accessed from either Eastgate Mall (via the facility roadways) or Miramar Road. Access to and from Miramar Road shall be coordinated with Caltrans. Contractor shall obtain any required temporary easements from Caltrans that may be required. Right turn only egress is allowed on Miramar Road.
- H. Process or Facility Shutdown and Operating Requirements:
 - 1. The following describes operating requirements and facilities which may be shutdown at some time during the Work:
 - a. 12 – Existing Flow Equalization Basins 1 and 2 shall remain in operation at all times, except a shutdown of up to 4 hours is allowed.
 - b. The high pressure utility water UWHP may be shut down for up to 3 hours.
 - c. 16-inch Blended Sludge Pipeline (16-inch BLSD) may be shut down for eight hours during relocation activities.
 - d. 10-inch Land Fill Gas Pipeline (10-inch LG) may be shut down for 8 hours during relocation activities.

2. Power outages will be considered upon 7 days written request to Owner and Construction Manager. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.
 3. Provide 21 days advance written request for approval of need to shut down a process or facility to Owner and Construction Manager.
- I. Install and maintain bypass facilities and temporary connections required to keep Owner's wastewater treatment operations on line. Sequences other than those specified will be considered upon written request to Owner and Construction Manager, provided they afford equivalent continuity of operations.
- J. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Construction Manager's advance approval of the need for and duration of such Work.
- K. Relocation of Existing Facilities:
1. During construction, it is expected that minor relocations of Work will be necessary.
 2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
 3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
 4. Perform relocations to minimize downtime of existing facilities.
 5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Construction Manager.
 6. The relocation of existing facilities shall be included in Bid Item No. 6.

1.07 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Construction Manager, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
 2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs and Article Audio-Video Recordings.
2. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Construction Manager shall have right to select subject matter and vantage point from which photographs are to be taken.

B. Preconstruction and Post-Construction:

1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 60 photographs of Site and property adjacent to perimeter of Site.
2. Particular emphasis shall be directed to structures both inside and outside the Site.
3. Format: Digital, minimum resolution of 20 megapixel.

C. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
2. Weekly: Take 10 photographs using digital, minimum resolution of 20 megapixel.

D. Documentation:

1. Digital Images:
 - a. Electronic image shall have date taken embedded into image.
 - b. Archive using a commercially available photo management system that provides listing of photographs including date, keyword description, and direction of photograph.
 - c. Label file folders or database records with Project and Owner's name, and month and year images were produced.

1.09 AUDIO-VIDEO RECORDINGS

- A. Prior to beginning the Work on Site or of a particular area of the Work, video Site and property adjacent to Site.
- B. In the case of preconstruction recording, no work shall begin in the area prior to Construction Manager's review and approval of content and quality of video for that area.
- C. Particular emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within site and areas adjacent to and within the right-of-way or easement, and on Contractor storage and staging areas.
- D. Construction Manager shall have right to select subject matter and vantage point from which videos are to be taken.
- E. Video recording shall be by a professional commercial videographer, experienced in shooting exterior: and interior construction videos. Video Format and Quality:
 - 1. DVD format, with sound.
 - 2. Video:
 - a. Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.
 - b. Electronically, and accurately display the month, day, year, and time of day of the recording.
 - 3. Audio:
 - a. Audio documentation shall be done clearly, precisely, and at a moderate pace.
 - b. Indicate date, project name, and a brief description of the location of recording, including:
 - 1) Facility name.
 - 2) Street names or easements.
 - 3) Addresses of private property.
 - 4) Direction of coverage, including engineering stationing, if applicable.
- F. Documentation:
 - 1. DVD Label:
 - a. DVD number (numbered sequentially, beginning with 001).
 - b. Project name.
 - c. Applicable location.
 - d. Date and time of coverage.

2. Project Video Log: Maintain an ongoing log that incorporates above noted label information for DVDs on Project.

1.10 REFERENCE POINTS AND SURVEYS

- A. Location and elevation of bench marks are shown on Drawings.
- B. Contractor's Responsibilities:
 1. Provide additional survey and layout required to layout the Work.
 2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
 3. In event of discrepancy in data or staking provided by Owner, request clarification before proceeding with Work.
 4. Retain professional land surveyor or civil engineer registered in California who shall perform or supervise engineering surveying necessary for construction staking and layout.
 5. Maintain complete accurate log of survey work as it progresses as a Record Document.
 6. On request of Construction Manager, submit documentation.
 7. Provide competent employee(s), tools, stakes, and other equipment and materials as Construction Manager may require to:
 - a. Establish control points, lines, and easement boundaries.
 - b. Check layout, survey, and measurement work performed by others.
 - c. Measure quantities for payment purposes.

1.11 OWNER PERFORMED TESTING

- A. General:
 1. Owner performed tests does not:
 - a. Relieve Contractor of responsibility for providing adequate quality control measures.
 - b. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 2. Contractor is responsible for additional costs associated with tests when Work is not ready for testing in accordance with the schedule previously identified and coordinated between Contractor and Construction Manager. Contractor and Construction Manager to coordinate schedule for all tests beforehand as directed by Construction Manager.
 3. Contractor is responsible for associated costs for additional tests because of rejection of materials or Work that cannot be completed in the absence of acceptable test results as required by the Contract Documents.

4. Contractor shall provide access for all testing performed by Owner or Construction Manager.
 5. Contractor shall notify the Construction Manager and Owner in advance of required tests no later than 48 hours prior to test.
 6. Contractor shall provide access of construction documents at all times to personnel performing testing.
 7. Contractor shall cooperate with Construction Manager and testing personnel and provide safe access to the Work in order to perform and complete the tests.
 8. Contractor shall provide reasonable auxiliary services as requested by the Construction Manager and testing personnel. Auxiliary services include, but is not limited to:
 - a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate tests and assist the testing personnel in performing tests.
 - b. Providing storage space for the exclusive use of testing personnel, such as area for storing test samples, curing concrete samples, and delivery of samples to testing laboratories if required by Construction Manager and testing personnel.
 - c. Providing security and protection of samples and test equipment at the Project Site if required by the Construction Manager or testing personnel.
 - d. Provide samples of materials to be tested in required quantities.
 9. Owner performed test reports will be submitted to the Construction Manager, Contractor, Design Engineer, and Owner within 1 week of the test completion. Delays that may occur due to delays in Owner performed tests shall be negotiated between the Owner and Contractor.
- B. Concrete Testing: Portions of specified concrete laboratory test mixes and similar test to verify material quality and conformance to specifications will be the responsibility of the Owner and Construction Manager as listed in this section. All other tests required as specified in the Specifications but not listed in the table below shall be the responsibility of the Contractor.

Owner Performed Concrete Tests	
Test Name	Specification Section
Mockup Panel for Repair System A – Compression Strength Test	03 01 32, Repair of Vertical and Overhead Concrete Surfaces
Mockup Panel for Repair System A – Tensile Bond Test	03 01 32, Repair of Vertical and Overhead Concrete Surfaces

Owner Performed Concrete Tests	
Test Name	Specification Section
Mockup Panel for Repair System C – Compression Strength Test	03 01 32, Repair of Vertical and Overhead Concrete Surfaces
Mockup Panel for Repair System C – Tensile Bond Test	03 01 32, Repair of Vertical and Overhead Concrete Surfaces
Sounding for hollow areas	03 01 32, Repair of Vertical and Overhead Concrete Surfaces and 03 01 33, Repair of Horizontal Concrete Surfaces
Compression strength test	03 01 32, Repair of Vertical and Overhead Concrete Surfaces and 03 01 33, Repair of Horizontal Concrete Surfaces
Direct tension bond test: In situ	03 01 32, Repair of Vertical and Overhead Concrete Surfaces and 03 01 33, Repair of Horizontal Concrete Surfaces
Direct Tension bond test: Laboratory	03 01 32, Repair of Vertical and Overhead Concrete Surfaces and 03 01 33, Repair of Horizontal Concrete Surfaces
Concrete Air content test	03 30 00, Cast-In-Place Concrete
Concrete Slump test	03 30 00, Cast-In-Place Concrete
Concrete Strength test	03 30 00, Cast-In-Place Concrete

- C. Compaction Testing: Owner and Construction Manager will perform compaction testing required in Section 31 23 13, Subgrade Preparation; Section 31 23 23, Fill and Backfill; Section 31 23 23.15, Trench Backfill; and Section 32 11 23, Aggregate Base Courses.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 GENERAL

- A. Construction Manager shall schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

1.02 PRECONSTRUCTION CONFERENCE

- A. Contractor shall be prepared to discuss the following subjects, as a minimum:

1. Required schedules.
2. Status of Bonds and insurance.
3. Sequencing of critical path work items.
4. Progress payment procedures.
5. Project changes and clarification procedures.
6. Use of Site, access, office and storage areas, security and temporary facilities.
7. Major product delivery and priorities.
8. Contractor's safety plan and representative.

- B. Attendees will include:

1. Owner's representatives.
2. Construction Manager's representatives.
3. Contractor's office representative.
4. Contractor's resident superintendent.
5. Contractor's quality control representative.
6. Subcontractors' representatives whom Contractor may desire or Construction Manager may request to attend.
7. Design Engineer's representatives.
8. Others as appropriate.

1.03 ENVIRONMENTAL MITIGATION MONITORING AND REPORTING
PROGRAM PRECONSTRUCTION CONFERENCE

- A. The Contractor shall be required to discuss the following:
 - 1. Discuss the Environmental Mitigation Monitoring and Reporting Program.
- B. Attendees will include:
 - 1. City's Mitigation Monitoring Coordination Section Construction Manager.
 - 2. Owner's representatives.
 - 3. Construction Manager's representatives.
 - 4. Contractor's representatives.
 - 5. Contractor's quality control representative.
 - 6. Others as appropriate.

1.04 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.05 PROGRESS MEETINGS

- A. Construction Manager will schedule regular progress meetings at Site, conducted weekly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- B. Attendees will include:
 - 1. Owner's representative(s), as appropriate.
 - 2. Construction Manager's representative (s), as appropriate.
 - 3. Contractor, Subcontractors, and Suppliers, as appropriate.
 - 4. Design Engineer's representative(s).
 - 5. Others as appropriate.

1.06 QUALITY CONTROL MEETINGS

- A. Scheduled by Construction Manager on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of the Work and work of other Contractors.

B. Attendees will include:

1. Contractor.
2. Contractor's designated quality control representative.
3. Subcontractors and Suppliers, as necessary.
4. Construction Manager's representatives
5. Design Engineer's representatives, as necessary.

1.07 PREINSTALLATION MEETINGS

- A. When required in individual Specification sections, convene at Site prior to commencing the Work of that section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Construction Manager 5 days in advance of meeting date.
- D. Provide suggested agenda to Construction Manager to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.08 FACILITY STARTUP MEETINGS

- A. Schedule and attend a minimum of five facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01 91 14, Testing, Integration, and Startup, and shall include preliminary discussions regarding such plan.
- B. Agenda items shall include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees will include:
 1. Contractor.
 2. Contractor's designated quality control representative.
 3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
 4. Construction Manager.
 5. Design Engineer's representatives.
 6. Owner's operations personnel.
 7. Others as required by Contract Documents or as deemed necessary by Contractor or City.

1.09 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Construction Manager.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. It is expressly understood and agreed that the rate of progress and the time of completion of the work are of the essence for this Contract. The work shall be executed with such progress as required to prevent any delay to this Contract and to other projects or contractors working at the site. Compliance includes, but is not limited to, meeting Contract milestone dates, compliance to scheduling submittals, working within any constraints and completion of all Contract work within the allotted time.
- B. The work specified in this section includes the preparation, submittal, and acceptance of a Baseline Schedule, construction progress schedules, schedule updates, recovery schedules, Time Impact Analysis (TIA) and revisions to the construction progress schedule. The construction schedule shall conform to the time provisions specified in the special provisions of the Contract Documents and the requirements of all other specified work sequence constraints set forth in the Contract Documents.
- C. The Contractor shall prepare and submit a Baseline Construction Schedule in accordance with the requirements of this section. By preparing and submitting the Baseline Construction Schedule and monthly schedule updates, the Contractor represents that it can and intends to safely execute the contracted work and all portions thereof including all activities of subcontractors, equipment vendors, and suppliers including submittals and resubmittals within the specified times and constraints. The Contractor also represents that the bid price covers all costs associated with the execution of the Work in accordance with the construction schedule and Contract Documents.
- D. This specification includes the cost loaded schedule requirements, consistent with Section 01 29 00, Payment Procedures, which shall form the basis for the pay application report and all monthly payment requests. These referenced sections shall be correlated and linked when preparing the monthly progress payment. The Schedule of Values shall be generated from the Oracle Primavera P6 current accepted schedule.
- E. The City will review the schedule, and any updates or revisions, and any other schedule data for conformance to the Contract. Review and acceptance of the Baseline Construction Schedule and associated documents does not relieve the Contractor of responsibility for the feasibility of the schedule, performance of

any omitted work and completion of the work and milestones within the Contract time.

1.02 DEFINITIONS

- A. Activity: A discrete work element of a project that can be identified for planning, scheduling, and controlling the construction project. Activities included in a construction schedule consume time and resources.
- B. Predecessor Activity: An activity that precedes another activity in the network.
- C. Successor Activity: An activity that follows another activity in the network.
- D. Code of Accounts: A unique lettering or numbering system in which letters or numbers are assigned to each unique component of the work breakdown structure.
- E. Hard Logic: Relationships with mandatory dependencies where the nature of the work itself dictates the order in which the activities should be performed. Construction of the walls before starting painting work is an example of mandatory dependency.
- F. Soft Logic: Also known as Discretionary Dependencies or Preferential Logic. Preferential logic that controls the critical path using constraints and lags will not be allowed.
- G. Hard Constraints: Override logical relationships and thereby prevent activities from being scheduled according to the logic. Hard Constraints include Mandatory Start, Mandatory Finish, Start On and Finish On.
- H. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- I. Critical Activities: Activities on the critical path. To avoid project delays, work must start and finish on the planned early start and finish dates.
- J. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the maximum overall project duration or completion. There can only be one critical path for a project duration or a project milestone.
- K. Near Critical Path: The Near Critical Path shall be defined as the “longest path” plus 15 working days total float.

- L. Float:
1. The measure of leeway in starting and completing an activity. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date or Contract milestone.
- M. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- N. Work Area: An area of construction, a separate facility, or a similar significant construction element.
- O. Contract Milestone: An activity or event that must be completed by a specific date and to which liquidated damages may apply. Contract start and completion dates are considered Contract Milestones.
- P. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- Q. Schedule of Values: A realistic statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment. The Schedule of Values should be produced from P6 and match the Cost Loading in the Schedule.
- R. Cost-Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract amount, unless otherwise approved by the City.
- S. Resource Loading: The allocation of manpower necessary for the completion of an activity as scheduled.
- T. Work Breakdown Structure (WBS): The WBS is a hierarchical structure of the Work to be performed under the Contract.
- U. Calendar Day: All days in a calendar year including weekends and holidays. Contract duration is measured in calendar days against Contract milestones.
- V. Pacing: An intentional slowing of work activities during a delay, or alleged delay, to project completion.

- W. Installed Major Equipment: All major equipment installed as part of the final constructed facility. See Section 01 29 00, Payment Procedures, for definition of Major Equipment.
- X. Construction Equipment: All equipment utilized by the Contractor to construct the facility but is not a part of the final constructed facility.
- Y. Blackout Calendar: An activity calendar that applies the nonwork option in Primavera P6 Activity Calendars to create non-working days, weeks, and/or months when work is restricted from occurring. The City requires the use of blackout calendars for restricted activities rather than adjusted logic and durations.

1.03 SCHEDULER QUALIFICATIONS

- A. The Contractor shall employ or retain the services of a full-time, onsite Senior Project Scheduler who shall have experience in construction work sequencing, productivity, and scheduling as well as preparing and maintaining detailed construction schedules using the most current version of Oracle Primavera P6 software. Experience on projects similar in size and total construction cost is desirable. Within 7 calendar days after Notice to Proceed, the Contractor shall submit to the City Representative for review and acceptance, in accordance with the Section 01 33 00, Submittal Procedures, and Section 01 33 22, Web Based Construction Document Management, the Project Scheduler's resume, including personal references from at least two Owner representatives familiar with the Project Scheduler's work on previous water or wastewater treatment projects. The City reserves the right to reject the proposed scheduler based on the lack of qualifications as defined in this section. The Contractor's scheduler shall attend all schedule related meetings, including progress meetings, job walks when necessary to verify schedule progress, schedule review meetings and special meetings pertaining to scheduling of the Work. This person, along with the Contractor's management team, is expected to work closely with the City Representative to deliver acceptable products outlined in this section and comply with the Reports requirements of this section.
- B. If the Senior Construction Scheduler leaves the employment or retainage of the Contractor, the Contractor will be required to notify the City Representative in advance of the intended departure and fulfill the requirements of this subsection within 30 calendar days of the departure of the Contractor's Senior Construction Scheduler. The City reserves the right to disapprove any candidate proposed for the Project. The City reserves the right to remove any member of the Contractor scheduling staff that is, in the City's opinion, not performing scheduling work in accordance with the scheduling requirements.

1.04 SCHEDULING CONFERENCES

- A. Preconstruction Scheduling Conference: Within 30 calendar days after Notice to Proceed, the City Representative shall schedule and conduct a preconstruction scheduling conference to commence development of the required construction schedule. Attendance by the Contractor's Senior Construction Scheduler is mandatory. At the meeting, the requirements of this section will be reviewed with the Contractor; the Contractor shall present their proposed methodology for the Baseline Construction Schedule, sequence of operations, and resource and cost/quantity loading methodology. The Contractor shall submit to the City Representative a written copy of its proposed WBS structure at this meeting. The City shall review the WBS structure within 10 calendar days after submission by the Contractor. The Contractor shall make all modifications to the proposed WBS structure that are requested by the City. The WBS shall be correlated with the Contractor's Schedule of Values and the cost loaded schedule. The Senior Scheduler shall develop other activity codes and values needed to comply with the reporting requirements listed herewith, subject to acceptance by the City. The Contractor shall bring to the Preconstruction Scheduling Conference the Network Logic Diagram used in bid preparation. This will be used as a basis of discussion for the construction plan.

1.05 FLOAT

- A. Pursuant to the float sharing requirements of the Contract, use of float suppression techniques such as preferential sequencing, special lead/lag logic restraints, hard constraints, Start on or After and Start on or Before constraints, adding and/or removing working or nonworking days from an accepted activity calendar, extended activity durations, or imposed dates, shall be cause for rejection of the Baseline Construction Schedule and any revisions or updates. The use of float time disclosed or implied using alternative float suppression techniques shall be shared as directed by the City.
- B. Float time is not for the exclusive use or benefit of either the City or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and the Contract completion date. Contractor's use of float shall be pre-approved by the City prior to use.
- C. No time extensions will be granted nor delay damages paid unless a City-caused delay occurs which impacts the Project's critical path and the Contractor has complied with all related Contract requirements. Other delays will be evaluated by the Contractor for concurrency to issues and be included as part of the Contractor's analysis.

- D. Submittal of an early completion schedule shall not provide a basis for the Contractor to claim an excusable delay for any time earlier than the Contract completion date. Any early completion schedule shall be approved by a Contract Change Order.

1.06 LOGIC AND LEVEL OF DETAIL

- A. The Project schedule shall include activities of sufficient detail to accurately represent and clearly convey the Contractor's feasible plan for the timely completion of the full scope of the work. Activities performed on site shall have maximum durations of 20 days and a value of \$50,000. The Contractor shall be responsible for developing the logic of the Baseline Schedule and for updating the logic each month to accurately reflect the progress of the work to date and the Contractor's current plan for the timely completion of the work. The schedule logic for each activity shall be constructed by determining which activities must be completed before any subsequent activity can start, which activities can occur simultaneously with the predecessor activity, which activities cannot start until another activity is complete, and the impact of all resource limitations on activity sequencing, activity durations, and activity dates. Every activity, except the project start and finish milestones, shall have a minimum of one predecessor and one successor. All paths through the project schedule shall proceed in the direction representing the progression of time; start to finish logic is disallowed. Activity lags shall not have a negative value. The use of lags shall be kept to a minimum and shall be subject to acceptance by the City. Redundant ties to preceding activities in a sequential series of activities will not be permitted.
- B. The activity descriptions shall be specific and discrete such that it cannot be confused with any other activity description. For example, "Form Concrete Wall" is too broad; there must be a description of the unique location of the wall. Similarly, activities that are discrete should not be combined.
- C. Finish to start logical relationships shall be predominantly used for schedule activities. The use of logical relationships with negative lags will not be allowed in the baseline schedule, in proposed revised schedules, or in the monthly updates.
- D. Milestones: Separately identify each Project milestone, conforming to the scheduling requirements as set forth in the Contract Documents, and assign a "finish no later than" constraint date. For Completion Deadlines, the activity description shall reference the appropriate Contract clause.

- E. No unspecified milestone constraints, other constraints, Float suppression techniques, or use of Project activity durations, logic ties, and/or sequences deemed unreasonable by the City, will be used in the Project Schedule.
- F. Any schedule showing an early completion date must show the time between the scheduled completion date(s) and the applicable Completion Deadline(s) as Float.

1.07 SCHEDULE SOFTWARE SETTINGS AND RESTRICTIONS

- A. Contractor shall use the most current version of Oracle Primavera P6 software to produce the Contract schedules and reports as specified herein. In accordance with the Section 01 33 00, Submittal Procedures, the Contractor shall submit all schedules and associated documentation directly into the City-furnished, web-based, document control system in accordance with Section 01 33 22, Web Based Construction Document Management. The schedule files shall be submitted in Primavera's Proprietary Exchange (XER) format until such time as Primavera recommends transferring to their Extensible Markup Language (XML) format. Reports shall be in Adobe Portable Document Format (PDF).
- B. Activity Constraints: Date/time constraint(s), other than those required by the Contract, will not be allowed unless accepted by the City. Identify any constraints proposed and provide an explanation of the purpose of the constraint in the Narrative Report. Any finish constraints for City required milestones must use a 'Finish on or Before' type designation and have logic ties. Start on or After and Start on or Before constraints are discouraged. All Start on or After and Start on or Before constraints are subject to approval by the City representative. No hard constraints, which include Start on, Finish on, Mandatory Start, and Mandatory Finish, are allowed. The Contractor shall not use any manual date entries that override schedule driven dates based on duration and network logic.
- C. Lags: Lags will not be used when the creation of an activity will perform the same function (e.g., concrete cure time), instead an activity representing the gap between the completion of one activity and the start of another will describe the time gap.
- D. Default Progress Data Disallowed: Actual Start and Actual Finish dates on the CPM schedule shall match the dates provided from Contractor Quality Control Production Reports, Contractor daily reports and other contemporaneous project documentation.

- E. Software Settings:
1. Schedule calculations and Out-of-Sequence progress (if applicable) shall be handled through Retained Logic, not Progress Override. All activity durations and float values will be shown in days. Activity progress will be shown using Remaining Duration. Default activity type set to "Task Dependent." User preference settings shall be set to hours with the show unit label box checked and zero decimal places. The "Durations Format" shall be set to days with the show durations label box checked, and zero decimal places.
 2. The critical path shall be calculated by selecting the Longest Path as opposed to Total Float.
- F. Activities unless otherwise approved will be "physical percent complete" type. Duration percent complete will only be used on City-related activities such as submittal reviews.
- G. Duration Type shall be set to Fixed Duration and Units.
- H. The "Automatically Level resources when scheduling" box shall not be checked. All schedule submittals, and schedule related data of any kind, shall not be resource leveled and shall be the basis for rejection if submitted with resource leveling.
- I. The project critical path shall be displayed using both the 'Critical' and 'Longest Path' filters in P6.

1.08 COST LOADING

- A. The activities contained within the schedules shall be cost loaded, and they shall equal the Contract Total Price with Sub-Totals that match the Schedule of Values within Section 01 29 00, Payment Procedures. Contractor is required to cost load the construction schedule using price per unit. Equipment shall include installed and construction equipment specified as price of equipment that is worth over \$100,000. For example, the labor unit would be \$ per hour; the material unit would be material cost per unit installed. The nonlabor resources shall be used exclusively on activities containing equipment. Equipment shall include installed and construction equipment specified as price of equipment. The resource coding and name shall distinguish between installed and construction equipment. An example of price per unit cost loading is shown below:
1. One labor unit equals \$1 of labor.
 2. Material unit of \$1 for one unit.
 3. Equipment unit of \$1 for one unit.

- B. Procured items, including installed equipment, should be budgeted as part of separate procurement activities such that the installation activity is not statused as started when the procured material is onsite and installation has not begun. Refer to Section 01 29 00, Payment Procedures, for more details. O&M and Training activities shall be their own cost-loaded schedule activities. Project record documentation (as-builts) shall also be a separate cost-loaded schedule activity.
- C. Overhead and profit shall be prorated evenly on all cost loaded activities. Alternatively, overhead may be treated as a Level of Effort activity or activities. The Contractor shall not unbalance the activity cost loading, nor shall the Contractor utilize Resource Leveling as a technique for extending activity durations. The approved Schedule of Values, as generated from the Cost Loading becomes the basis for the Payment Application.
- D. Every construction activity that contains labor shall be cost loaded.
- E. Fabricate and Deliver activities shall be cost loaded to cover the material or equipment costs. The Fabrication activities shall utilize a material or equipment resource.
- F. Commissioning activities shall be cost loaded using a labor resource.
- G. The cost loading and progress payments for long lead procurement items will be discussed at the preconstruction scheduling conference.
- H. Once the Schedule of Values is accepted with the Baseline Construction Schedule, requests for changes to the Baseline Schedule of Values will not be approved unless approved in writing by the City Representative.
- I. The Contractor shall submit with the Baseline Schedule the detailed budget documents reflecting the costs used as the basis of the cost loading contained therein.
- J. In Oracle Primavera P6, for actual monthly costs to store correctly, the Contractor must setup the financial period to equal the first and last date of the calendar month, regardless of the actual monthly cutoff date. Financial periods cannot bridge 2 months and must equal the full month. Financial dates table will be provided at the Preliminary Schedule meeting.
- K. Work Restrictions in Section 01 31 13, Project Coordination, indicating activities that cannot be performed during specific periods of time due to operational or other City requirements shall be accommodated in the Baseline and Progress Schedules using blackout calendars. These Blackout Calendars must be developed incorporating the specific durations when work cannot be

performed, according to the terms of each work restriction, and applied to the applicable activities. These Blackout Calendars will prevent work from extending into these restricted periods by shifting it until after the completion of the restriction.

1.09 RESOURCE LOADING

- A. Schedules shall include resource loading, also known as manpower loading, showing at a minimum, the composite crew, the classification (e.g., foreman, journeyman, etc.) of the individual craftsman comprising the crew, materials or equipment associated with each construction and commissioning activity shown on the schedule, plus any other information required by the City. Manpower shall be expressed as manhours.
- B. Manpower resources shall be listed in the Resource Library of the Primavera Software and the Contractor shall assign manpower resource loading by trade for each work activity of the schedule.
- C. The Contractor warrants that it will allocate resources and costs based upon Early Date curves and Late Date curves as well as all area between these two curves. The Contractor also warrants that the cost of performing the work, based upon both curves, is included within its bid price.
- D. The Contractor shall submit with the Baseline Schedule the detailed budget documents reflecting labor hours used as the basis of the resource loading contained therein. The budget documents used to resource load the Baseline Construction Schedule shall be based upon the escrowed bid documents and reconcile thereto.
- E. Work performed by the prime contractor and all subcontractors with a contract value greater than or equal to 2 percent of the Prime Contract Value shall use the following resources:
 - 1. Labor.
 - 2. Materials.
 - 3. Installed major equipment (refer to Article Definitions).
 - 4. Construction equipment (refer to Article Definitions).
 - 5. Manhours.
- F. The Prime Contractor, and each of the subcontractors with a contract value greater than or equal to 2 percent of the prime contract value, shall create separate Labor, Material and Nonlabor (Equipment) resources for the Prime Contractor and each subcontractor. The resources shall be titled with the name and/or trade of the Prime Contractor and subcontractors and shall match the responsibility activity code assigned to each activity.

1.10 ACTIVITY CALENDARS

- A. All calendars shall be given specific project names and defined clearly in Oracle Primavera P6. For example, "NCWRP Standard 5-day with Holidays," "NCWRP 6-day with Holidays," Calendars for different trades if used, should be specified. All calendars and activity coding within the schedule shall be "Global" rather than "Project" level and shall have a unique prefix of the City Contract Number.
- B. The Contractor shall utilize Blackout Calendars and apply the calendars to activities that may be impacted by the work restrictions stated in Section 01 31 13, Project Coordination.

PART 2 PRODUCTS

2.01 180-DAY SCHEDULE

- A. Within 30 calendar days after Notice to Proceed, the Contractor shall submit to the City the Preliminary Construction Schedule for all work in the first 180 calendar days following NTP, as well as a general approach for the remainder of the Work.
- B. Within 60 days after Notice to Proceed, the Contractor shall submit to the Preliminary Construction Schedule cost and resource loaded. The remaining portion of the work may be summary activities assigned to the Contractor's planned baseline WBS structure and shall be cost-loaded to equal the full Contract amount.
- C. The City Representative, Contractor and its Senior Project Scheduler shall meet within 14 calendar days of the submittal of the 180-calendar day Construction Schedule to review and make any necessary adjustments or revisions. The Contractor shall submit the revised 180-calendar day Construction Schedule within 14 calendar days after receiving comments. Such resubmittal shall be reviewed by the City Representative within 7 calendar days of receiving such re-submittal. The 180-calendar day Construction Schedule, when revised, will represent the Contractor's planned means, methods, and sequences for performance of the Work required in the 180 calendar days following NTP and is to be incorporated as the first 180 days of the Contractor's Baseline Construction Schedule. The 180-day schedule will include, but not be limited to work tasks that will or may be critical to performance within the Contract Time including, but not limited to, the following:
 - 1. Planning.
 - 2. Mobilization.

3. Key shop drawing and sample submittals.
 4. Fabrication and delivery of key and long-lead procurement elements.
 5. Contractor and Subcontractor Activities.
 6. Activities for the City, other contractors, utility providers, tenants, or other third parties.
 7. Specific phasing as required by Contract.
 8. Summary activities for the remaining duration of the Contract.
- D. The 180-day schedule shall be cost loaded as described in the Cost Loading Section of this specification.
- E. The Contractor shall include a Schedule Narrative with the 180-Day Schedule submittal.

2.02 BASELINE CONSTRUCTION SCHEDULE

- A. The Baseline Construction Schedule shall be constructed to show sequence and duration of the activities the Contractor proposes to carry out the Work. The schedule shall be resource (manpower) and cost loaded and should indicate any restrictions on the availability of work areas. The Contractor shall utilize the Baseline Construction Schedule in planning, scheduling, coordinating, and performing the work under the Contract (including all activities of Subcontractors, equipment vendors, and Suppliers). The Baseline Construction Schedule is the basis of the Schedule of Values and 4-week look-ahead schedules. The approved 180-Day Schedule shall be incorporated into the Baseline Schedule without any changes or progress. The Baseline Schedule shall demonstrate the feasibility of the Contractor's Civil and Concrete plans. Among other elements, this plan shall demonstrate the ability to meet concrete pour, cure and strip requirements including restrictions on adjacent pours, the ability of the crane and concrete pumping equipment to reach all areas of the concrete work, and a logical plan for completing and exiting the work. The plan shall demonstrate all work including Mechanical and Electrical work and Commissioning phases.
- B. Within 180 days after Notice to Proceed, the Contractor shall submit the Baseline Construction Schedule to the City, including a written narrative to further explain the plan as set forth in its CPM logic network and schedule. The Contractor shall schedule a workshop prior to submittal of the Baseline Construction Schedule to present the schedule plan. Within 5 working days from Baseline Schedule submittal, the Contractor shall conduct a Baseline Schedule presentation describing the schedule in detail and the Contractor's means and methods for construction. The City Representative shall accept or reject, in writing, the Contractor's Baseline Schedule within 30 calendar days after receipt of all required information. If rejected, the Contractor shall make

necessary modification to the Baseline Schedule and resubmit to the City within 14 calendar days. The City Representative shall accept or reject, in writing, the revised Baseline Construction Schedule within 14 calendar days of resubmittal. Once accepted, the Baseline Construction Schedule shall be used for monitoring and evaluating Contract performance, including, but not limited to progress, progress payments, changes, and delays.

- C. The Baseline Construction Schedule will be the Performance Measurement Baseline (PMB) for the Project. This requires that the PMB will be maintained with any structural schedule changes in the Current schedule. This includes expansion and contraction in WBS and/or activities, detailing out summary cost items, and anything else that makes the PMB nonmeasurable.
- D. There shall be at least one continuous Critical Path in the Baseline Schedule, using the longest path definition that starts at the earliest occurring schedule activity in the network (i.e., NTP1) and ends at the latest occurring schedule activity in the network. No more than 20 percent of the activities may be critical or near critical. The Near Critical path shall be defined as within 15 working days of the critical path. If 20 percent of the activities become critical, present a plan to reduce the number of near-Critical Path activities to the client.
- E. The Baseline Construction Schedule shall demonstrate the final level of detail for each activity and shall contain the required relationships completely identified and the durations of each activity correctly depicted. The Baseline Construction Schedule shall be developed as follows:
 - 1. The Baseline Construction Schedule shall contain no Contract changes or delays which may have been incurred during the interim schedule development period. These changes will be entered at the first update after the baseline schedule has been accepted and a change to the Contract time or duration was made via an approved Change Order.
 - 2. The Baseline Construction Schedule submitted for review and acceptance by the City shall contain no status and the data date shall be the Contract Notice to Proceed date.
 - 3. The Baseline Construction Schedule shall clearly indicate the longest critical path of activities from notice to proceed to the Contract completion date or Contract milestone.
 - 4. The Baseline Construction Schedule will contain all cost information assigned to each of the specific activities at the final level of detail. Every construction activity that contains labor, construction equipment or permanent equipment shall be cost and resource loaded to permit initial generation of a cash flow curve and resource curve.

- F. The Baseline Schedule shall include summary activities and milestones for startup as defined in Section 01 91 14, Testing, Integration, and Startup. The detailed Startup Schedule will be submitted and updated separately as described in Section 01 91 14, Testing, Integration, and Startup, with links to the accepted Baseline Schedule summary activities and milestones for startup. 100 working days prior to the start of precommissioning, the Contractor shall submit detailed Startup Schedule which will link to the accepted Baseline Schedule summary activities and milestones for startup.
- G. The Comments made by the City Representative on the Baseline Construction Schedule, during review, will not relieve the Contractor from compliance with requirements of the Contract Documents. To the extent that there are any conflicts between the accepted schedule and the requirements of the Contract Documents, the Contract Documents shall govern. The Baseline Schedule shall show the sequence and interdependence of activities required for complete performance of the Work, beginning with the date of the Contractor's Notice to Proceed date and concluding with the Contract Completion.
- H. Please refer to Section 01 31 13, Project Coordination, for specific requirements regarding Facility Operations. Maintenance of Plant Operations (MOPO) Requests must be submitted prior to starting work in any area, and additional specific MOPO Requests must be submitted for each shutdown and cutover. MOPO Requests shall be submitted a minimum of 10 working days prior to the need date. Activities for the MOPO Request Submittal, City Review Period, and MOPO Request Approval shall be included in the baseline schedule.
- I. The Baseline Construction Schedule shall reflect the Contractor's true plans for progressing and performing the work. The Contractor shall be responsible for the means, methods, and duration and certifies that the schedule duration and Contract period is achievable and Contractor's estimate/bid, and/or budgets, are based upon sequences shown in the schedule.
- J. The Baseline Schedule shall provide the Contractor and the City with a tool to monitor and follow the progress of all phases of the Work. The Baseline Schedule submitted to the City shall comply with all limits imposed by the Scope of Work, with all contractually specified intermediate milestone and completion dates, and with all constraints, restraints or sequences included in the Contract. The Contractor shall obtain subcontractor written concurrence with its Baseline Construction Schedule for all subcontracts with a Contract value of 2 percent or greater of the prime contract value.

- K. The Baseline Construction Schedule shall incorporate and include:
1. Appropriate administrative activities and contract specified review periods (including the City and third parties) for all and phases and components of work.
 2. Required cost, resource and activity codes.
 3. Project milestones dates and overall construction activities and project completion dates.
 4. Project budget, schedule of values and the cost basis for progress payments.
 5. Commissioning activities.
 6. Punch list and final completion activities.
- L. Failure to include in the schedule any element of Work required for performance of Contract shall not excuse Contractor from completing all Work required within applicable time constraints, notwithstanding the City's acceptance of Contractor's Baseline Construction Schedule.
- M. Nothing in these requirements shall be deemed to negate or diminish Contractor's authority and responsibility to plan and schedule Work as required, subject to requirements of Contract Documents.
- N. No construction activity shall be more than 20 working days duration. Exceptions may be approved by the City.
- O. SUBMITTAL REVIEW TIME:
- P. Include in the schedule the review times indicated in Section 01 33 00, Submittal Procedures. Coordinate submittal review times in Contractor's baseline construction schedule with submittal schedule. The schedule shall include a schedule activity for all submittals required by these specifications. Rejected submissions will require the Contractor to add activities that start a second submission and review process.

2.03 SCHEDULE NAMING REQUIREMENTS

- A. To assist the City in consolidating the schedules from all the projects, a standard naming convention has been adopted. The Project name in P6 and the schedule file name should be the same as the following example:

WRP Baseline 01 Dec18 DD123118

Where:

WRP = the code for the project, in this case North City Water Reclamation Plant

Baseline = the type of schedule submittal, which can also be Update, Recovery or Time Impact Analysis

01 = the submittal number or version

Dec18 = the month and year of the schedule submittal

DD = the Data Date, in this example Dec 31, 2018

The exported P6 data (XER) file shall use the same name as the Schedule ID

2.04 ACTIVITY CODES

- A. The project schedule shall utilize the following activity codes and code values. Unless otherwise specified, a value for each code shall be assigned to each activity. In the event it is unclear which code value assignment should be made for an activity, the City Representative will make the final decision. The Project ID (City Contract Number) shall be the prefix for all Activity Codes. All District-required Activity Codes should be global. Final configuration will be presented at the Preconstruction scheduling meeting.

Activity Code	Description
(Project ID) Phase	Phase of Work, Examples include Submit, Review & Approve, Fabrication, Deliver, Mobilization, Construction, Commissioning etc.
(Project ID) Work Area	Assign Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints

Activity Code	Description
	that would preclude a resource, such as a particular trade or craft work crew, from working in more than one work area at a time due to restraints on resources of space. Examples of Area code include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Area code. Not all activities are required to be work area coded.
(Project ID) Responsibility	Assign a Responsibility code to all activities indicating who is responsible for performing the activity. Examples include Electrical, Mechanical, Plumbing, Fire Protection, the City, General Contractor, etc. Responsibility code may be named to the company performing the work.
(Project ID) System	Assign System code to the group of activities that comprise a system that will be Commissioned during the commissioning phase. Examples of a System are: Chemical Treatment System, Sprinkler System, HRSG System, SCADA System, Switchgear, etc.
(Project ID) CSI	All procurement and submittal activities shall be assigned a 6 digit CSI code identifying Submittals, Purchase Orders, Fabrication and Delivery activities. The City uses CSI's Master Format 50 numbering system.
(Project ID) Cost ID	All cost loaded activities shall be assigned a cost code for the purpose of categorizing costs into accounts.
(Project ID) Change Orders	The Contractor shall use a City-provided change order code structure containing the change order number and a description of the change order.
CITY Project Code	The Contractor shall add the City's Project code to all activities. For NCWRP, for example, use the Code Value of "WRP" with a Description of "North City Water Reclamation Plant (NCWRP)."
(Project ID) 180-Day Schedule	Assign an activity code to all activities to be reviewed and approved as part of the 180-Day Schedule, which includes all activities within the 180-day window

Activity Code	Description
(Project ID) Major Equipment	Assign an activity code to all activities related to procurement of Major Equipment as defined in the Definitions and Terms found in the Section 01 29 00, Payment Procedures.
CITY Access Requests	Assign an AR Code to all access request activities.
(Project ID) Milestones	The Contractor shall add a Milestones code to all milestones in the schedule.
(Project ID) Weather Sensitivity	Code (WS or NWS). Assign Category of Work Code to all Activities based upon Weather Sensitive Installation or Non- Weather Sensitive Installation.

2.05 ACTIVITY ID

- A. Every Activity ID in the baseline and updated schedules shall be preceded by a 3 or 4 letter prefix code followed by a dash. All suffix coding to the right of the dash is at the discretion of the Contractor. The prefix code for the NCWRP project is 'WRP-'.
- B. If for any reason an Activity ID is deleted or removed from the schedule, it may not be reused for another activity. Similarly, once the baseline construction schedule is accepted, activity descriptions may not be changed without the permission of the City Representative.

2.06 SCHEDULE SUBMITTALS

- A. In accordance with the Section 01 33 00, Submittal Procedures, and the Section 01 33 22, Web Based Construction Document Management, submit all required schedule submittals in the following format:
 - 1. One electronic copy of the Oracle Primavera P6 XER file including all project layouts.
 - 2. One PDF copy of all reports, bar-charts, time-scaled diagrams, histograms, s- curves and narrative.
- B. Variance Report: With each updated schedule submission, provide a computer-generated Log Report listing all changes made between the previous schedule and current updated schedule. Identify the name of the previous schedule and name of the current schedule being compared showing all changes to the Schedule. This report will as a minimum show changes for: Added & Deleted Activities, Original Durations, Calendars, Descriptions,

Constraints (added, deleted or changed), Added/Deleted Resources, Costs, Added/Deleted Relationships, Changed Relationship Lags, a Critical Path Analysis, Float Analysis, Open Ended Activity Analysis. A narrative shall be included in the variance report stating the reason for the changes listed above.

- C. CPM Reports: Concurrent with the CPM schedule, submit in PDF format the reports listed below. The specific format of the required reports will be discussed at the Preconstruction Scheduling Conference.
1. Critical Path Gantt Chart as further described in Article Baseline Construction Schedule.
 2. Critical and Near Critical Path Gantt Chart as further described in Article Baseline Construction Schedule.
 3. Activity ID Report: List of all activities sorted by activity number.
 4. Activity Schedule Bar-chart: Sorted by phase, area, start and finish.
 5. Logic Report: List of preceding and succeeding activities for all activities, sorted by phase, area, start and finish.
 6. Total Float Report: List of all activities sorted by phase in descending order of total float, then descending finish.
 7. Schedule of Values Report generated from the Oracle Primavera P6 schedule grouped by the Cost ID activity code and filtered by “budgeted total cost is not equal to \$0.” Sort by Activity ID with the following columns:
 - a. Activity ID.
 - b. Activity Name.
 - c. Remaining Duration.
 - d. Start.
 - e. Finish.
 - f. Cost Percent Complete.
 - g. Physical Percent Complete.
 - h. Previous Physical Percent Complete.
 - i. Budgeted Total Cost.
 - j. Actual Total Cost.
 - k. Actual This Period Total Cost.
 - l. Previous Applications Total Cost.
 - m. Remaining Total Cost.
 - n. At Completion Total Cost.
 8. Project Cash Flow S-Curve: Show the monthly budgeted costs, actual costs and estimate at completion. Include cash curves for early and late start and finish dates.
 9. Manpower Histograms: Showing project overall labor hours per month and trade labor hours per month (carpenters, masons, electricians, laborers, foremen, etc.).

10. Material and Equipment Status Report: Showing the status of materials and equipment stored on-site and materials and equipment stored in bonded warehouse(s).

2.07 BASELINE NARRATIVE

- A. The Contractor shall provide a written narrative accompanying the electronic version of the Contractor's Baseline Schedule submission. This narrative shall explain the Contractor's approach for meeting all milestones and project completion dates. It shall also include a clear description of the critical path activities from beginning to end and describe anticipated crew sizes, production rate and anticipated problems of major activities along the critical path.
- B. In the written narrative, the Contractor shall include the basis and assumptions used to develop the Contractor's Baseline Schedule. The Contractor shall include crew sizes, equipment requirements, and anticipated delivery dates; restraints; critical path activities; activities requiring overtime or additional shifts; activities that contain time contingencies for impacts to be expected from normal rainfall; holidays and other non- work days; potential problem areas; permits; coordination required with the City and third party agencies; and long lead delivery items requiring more than 60 calendar days from order to delivery. The narrative shall also include a description of winterization activities necessary for work to continue through normally inclement weather periods.

2.08 PAYMENTS DURING THE 180-DAY AND BASELINE SCHEDULE PROCESSING

- A. The City will only process the Contractor's payment applications for Mobilization, Bonds and Insurance prior to the acceptance of the 180-Day Schedule. The accepted 180-Day Schedule shall be the basis for progress payment request until the duration of the 180-Day Schedule is exceeded, at which time the Contractor shall have an accepted Baseline Schedule in effect. Should the Contractor not have an accepted Baseline Schedule at the end of the 180-Day Schedule duration, the City will be unable to process payments until a Baseline schedule is accepted and stasured. This paragraph remains in effect in addition to any payment deductions or withholds determined per Paragraph 3.04.
- B. The City places a high value on the timely acceptance of the 180-Day and Baseline Schedules, and their usefulness to the City diminishes with late acceptance of these schedules. Accordingly, for every month that acceptance of the 180-Day Schedule is delayed beyond 95 calendar days after NTP, the

payment amount for the 180-Day Schedule, as specified in Section 01 29 00, Payment Procedures, will be reduced by 10 percent of the specified amount. For every month beyond 180 calendar days after NTP that an accepted Baseline Schedule is delayed, the payment amount for the Baseline Schedule, as specified in Section 01 29 00, Payment Procedures, will be reduced by 10 percent of the specified amount.

2.09 SCHEDULE UPDATE PROCESS AND PAYMENTS

- A. Contractor to monthly update the approved Baseline Schedule to reflect the current status of the Project. The update shall include all information available and status of the Project as of the cut-off date established in the Preliminary Schedule Meeting. All Monthly Progress Schedules shall incorporate all schedule Revisions and changes previously approved by the City.
- B. Each Monthly Progress Schedule shall reflect all as-built activities performed as of the effective data date of the update schedule. The Monthly Progress Schedule shall include the period from the last update to the effective data date and for the remainder of the Project. The current period's activities shall be reported as they actually took place. In the updated schedule, Contractor shall indicate the actual dates that activities were started, completed, or split. Ongoing activities shall have an indication of the percent complete based on the amount of actual work performed, and the estimated remaining duration to complete such activities.
- C. Contractor shall certify that the progress shown on the schedule update accurately represents Work completed through the cutoff date of the Submittal.
- D. If Work was performed out of sequence, implement changes to the schedule so that it correctly reflects the actual sequence of work. In the case of repairing logic for Work performed out of sequence, the City may consider the use of negative lags. Any such schedule corrections for out of sequence work shall be considered a Revision, and Contractor shall obtain written approval from the City prior to implementing those revisions to the Monthly Progress Schedule or any other type of schedule.
- E. The physical percentage completion status (and remaining duration) of activities shall be stated in the schedule Updates and the Monthly Progress Schedule independently from the status of the dollar amount assigned to the activity for cost (price) and progress payment purposes. For example, the status of an activity can be 50 percent complete (based on time of performance) and may have a remaining duration of 5 days of the original 10-day duration, but the cost assigned to that activity may have a different

completion status, and the earned dollars could be more or less than 50 percent of the at-completion dollars assigned to that activity. Contractor shall set up the scheduling software to calculate the physical completion status of each activity related to time separately from the status of the value of dollars earned for progress payment purposes.

- F. The earned-to-date dollar amount must reflect the value of the work completed (which may not be directly proportional to the activity remaining duration or physical completion status), and consideration must be given to: 1) materials stored at the site or off site, but not incorporated into the work when payment prerequisites are met by Contractor; 2) reductions for non-compliant work; 3) reductions for failure to provide material testing or required certifications; 4) reductions for other reasons described by the Contract Documents; 5) when the value of the work remaining is naturally disproportionate to the performance time remaining. When the physical percentage complete of an activity is disproportionate to the earned-to-date dollar amount, the reasons for the variance shall be described in a Log field as part of the Monthly Progress Schedule data, and those Log field notations shall be displayed as a column in the Application for Payment Detail.
- G. In addition to what is required for a schedule Update of work progress, the submission shall include a separate tabular report of all schedule activities that are cost loaded, and shall include the at-completion Total Cost, the proposed earned-this-period Cost amount, and the proposed earned-to-date Cost. The format and group subtotaling of the cost and payment accounting tabular report shall be submitted for review and acceptance by the City prior to the first Monthly Progress Schedule submission, and the City can request and Contractor shall implement revisions to the formatting and data displayed in the tabular report at any time thereafter to better serve the City's cost accounting system. The tabular report shall serve as the line item detail of the earned-to-date dollars assigned to each activity through the schedule's data date, will be referred to as the Application for Payment Detail document, and once approved by the City, will be an attachment to the Contractor Summary of Tasks submitted by Contractor as part of the monthly Invoice and Invoice Certificate Package.
- H. Two days prior to the Monthly Progress Schedule data date, submit draft Monthly Progress Schedule for review by the City. Review will be done during a meeting to go over the claimed amounts. During the meeting the City Representative will respond to Contractor's estimated earned-to-date dollar amounts, and any variances between Contractor's proposed earned-to-date dollars and the City's estimate will be discussed and resolved. A marked up copy of the tabular report of the resolution of any variances will be copied for each party. Those changes to the draft Monthly Progress Schedule earned-to-

date dollars will be made to the schedule before the Monthly Progress Schedule is formally submitted. If follow-up is required to further a discussion or to present proof in order to resolve the earned-to-date dollar amount for an activity, it shall occur within 2 working days after the Meeting, and a resolution shall be reached before formal submission of the Monthly Progress Schedule. If there is a disagreement between City's and Contractor's estimated earned-to-date dollar amounts, Contractor shall use the City's earned-to-date figure.

- I. If at any time, Contractor or the City discovers an at-completion dollar amount (budget) assigned to an activity that is unreasonable or incorrect, either party can request that an adjustment be made. Such proposed adjustment shall be presented at the next Weekly Progress Meeting and discussed and treated like any other proposed schedule revision. Adjustments to the at-completion dollar amount for any activity will naturally require an equal adjustment to another activity such that the total Contract value does not change. Any proposed Revision to the at-completion dollar amount for any activity must be accepted by the City in writing prior to the change being made to the Monthly Progress Schedule. Contractor will maintain and make available to the City a record of all approved revisions to at-completion dollar amounts that displays each approved revision, and the adjustments to all activities affected by a revision.
- J. Contractor's monthly payment applications shall not be accepted and processed for payment by the City Representative without Baseline Schedule progress updates submitted in the time and manner required by this specification which accurately reflect the allowable costs due under the Contract Documents and are accepted by the City. Should the Baseline Schedule progress updates not be accepted due to the Contractor's failure to address all City provided comments, payment withholds and deducts will be applied as specified in Paragraph 3.04 of this section.
- K. Please see Section 01 29 00, Payment Procedures, for the Schedule of Values approval process and coordination with invoice payment.
- L. The Schedule Update Submittal shall include:
 1. A detailed Gantt chart showing all activities organized by Work Breakdown Structure. The activity columns shall include Activity ID, Activity Name, Original Duration, Remaining Duration, Duration Percent Complete, Physical Percent Complete, Start, Finish, and Total Float. The critical path shall be clearly shown.
 2. A Critical Path Gantt chart showing Longest Path grouped by WBS to level 1 only. The activity columns shall include Activity ID, Activity

Name, Remaining Duration, Start, Finish, and Total Float. The critical path and relationship lines (logic) shall be clearly shown and based upon the critical and longest path.

3. A Critical and Near Critical Path Gantt using the “calculate multiple float paths” option in P6 with the “display multiple float paths ending with activity” set to each of the Contract milestones. Set the number of float paths to 30. Group the report by “Float Path” and filter for float value 15 days from the float value showing on each Contract milestone. The activity columns on the tabular data portion of the schedule shall include Activity ID, Activity Name, Remaining Duration, Start, Finish, and Total Float. The critical path and relationship lines (logic) shall be clearly shown.
4. A Schedule Variance Report shall be submitted comparing the current schedule submittal with the previously accepted schedule. Display the baseline project bars and milestones in the Gantt Chart. Include the following categories:
 - a. Activity ID.
 - b. Activity Name.
 - c. Original Duration.
 - d. BL Project Duration.
 - e. Variance – BL Project Duration.
 - f. Start.
 - g. Finish.
 - h. BL Project Start.
 - i. BL Project Finish.
 - j. Variance – BL Project Finish Date.
5. Schedule of Values Report generated from the Oracle Primavera P6 schedule grouped by the Cost ID activity code and filtered by “budgeted total cost is not equal to \$0.” Sort by Activity ID with the following columns:
 - a. Activity ID.
 - b. Activity Name.
 - c. Remaining Duration.
 - d. Start.
 - e. Finish.
 - f. Cost Percent Complete.
 - g. Physical Percent Complete.
 - h. Previous Physical Percent Complete.
 - i. Budgeted Total Cost.
 - j. Actual Total Cost.
 - k. Actual This Period Total Cost.
 - l. Previous Applications Total Cost.
 - m. Remaining Total Cost.
 - n. At Completion Total Cost.

6. A Cashflow curve plotting actual invoicing against Baseline forecast cashflow and the update forecast to project completion. The cashflow shall include Show the monthly budgeted costs, actual costs and estimate at completion. Include cash curves for early and late start and finish dates.
 7. A manpower histogram plotting actual labor hours against Baseline forecast labor hours over the entire project.
 8. Material and Equipment Histograms: Showing the status of materials and equipment stored on-site and materials and equipment stored in bonded warehouse(s).
 9. Construction Equipment Histograms: Show project overall equipment count per month by major equipment category count per month (cranes, excavators, etc.).
- M. All changes to Schedule Updates must be accepted by the City Representative. If the Contractor desires to make a change to the current accepted Progress Update Schedule, the Contractor shall request permission from the City in writing, stating the reasons for the change as well as the specifics, such as revisions to activities, logic, durations, calendars, etc. Pending changes will be discussed at the Monthly Schedule Review (2 days prior to last Friday) where the City may authorize their inclusion in the schedule without any determination of merit or responsibility.
- N. Out of sequence logic must be corrected before the Progress Update Schedule is submitted.
- O. Pending Changes shall have a City assigned Potential Change (PC) number. The Contractor shall incorporate PC activities into the schedule as Level of Effort (LOE) activities, with a zero-dollar value cost, in the update period in which the Contractor knew, or should have known of the change. The LOE shall be linked to the impacted base Contract schedule activities. The change activity shall not be cost loaded until an agreement is reached between the Contractor and City as to cost. Should the PC impact the critical path, the Contractor shall submit a Time Impact Analysis (TIA) per the TIA provisions of these specifications. Upon acceptance of a TIA by the City Representative, the Contractor shall incorporate the detailed TIA schedule activities into the next Schedule Update retaining the original LOE activity. All Potential Change Activities shall be assigned a WBS and coding structure to distinguish said activities from base contract schedule activities. Upon PCs being incorporated into a Contract Change Order (CCO), the Contractor shall assign a WBS and Activity Code for each CCO, with its subset of PC numbers, with the sum cost loading of said PC activities equal to the value of the CCO. The sum of the base contract activities shall total the original contract value. The sum of the change activities shall total CCOs issued to date, plus remaining

PCs pending CCO. In the case of deductive change, the base contract activity shall be broken into two activities with the same logic ties consisting of the original activity with the remaining base contract amount and second activity with the amount to be deducted, the sum of the two totaling the originally scheduled value. Add an offsetting deduct (negative cost) as a PC change activity. The deduct amount activity on the base contract section shall have the successor logic removed, with a “deduct” note in parenthesis added to the end of the activity description. The deduct activity shall remain open until the actual deduct activity in the change section is statused as complete upon the CCO being issued. Upon the CCO being issued, both activities shall be statused with the CCO issue date.

- P. Failure to include in the schedule any element of Work required for performance of Contract shall not excuse Contractor from completing all Work required within applicable time constraints, notwithstanding the City's acceptance of Contractor's Construction Schedule.
- Q. Contractor shall address City review comments and resubmit within 7 calendar days from receipt of review comments. Should the Contractor fail to timely incorporate the City schedule review comments prior to the due date for the next month's update, the Contractor shall proceed with the update and the outstanding schedule review comments from the prior month will be included in the current schedule update's review comments. The Contractor is responsible for including the City schedule review comments into all affected schedules.
- R. Schedule updates forecasting Contract milestones 30 or more days late are subject to rejection.

2.10 NARRATIVE PROGRESS REPORTS

- A. A Cost Activity Report shall be prepared and submitted with each progress payment. The cost information shall be updated by activity and summarized for each month. The sum of all monthly costs shall be equal to the Contract amount plus approved change orders.
- B. The Narrative Report shall be submitted with the monthly progress update and include:
 - 1. The Contractor's Transmittal Letter.
 - 2. Schedule report indicating each activity on the CPM Schedule that has been:
 - a. Completed during this reporting period.
 - b. In progress during this reporting period.
 - 3. Scheduled for the next reporting period.

4. Analysis, by critical path. (Note: critical path is longest path as described above.)
 - a. A listing of the current critical path.
 - b. Progress made on critical path activities in current CPM schedule.
 - c. Explanations for any lack of Work on critical path activities planned to be performed during the last month.
 - d. Impact on other activities, milestones, and completion dates.
5. Current and anticipated delays:
 - a. Cause of the delay.
 - b. Corrective action and schedule adjustments taken or to be taken to correct the delay.
 - c. Impact of the delay on other activities, milestones, and completion dates.
 - d. Recommendations for recovery of the delays.
6. Any change in construction sequence, logic changes, relationship changes, or duration changes and the rationale associated with each change for City review and acceptance.
7. Any corrective actions taken by the Contractor to address delays or potential delays
8. Value of materials and equipment properly stored at the site but not yet incorporated in the Work.
9. Identify interface items of work with another contract or with existing facilities or where third-party action or coordination is required.
10. Pending issues and status of other items such as:
 - a. Permits.
 - b. Contract modifications.
 - c. Time extension requests.
 - d. Long-lead procurement items.
11. Contract complete date status.
12. Ahead of schedule and number of days.
13. Behind schedule and number of days.
14. Summary of project status including cumulative information to date, variance, and forecast at completion.
15. Other project or scheduling concerns.

2.11 WEEKLY 4-WEEK LOOK-AHEAD SCHEDULE

- A. The weekly bar chart “Four-Week Look-Ahead Schedule” submittal shall comply with the following requirements:
 1. Be produced using the latest version of Oracle Primavera P6 software and generated from the latest Monthly Schedule Update.
 2. Updated weekly with a Monday Data Date.

3. The filter for the bar chart will be all activities that have started but not finished, plus all activities with a start or finish within minus 1 week and plus 4 weeks. Total float and the critical path shall clearly be shown.
4. Submit as a printed bar chart on 11-inch by 17-inch paper 24 hours prior to the weekly project meeting.
5. Identify any shutdowns/cutovers that may potentially impact stakeholders.
6. Be prepared to discuss the status of activities on the Four Week Look Ahead Schedule, including any key issues or delays at the weekly project meetings. The Contractor's Superintendent in charge of the work areas in the schedule shall review and sign off on the Four Week Look Ahead Schedule. The Superintendent shall be prepared to review the activities in the Four Week Look Ahead Schedule and discuss any foreseeable issues.
7. The Contractor may provide supplemental detail to elaborate on any schedule activity and must clearly represent this supplemental detail as supplemental task information separate from the Oracle Primavera P6 generated schedule. The Contractor shall not in any way change the Activity ID and description in the schedule. For each activity on the Four Week Rolling Schedule, the Contractor shall list the corresponding schedule activity identification number from the current Monthly Progress Schedule Update.

2.12 RECOVERY SCHEDULE

- A. When a periodic update indicates the project completion, or any intermediate Contract milestone, is 1 day to 15 days behind the current accepted schedule, the City reserves the right to request a recovery schedule. If the work falls more than 15 days behind the current accepted schedule, the Contractor is required to submit a Recovery Schedule taking steps necessary to improve progress at no additional cost to the City.
- B. Recovery schedules may be submitted independently or included in the next Monthly Progress Update. Indicate changes to working hours per shift, labor per shift, shifts per working day, working days per week, or amount of construction equipment, or any combination of foregoing, sufficiently to achieve the contractual milestones in accordance with the current Contract requirements. If the Contractor chooses to include the recovery schedule with the next Monthly Progress Update, the City Representative may reject the Monthly Progress Update or require revisions to be made to the recovery schedule before the Monthly Progress Schedule is accepted. Recovery Schedules shall be prepared by the Contractor regardless of the underlying cause for the delay and responsibility for the time.

- C. The Recovery Schedule shall have the same data date as the submitted Monthly Progress Schedule, and the data prior to the data date shall be the same in both.
- D. Concurrent with the submittal of the Monthly Progress Schedule for review by the City, Contractor shall submit the proposed Recovery Schedule. The Submittal shall also include a written, narrative format document detailing proposed changes to the Project Schedule and including reasons for the changes. This narrative document shall include at a minimum, the following:
 - 1. Detailed description of the changes in the means and methods that Contractor intends to implement to recover from schedule delay; such as additional design staff, additional construction crews, additional equipment, extended working hours, additional shifts per day, or other means;
 - 2. Detailed description of proposed changes in work activity sequences that will permit previously scheduled sequential work to be performed concurrently, or other scheduling changes, which will result in recovery of the schedule delay;
 - 3. Identification of changes to specific activity original durations;
 - 4. Identification of changes to activity relationships and/or schedule logic;
 - 5. Identification of activities that have been added, deleted, or modified; and/or
 - 6. Identification of changes to the Project Schedule's Critical Path.

2.13 TIME IMPACT ANALYSIS (TIA)

- A. When the Contractor asserts it has been or will be delayed, and as a result is requesting a time extension, the Contractor shall notify the City Representative of a potential delay and prepare and submit a TIA within 14 calendar days after the impact is known or should have been known.
- B. The TIA shall be submitted separately and based upon the current accepted schedule with a data date closest to and prior to the date when the Contractor knew, or should have known, of the impact. The current accepted schedule can be the Initial 180-Day Schedule, Baseline Schedule, or Monthly Schedule Update.
- C. If the Contractor is submitting time related costs of any kind and/or is requesting time due to a schedule delay, the submittal of a TIA is required.
- D. The Contractor shall submit to the City a written TIA illustrating the influence of each change or delay on any specified intermediate milestone date and the current projected completion date. Each TIA shall include a CPM schedule network (fragnet) indicating all necessary added activities, logic, duration and

demonstrating how the Contractor proposes to incorporate the change or delay into the Schedule and any additional supporting evidence that the City deems necessary.

- E. The TIA submittal shall include a PDF fragnet comparing the current accepted schedule against the Contractor's claimed delay, showing the impact on the critical path. The fragnet must show all impacts leading up and including the Contract milestones.
- F. The TIA shall include a narrative addressing entitlement including a description of the scope of the change as well as addressing compliance with all Contract requirements for requesting a time extension. The schedule narrative at a minimum shall address the chronology of events (impact activities), compliance with notice requirements, schedule update used as the basis of analysis (or baseline schedule if applicable), critical path, identification of CPM schedule activities impacted, logic ties between impact activities and CPM schedule activities, fragnet, concurrency, and compensability if applicable.
- G. The Contractor shall submit one electronic copy of the Oracle Primavera P6 schedule files in XER format, PDF copies of the fragments, and the narrative. Each TIA should be identified with a discrete ID number and description.
- H. Should the Contractor fail to request time and submit a contract compliant TIA per these specifications, the Contractor will have irrevocably waived its contract right to a time extension and time-related costs and will be responsible for all costs associated with mitigating said delay to complete the work within the Contract time.
- I. It is expressly agreed and understood that the Contractor shall not be entitled to any time or compensation for potential delays, or delays, which:
 - 1. Can be avoided by re-sequencing work activities;
 - 2. Applying additional resources;
 - 3. Do not delay the project completion date or a project milestone; or
 - 4. Result from any method used to sequester float.
- J. Pacing is defined as an intentional slowing of work activities during a delay, or alleged delay, to project completion. Absent contemporaneous notice of intent to pace, including the Contractor's rational to pace and the City's concurrence, pacing of work activities will be construed as a concurrent delay for the purposes of assessing time extensions and delay costs."
- K. The Contractor shall incorporate City review comments and resubmit the TIA within 7 calendar days of receiving them.

- L. Upon acceptance of the TIA by the City Representative, the Contractor shall incorporate the TIA fragment into the next monthly progress schedule update.

PART 3 EXECUTION

3.01 ANTICIPATED WEATHER DAYS

- A. Time Allowance for Inclement Weather: Time allowance for inclement weather: "Inclement weather" is a lost workday, caused by inclement weather conditions, and is defined as a day in which the Contractor's workforce cannot work 50 percent or more of the day thereby resulting in a delay to the critical path. The number of inclement weather days will be reflected in a schedule activity titled "Inclement Weather". The Contractor shall allow 13 working days per year within the Baseline Construction Schedule for inclement weather, the unused portion shall be considered as Float to be used by either party. The inclement weather activity's successor shall be the Substantial Completion milestone. The predecessor activities shall be the last project activities that occur before Substantial Completion. The Contractor shall notify the Resident Project Representative in writing when a lost workday has occurred due to inclement weather in accordance with the Baseline Construction Schedule update requirements. Any delays beyond the 13 working days per year shall not entitle the Contractor to any additional compensation. The sole remedy of the Contractor shall be to seek a non-compensable extension of time.

3.02 WEATHER CALENDAR AND ACCOUNTING OF DAYS

- A. The accounting of weather days shall occur once monthly corresponding to the Monthly Schedule Update. The City granted non-working days affecting the critical path attributable to weather shall be accounted for in the Weekly Statement of Contract Time, as prepared by the City, independent of the weather allowance. City granted weather days shall be added to the schedule monthly as a one work day Non-work days in the calendars with an actual date equal to the non-working day as reflected in the Weekly Statement of Contract Time. A monthly reconciliation will occur between the inclement weather allowance and actual weather impact, as reflected in the Weekly Statement of Contract Time. Should the Contractor meet all Contract requirements for demonstrating unavoidable delay, the Contractor shall be granted a time extension for weather impact days, beyond the weather allowance days for the same time period, for activities on the critical path.
- B. No Contract time adjustment shall be made if actual non-working days attributable to weather affecting the critical path DOES NOT exceed the allowance. Unused weather allowance shall become project float.

3.03 COMPLIANCE AND FAILURE TO SUBMIT TIMELY SCHEDULES

- A. Because the City places a high value on the importance and use of project scheduling information as a management tool in achieving the completion of Work as planned, the City will deduct 10 percent of the monthly Progress Payment, but not more than 3 percent of the Contract value, for failure by the Contractor to submit accepted Baseline Schedules or the monthly Progress Update Schedules as required by these specifications. These deductions shall apply should the Contractor fail to address within the specified time frame schedule review comments, TIA review comments, recovery schedule requirements, and address any other requirements of these specifications and/or the City. These deductions are cumulative and will be made for each and every month that the Contractor fails to provide the required information. The Progress Update Schedules and narratives shall be accurate, reflect actual events on the project, and meet all requirements of these specifications. If the Contractor does not correct the deficiency by providing an acceptable schedule within the specified time frame from receiving the City's review comments, the deduction will become permanent via a deductive change order.

3.04 PROJECT RECORD SCHEDULE

- A. Final Progress Schedule:
1. The last monthly update of the project schedule shall be the project record (as-built) schedule. The project record schedule shall accurately show the completion of all work required by the Contract and shall have a data date equivalent to the day after the actual date of the Contract Completion milestone. All project schedule activities shall be stasured at 100 percent complete and have actual start and actual finish dates. The project budgeted cost reflected in the project record schedule shall be the Contract price, inclusive of all adjustments due to executed change orders. The project record schedule submittal shall meet all monthly update requirements and include an actual cost statement. The City's acceptance of the project record schedule shall be a condition precedent to acceptance of the Contract by the City's Board of Directors and to the release of final payment and bonds by the City.

2. This schedule submission shall be accompanied by a certification, signed by an officer of the company and the Contractor's Project Manager and Project Scheduler, stating "To the best of our knowledge, the enclosed final update of the Construction Progress Schedule accurately reflects the actual start and completion dates and logical relationships of all activities contained herein and represents an accurate depiction of the way in which the project was constructed."

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor that requires Design Engineer's approval.
- B. Deferred Submittal: Information as indicated on Drawings, submitted by Contractor, for portions of design that are to be submitted to permitting agency for approval prior to installation of that portion of the Work, along with Design Engineer's review documentation that submittal has been found to be in general conformance with Project's design.
- C. Informational Submittal: Information submitted by Contractor that requires Design Engineer's review and determination that submitted information is in accordance with the Conditions of the Contract.

1.02 PROCEDURES

- A. Direct submittals as described in Section 01 33 22, Web Based Construction Document Management, unless specified otherwise.
 - 1. Via Construction Manager.
- B. Electronic Submittals: Submittals shall, unless specifically accepted, be made in electronic format.
 - 1. Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
 - 2. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.
 - 3. PDF files shall be set to open "Bookmarks and Page" view Magnification shall be set to "fit page".
 - 4. Add general information to each PDF file, including title, subject, author, and keywords.
 - 5. PDF files shall be set up to print legibly at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 - 6. Submit new electronic files for each resubmittal.

7. Include a copy of the Transmittal of Contractor's Submittal form, located at end of section, with each electronic file.
8. Owner will reject submittal that is not electronically submitted, unless specifically accepted.
9. Provide Construction Manager with authorization to reproduce and distribute each file as many times as necessary for Project documentation. Provide file password if security settings are used.
10. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference and shall be as required by Section 01 33 22, Web Based Construction Document Management.

C. Transmittal of Submittal:

1. Contractor shall:
 - a. Review each submittal and check for compliance with Contract Documents.
 - b. Stamp each submittal with uniform approval stamp before submitting to Construction Manager.
 - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - 2) Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form in format approved by Construction Manager.
3. Identify each submittal with the following:
 - a. Numbering and Tracking System:
 - 1) Sequentially number each submittal.
 - 2) Resubmission of submittal shall have original number with sequential alphabetic suffix.
 - b. Specification section and paragraph to which submittal applies.
 - c. Project title and Owner's project number.
 - d. Date of transmittal.
 - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
4. Identify and describe each deviation or variation from Contract Documents.
5. All submittals shall be in the English language.

D. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.
2. Package submittal information by individual specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in specification.
3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
4. Index with labeled tab dividers in orderly manner.
5. Submit all text in the English language.

E. Timeliness: Schedule and submit in accordance Schedule of Submittals, and requirements of individual specification sections.

F. Processing Time:

1. Time for review shall commence on Design Engineer's receipt of submittal.
2. Construction Manager will act upon Contractor's submittal and transmit response to Contractor not later than 20 working days after receipt, unless otherwise specified.
3. Allow 30 working days for the review of deferred submittals by the AHJ after approval by the Design Engineer.
4. Resubmittals will be subject to same review time.
5. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.

G. Resubmittals: Clearly identify each correction or change made.

H. Incomplete Submittals:

1. Design Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp; completed and signed.
 - b. Transmittal of Contractor's Submittal; completed and signed.
 - c. Insufficient number of copies.

I. Submittals not required by Contract Documents:

1. Will not be reviewed and will be returned stamped "Not Subject to Review."

2. Construction Manager will keep one copy and return submittal to Contractor.
- J. Approved Materials List (AML): See Section 4-3.6, "Preapproved Material" in The Whitebook and as amended in the SSP for submittal requirements of materials in the City's AML.
- K. Working Drawings: Submit Working Drawings listed in Table 3-8.2 of The Whitebook in accordance with the requirements of The Whitebook and The Greenbook.

1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual specification sections.
- B. Shop Drawings:
 1. Copies: Five copies of closed submittals as required under Section 01 33 22, Web Based Construction Document Management.
 2. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
 3. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
 4. Product Data: Provide as specified in individual specifications.
 5. Deferred Submittal: See Drawings for list of deferred submittals.
 - a. Contractor-design drawings and product data related to permanent construction.
 - 1) Written and graphic information.
 - 2) Drawings.
 - 3) Cut sheets.
 - 4) Data sheets.
 - 5) Calculations.
 - 6) Action item submittals requested in individual specification section.

- b. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit required supporting data and drawings for review and acceptance by Design Engineer. Documentation of review and approval provided on Design Engineer's comment form, along with completed submittal, will be filed with permitting agency by Contractor and approved by permitting agency prior to installation.
6. Foreign Manufacturers: When proposed, include names and addresses of at least two companies that maintain technical service representatives close to Project.

C. Samples:

1. Copies: Two, unless otherwise specified in individual specifications.
2. Preparation:
 - a. Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - 1) Manufacturer name.
 - 2) Model number.
 - 3) Material.
 - 4) Sample source.
 3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
 4. Full-size Samples:
 - a. Size as indicated in individual specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.

D. Action Submittal Dispositions:

1. Design Engineer will review, comment, stamp, and distribute as noted:
 - a. Approved:
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: Electronic.
 - a) One copy of closed submittal furnished to the Construction Manager.
 - b. Approved as Noted:
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Design Engineer's notations.
 - 2) Distribution: Electronic.

- c. Partial Approval, Resubmit as Noted:
 - 1) Make corrections or obtain missing portions, and resubmit.
 - 2) Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Design Engineer's notations.
 - 3) Distribution: Electronic.
- d. Revise and Resubmit:
 - 1) Contractor may not incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: Electronic.

1.04 INFORMATIONAL SUBMITTALS

A. General:

- 1. Copies: Electronic.
- 2. Refer to individual specification sections for specific submittal requirements.
- 3. Construction Manager will review each submittal. If submittal meets conditions of the Contract, Construction Manager will forward copy to appropriate parties. If Construction Manager determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Construction Manager will provide review comments to Contractor, and require that submittal be corrected and resubmitted.

B. Equipment Procured Overseas: Within 60 calendar days of Notice to Proceed, submit a list of equipment that will require overseas shipping for project delivery. List shall include the value of shipped items.

C. Certificates:

- 1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
- 2. Welding: In accordance with individual specification sections.
- 3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual specification section.
- 4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual specification sections.
 6. Manufacturer's Certificate of Compliance: In accordance with Section 01 61 00, Common Product Requirements.
 7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01 43 33, Manufacturers' Field Services.
- D. Construction Photographs and Video: In accordance with Section 01 31 13, Project Coordination, and as may otherwise be required in Contract Documents.
- E. Closeout Submittals: In accordance with Section 01 77 00, Closeout Procedures.
- F. Contractor-design Data (related to temporary construction):
1. Written and graphic information.
 2. List of assumptions.
 3. List of performance and design criteria.
 4. Summary of loads or load diagram, if applicable.
 5. Calculations.
 6. List of applicable codes and regulations.
 7. Name and version of software.
 8. Information requested in individual specification section.
- G. Deferred Submittals: See Drawings for list of deferred submittals.
1. Contractor-design data related to permanent construction:
 - a. List of assumptions.
 - b. List of performance and design criteria.
 - c. Summary of loads or load diagram, if applicable.
 - d. Calculations.
 - e. List of applicable codes and regulations.
 - f. Name and version of design software.
 - g. Factory test results.
 - h. Informational submittals requested in individual specification section.
 2. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit calculations and test results of Contractor-designed components for review by Design Engineer. Documentation of review and indication of compliance with general design intent and project criteria provided on Design Engineer's comment form as meets conditions of the Contract,

along with completed submittal, will be filed with permitting agency by Contractor and approved by permitting agency prior to installation.

- H. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual specification section.
- I. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- J. Payment:
 - 1. Application for Payment: In accordance with Section 01 29 00, Payment Procedures.
 - 2. Schedule of Values: In accordance with Section 01 29 00, Payment Procedures.
 - 3. Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.
- K. Quality Control Documentation: As required in Section 01 45 16.13, Contractor Quality Control.
- L. Schedules:
 - 1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - 3) Estimated date of submission to Construction Manager, including reviewing and processing time.
 - b. On a monthly basis, submit updated Schedule of Submittals to Construction Manager if changes have occurred or resubmittals are required.
 - 2. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.
- M. Special Guarantee: Supplier's written guarantee as required in individual specification sections.
- N. Statement of Qualification:
 - 1. Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land

surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.

Submittals Required by Laws, Regulations, and Governing Agencies:

- a. Promptly submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
- b. Transmit to Construction Manager for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.

O. Submittals Required by Laws, Regulations, and Governing Agencies:

1. Promptly submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
2. Transmit to Construction Manager for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.

P. Test, Evaluation, and Inspection Reports:

1. General: Shall contain signature of person responsible for test or report.
2. Factory:
 - a. Identification of product and specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Construction Manager.
 - f. Other items as identified in individual specification sections.
3. Field:
 - a. As a minimum, include the following:
 - 1) Project title and number.
 - 2) Date and time.
 - 3) Record of temperature and weather conditions.
 - 4) Identification of product and specification section.
 - 5) Type and location of test, Sample, or inspection, including referenced standard or code.
 - 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.

- 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - 8) Provide interpretation of test results, when requested by Construction Manager.
 - 9) Other items as identified in individual specification sections.
- Q. Testing and Startup Data: In accordance with Section 01 91 14, Testing, Integration, and Startup.
- R. Training Data: In accordance with Section 01 43 33, Manufacturers' Field Services.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 22
WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. The Owner, Construction Manager, Design Engineer, and Contractor shall utilize PMWeb (PMWeb is a registered trademark of PMWeb, Inc) for submission of all data and documents (unless specified otherwise herein) throughout the duration of the Contract.
1. PMWeb is a web-based electronic media site.
 2. PMWeb is paid for by the Owner.
 3. PMWeb will be made available to all Contractor's personnel, subcontractor personnel, suppliers, consultants, Construction Manager, and Design Engineer.
 4. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, and overall management of Construction Phase Documentation.
 5. PMWeb shall be the primary official means of project information submission and management.
- B. User Access Limitations: The Construction Manager will initially manage the Contractor's access to PMWeb by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system; determine assigned function based authorizations and user privileges. Subcontractors and suppliers will be given access to PMWeb by and through the Contractor. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on PMWeb shall be the responsibility of the Contractor.
- C. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the PMWeb system) by the Owner, Construction Manager, Design Engineer, and Contractor will be jointly owned.
- D. Automated System Notification and Audit Log Tracking: Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit

logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

E. Submittals:

1. See Section 01 33 00, Submittal Procedures.
2. Preconstruction Submittals List of Contractor's key PMWeb personnel. Include descriptions of key personnel's roles and responsibilities for this Project. Contractor should also identify their organizations administrator on the list.

F. Computer Requirements:

1. The Contractor shall use computer hardware and software that meets the requirements of the PMWeb system as required to access and utilize PMWeb. As recommendations are modified by PMWeb, the Contractor will upgrade their system(s) to meet or exceed the recommendations. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract.
2. The Contractor shall ensure that connectivity to the PMWeb system is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirements for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system.
3. PMWeb currently supports Mozilla's Firefox v3.0-3.5, Apple's Safari v3.0-3.5, and Microsoft's Internet Explorer v7.0 web browsers for accessing the application.

G. Contractor Responsibility:

1. The Contractor shall be responsible for the validity of their information placed in PMWeb and for the abilities of their personnel.
2. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program.
3. The Contractor shall utilize the existing forms in PMWeb to the maximum extent possible. If a form does not exist in PMWeb the Contractor must include a form of their own or provided by the Design Engineer as an attachment to a submittal.

4. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of PMWeb (outside what is provided by the Owner) and the other programs indicated above as needed.
- H. Connectivity Problems: Provide a list of Contractor's key PMWeb personnel for the Construction Manager's acceptance. Contractor is responsible for adding and removing users from the system. The Construction Manager reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and subcontractors to PMWeb.
- I. Training:
1. The Owner has arranged and paid for training to be provided to the Contractor.
 2. Training consists of web-based seminars in conjunction with a conference call.
 3. Contractor shall arrange and pay for the facilities and hardware/software required to facilitate their own training.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. PMWeb project management application ("no-equal").

PART 3 EXECUTION

3.01 PMWEB UTILIZATION

- A. PMWeb shall be utilized in connection with all document and information management required by these Contract Documents.

3.02 SUBMITTALS

- A. Shop Drawings:
1. Shop Drawing and design data documents shall be submitted PDF attachments to the PMWeb submittal work flow process and form. Examples of Shop Drawings include, but are not limited to:
 - a. Standard manufacturer installation drawings.
 - b. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.

c. Steel fabrication, piece, and erection drawings.

B. See Section 01 33 00, Submittal Procedures.

3.03 PRODUCT DATA

A. Product catalog data and manufacturer's instructions shall be submitted as PDF attachments to the PMWeb submittal work flow process and form. Examples of product data include, but are not limited to:

1. Manufacturer's printed literature.
2. Preprinted product specification data and installation instructions.

3.04 ADMINISTRATIVE OR INFORMATIONAL SUBMITTALS

A. All correspondence and preconstruction submittals shall be submitted using PMWeb. Examples of administrative submittals include, but are not limited to:

1. Permits.
2. Requests for substitutions (RFS).
3. List of contact personnel.
4. Requests for Information (RFI).

B. Network Analysis Schedules and associated reports and updates. Each schedule submittal specified in these Contract Documents shall be submitted as a native backed-up file (.PRX or .STX) of the scheduling program being used. The schedule shall also be posted as a PDF file in the format specified in these Contract Documents.

C. Plans for safety, demolition, environmental protection, and similar activities.

D. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.

E. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.

F. Any general correspondence submitted.

G. Project Photos: Project photos shall be posted monthly to PMWeb.

3.05 COMPLIANCE SUBMITTALS

- A. Test reports, certificates, and manufacture field report submittals shall be submitted on PMWeb as PDF attachments. Examples of compliance submittals include, but are not limited to:
1. Field test reports.
 2. Quality Control certifications.
 3. Manufacturer's documentation and certifications for quality of products and materials provided.

3.06 RECORD AND CLOSEOUT SUBMITTALS

- A. Operation and maintenance data and closeout submittals shall be submitted on PMWeb as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
1. Operation and Maintenance Manuals: final documents shall be submitted as specified.
 2. Extra materials, spare stock, etc., submittal forms shall indicate when actual materials are submitted.

3.07 FINANCIAL SUBMITTALS

- A. Schedule of Value, Pay Estimates, and Change Request Proposals shall be submitted on PMWeb. Supporting material for Pay Estimates and Change Requests shall be submitted on PMWeb as PDF attachments. Examples of compliance submittals include, but are not limited to:
1. Contractor's Schedule of Values.
 2. Contractor's Monthly Progress Payment Requests.
 3. Contract Change proposals requested by the Owner.

3.08 SUBMITTAL PAPER COPIES

- A. Contractor shall deliver bound and tabbed paper copies of every closed submittal to the Construction Manager within 1 week of the Construction Manager closing a submittal with any disposition as follows:
1. Each copy shall have the closed PMWeb cover page including the disposition and any comments.
 2. Final copies of submittals returned with comments, but not requiring resubmittal shall incorporate revisions per the Design Engineer's comments.

3. Number of paper copies:
 - a. Final O&M Manuals: Three copies as specified in the Section 01 78 23, Operation and Maintenance Data.
 - b. All Other Submittals: Five copies as specified in Section 01 33 00, Submittal Procedures.
 - c. For submittals with attachments over 30 megabytes in size, provide one CD of the submittal for each required paper copy.

END OF SECTION

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. Reference to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith shall be as provided in Article 3 of the General Conditions, and as may otherwise be required herein and in the individual Specification sections.
- B. Work specified by reference to published standard or specification of government agency, technical association, trade association, professional society or institute, testing agency, or other organization shall meet requirements or surpass minimum standards of quality for materials and workmanship established by designated standard or specification.
- C. Where so specified, products or workmanship shall also meet or exceed additional prescriptive or performance requirements included within Contract Documents to establish a higher or more stringent standard of quality than required by referenced standard.
- D. Where two or more standards are specified to establish quality, product and workmanship shall meet or exceed requirements of most stringent.
- E. Where both a standard and a brand name are specified for a product in Contract Documents, proprietary product named shall meet or exceed requirements of specified reference standard.
- F. Copies of standards and specifications of technical societies:
 - 1. Copies of applicable referenced standards have not been bound in these Contract Documents.
 - 2. Where copies of standards are needed by Contractor, obtain a copy or copies directly from publication source and maintain in an orderly manner at the Site as Work Site records, available to Contractor's personnel, Subcontractors, Owner, Construction Manager, and Design Engineer.

1.02 ABBREVIATIONS

A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.

1.	AA	Aluminum Association
2.	AABC	Associated Air Balance Council
3.	AAMA	American Architectural Manufacturers Association
4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ABMA	American Bearing Manufacturers' Association
6.	ACI	American Concrete Institute
7.	AEIC	Association of Edison Illuminating Companies
8.	AGA	American Gas Association
9.	AGMA	American Gear Manufacturers' Association
10.	AI	Asphalt Institute
11.	AISC	American Institute of Steel Construction
12.	AISI	American Iron and Steel Institute
13.	AITC	American Institute of Timber Construction
14.	ALS	American Lumber Standards
15.	AMCA	Air Movement and Control Association
16.	ANSI	American National Standards Institute
17.	APA	APA – The Engineered Wood Association
18.	API	American Petroleum Institute
19.	APWA	American Public Works Association
20.	AHRI	Air-Conditioning, Heating, and Refrigeration Institute
21.	ASA	Acoustical Society of America
22.	ASABE	American Society of Agricultural and Biological Engineers
23.	ASCE	American Society of Civil Engineers
24.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
25.	ASME	American Society of Mechanical Engineers
26.	ASNT	American Society for Nondestructive Testing
27.	ASSE	American Society of Sanitary Engineering
28.	ASTM	ASTM International
29.	AWI	Architectural Woodwork Institute
30.	AWPA	American Wood Preservers' Association
31.	AWPI	American Wood Preservers' Institute
32.	AWS	American Welding Society

33.	AWWA	American Water Works Association
34.	BHMA	Builders Hardware Manufacturers' Association
35.	CBM	Certified Ballast Manufacturer
36.	CDA	Copper Development Association
37.	CGA	Compressed Gas Association
38.	CISPI	Cast Iron Soil Pipe Institute
39.	CMAA	Crane Manufacturers' Association of America
40.	CRSI	Concrete Reinforcing Steel Institute
41.	CS	Commercial Standard
42.	CSA	Canadian Standards Association
43.	CSI	Construction Specifications Institute
44.	DIN	Deutsches Institut für Normung e.V.
45.	DIPRA	Ductile Iron Pipe Research Association
46.	EIA	Electronic Industries Alliance
47.	EJCDC	Engineers Joint Contract Documents' Committee
48.	ETL	Electrical Test Laboratories
49.	FAA	Federal Aviation Administration
50.	FCC	Federal Communications Commission
51.	FDA	Food and Drug Administration
52.	FEMA	Federal Emergency Management Agency
53.	FIPS	Federal Information Processing Standards
54.	FM	FM Global
55.	Fed. Spec.	Federal Specifications (FAA Specifications)
56.	FS	Federal Specifications and Standards (Technical Specifications)
57.	GA	Gypsum Association
58.	GANA	Glass Association of North America
59.	HI	Hydraulic Institute
60.	HMI	Hoist Manufacturers' Institute
61.	IBC	International Building Code
62.	ICBO	International Conference of Building Officials
63.	ICC	International Code Council
64.	ICEA	Insulated Cable Engineers' Association
65.	IFC	International Fire Code
66.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
67.	IESNA	Illuminating Engineering Society of North America
68.	IFI	Industrial Fasteners Institute
69.	IGMA	Insulating Glass Manufacturer's Alliance
70.	IMC	International Mechanical Code
71.	INDA	Association of the Nonwoven Fabrics Industry
72.	IPC	International Plumbing Code

73.	ISA	International Society of Automation
74.	ISO	International Organization for Standardization
75.	ITL	Independent Testing Laboratory
76.	JIC	Joint Industry Conferences of Hydraulic Manufacturers
77.	MIA	Marble Institute of America
78.	MIL	Military Specifications
79.	MMA	Monorail Manufacturers' Association
80.	MSS	Manufacturer's Standardization Society
81.	NAAMM	National Association of Architectural Metal Manufacturers
82.	NACE	NACE International
83.	NBGQA	National Building Granite Quarries Association
84.	NEBB	National Environmental Balancing Bureau
85.	NEC	National Electrical Code
86.	NECA	National Electrical Contractor's Association
87.	NEMA	National Electrical Manufacturers' Association
88.	NESC	National Electrical Safety Code
89.	NETA	InterNational Electrical Testing Association
90.	NFPA	National Fire Protection Association
91.	NHLA	National Hardwood Lumber Association
92.	NICET	National Institute for Certification in Engineering Technologies
93.	NIST	National Institute of Standards and Technology
94.	NRCA	National Roofing Contractors Association
95.	NRTL	Nationally Recognized Testing Laboratories
96.	NSF	NSF International
97.	NSPE	National Society of Professional Engineers
98.	NTMA	National Terrazzo and Mosaic Association
99.	NWWDA	National Wood Window and Door Association
100.	OSHA	Occupational Safety and Health Act (both Federal and State)
101.	PCI	Precast/Prestressed Concrete Institute
102.	PEI	Porcelain Enamel Institute
103.	PPI	Plastic Pipe Institute
104.	PS	Product Standards Section-U.S. Department of Commerce
105.	RMA	Rubber Manufacturers' Association
106.	RUS	Rural Utilities Service
107.	SAE	SAE International
108.	SDI	Steel Deck Institute
109.	SDI	Steel Door Institute
110.	SJI	Steel Joist Institute

111. SMACNA	Sheet Metal and Air Conditioning Contractors National Association
112. SPI	Society of the Plastics Industry
113. SSPC	The Society for Protective Coatings
114. STI/SPFA	Steel Tank Institute/Steel Plate Fabricators Association
115. SWI	Steel Window Institute
116. TEMA	Tubular Exchanger Manufacturers' Association
117. TCA	Tile Council of North America
118. TIA	Telecommunications Industry Association
119. UBC	Uniform Building Code
120. UFC	Uniform Fire Code
121. UL	Underwriters Laboratories Inc.
122. UMC	Uniform Mechanical Code
123. USBR	U.S. Bureau of Reclamation
124. WCLIB	West Coast Lumber Inspection Bureau
125. WI	Wood Institute
126. WWPA	Western Wood Products Association

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 43 33
MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.02 SUBMITTALS

- A. Informational Submittals:

1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.
2. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than 21 days prior to scheduled training and revise as necessary for acceptance.
3. Training Session Recordings: Furnish Owner with two complete sets of recordings fully indexed and cataloged with printed label stating session and date recorded.

1.03 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.
- B. Representative subject to acceptance by Owner, Construction Manager, and Design Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this section.

- B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.
- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Construction Manager will be credited to fulfill specified minimum services.
- F. When specified in individual specification sections, manufacturer's onsite services shall include:
 - 1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 - 3. Providing, on a daily basis, copies of manufacturers' representatives field notes and data to Design Engineer and Construction Manager.
 - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Construction Manager.
 - 5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
 - 6. Assistance during functional and performance testing, and facility startup and evaluation.
 - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.

3.02 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. A Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by equipment manufacturer's representative.
- B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.03 TRAINING

A. General:

1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.
3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:

1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
2. Allow for multiple sessions when several shifts are involved.
3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
4. Coordinate with Section 01 32 00, Construction Progress Documentation, and Section 01 91 14, Testing, Integration, and Startup.

C. Lesson Plan:

1. When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
 - a. Title and objectives.
 - b. Recommended attendees (such as, managers, engineers, operators, maintenance).
 - c. Course description, outline of course content, and estimated class duration.
 - d. Format (such as, lecture, self-study, demonstration, hands-on).
 - e. Instruction materials and equipment requirements.
 - f. Resumes of instructors providing training.

- D. Prestartup Training:
1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data.
 2. Complete at least 14 days prior to beginning of facility startup.
- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.
- F. Recording of Training Sessions:
1. Furnish video recording of prestartup and post-startup instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions.
 2. Video training materials shall be produced by a qualified, professional video production company.
 3. Use DVD format suitable for playback on standard equipment available commercially in the United States. Blu-ray® DVD format is not acceptable without Construction Manager's prior approval.
 4. DVD may contain multiple training sessions. If multiple training sessions included on a DVD, provide with on-screen menu for playback selection.

3.04 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is part of this Specification.
1. Manufacturer's Certificate of Proper Installation.

END OF SECTION

MANUFACTURER’S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO: _____
EQPT TAG NO: _____ EQPT/SYSTEM: _____
PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- Installed in accordance with Manufacturer’s recommendations.
- Inspected, checked, and adjusted.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections meet quality and safety standards.
- All applicable safety equipment has been properly installed.
- Functional tests.
- System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer’s Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20__

Manufacturer: _____

By Manufacturer’s Authorized Representative: _____
(Authorized Signature)

SECTION 01 45 16.13
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. D3740, Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - b. E329, Use in the Evaluation of Testing and Inspection Agencies as Used in Construction.

1.02 DEFINITIONS

A. Contractor Quality Control (CQC): The means by which Contractor ensures that the construction, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract.

1.03 SUBMITTALS

A. Informational Submittals:

1. CQC Plan: Submit, not later than 30 days after receipt of Notice to Proceed.
2. CQC Report: Submit, weekly, an original and one copy in report form.

1.04 OWNER'S QUALITY ASSURANCE

A. All Work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.

B. Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:

1. Relieve Contractor of responsibility for providing adequate quality control measures.
2. Relieve Contractor of responsibility for damage to or loss of the material before acceptance.
3. Constitute or imply acceptance.
4. Affect the continuing rights of Owner after acceptance of the completed Work.

- C. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.
- D. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Construction Manager.
- E. Owner may charge Contractor for any additional cost of inspection or test when Work is not ready at the time specified by Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.
- B. Maintain complete inspection records and make them available at all times to Owner and Construction Manager.
- C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

3.02 COORDINATION MEETING

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Construction Manager and Owner to discuss the quality control system.
- B. Develop a mutual understanding of the system details, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance.
- C. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by Contractor.

3.03 QUALITY CONTROL ORGANIZATION

A. CQC System Manager:

1. Designate an individual within Contractor's organization who will be responsible for overall management of CQC and have the authority to act in CQC matters for the Contractor.
2. CQC System Manager shall be an experienced construction person, with a construction experience on three similar size projects and Work.
3. CQC System Manager shall report to the Contractor's project manager or someone higher in the organization. Project manager in this context shall mean the individual with responsibility for the overall quality and production management of the Project.
4. CQC System Manager shall be onsite during construction; periods of absence may not exceed 2 weeks at any one time.
5. Identify an alternate for CQC System Manager to serve with full authority during the System Manager's absence. The requirements for the alternate will be the same as for designated CQC System Manager.

B. CQC Staff:

1. Designate a CQC staff, available at the Site at all times during progress, with complete authority to take any action necessary to ensure compliance with the Contract. CQC staff members shall be subject to acceptance by Construction Manager.
2. CQC staff shall take direction from CQC System Manager in matters pertaining to QC.
3. CQC staff must be of sufficient size to ensure adequate QC coverage of Work phases, work shifts, and work crews involved in the construction. These personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities.
4. The actual strength of the CQC staff may vary during any specific Work period to cover the needs of the Project. If the Owner's Quality Assurance staff believe the Contractor's Quality Control staff is insufficient in number or qualifications, the Owner will require the Contractor to increase and/or otherwise modify the CQC staff at no additional cost to the Owner.

- C. Organizational Changes: Obtain Construction Manager's acceptance before replacing any member of the CQC staff. Requests for changes shall include name, qualifications, duties, and responsibilities of the proposed replacement.

3.04 QUALITY CONTROL PHASING

- A. CQC shall include at least three phases of control to be conducted by CQC System Manager for all definable features of Work, as follows:
1. Preparatory Phase:
 - a. Notify Owner at least 48 hours in advance of beginning any of the required action of the preparatory phase.
 - b. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The CQC System Manager shall instruct applicable CQC staff as to the acceptable level of workmanship required in order to meet Contract requirements.
 - c. Document the results of the preparatory phase meeting by separate minutes prepared by the CQC System Manager and attached to the QC report.
 - d. Perform prior to beginning Work on each definable feature of Work:
 - 1) Review applicable Contract Specifications.
 - 2) Review applicable Contract Drawings.
 - 3) Verify that all materials and/or equipment have been tested, submitted, and approved.
 - 4) Verify that provisions have been made to provide required control inspection and testing.
 - 5) Examine the Work area to verify that all required preliminary Work has been completed and is in compliance with the Contract.
 - 6) Perform a physical examination of required materials, equipment, and sample Work to verify that they are on hand, conform to approved Shop Drawing or submitted data, and are properly stored.
 - 7) Review the appropriate activity hazard analysis to verify safety requirements are met.
 - 8) Review procedures for constructing the Work, including repetitive deficiencies.
 - 9) Document construction tolerances and workmanship standards for that phase of the Work.
 - 10) Check to verify that the plan for the Work to be performed, if so required, has been accepted by Construction Manager.
 2. Initial Phase:
 - a. Accomplish at the beginning of a definable feature of Work:
 - 1) Notify Owner at least 48 hours in advance of beginning the initial phase.

- 2) Perform prior to beginning Work on each definable feature of Work:
 - a) Review minutes of the preparatory meeting.
 - b) Check preliminary Work to verify compliance with Contract requirements.
 - c) Verify required control inspection and testing.
 - d) Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Comparison with sample panels is appropriate.
 - e) Resolve all differences.
 - f) Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 - 3) Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
 - 4) The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
3. Follow-up Phase:
- a. Perform daily checks to verify continuing compliance with Contract requirements, including control testing, until completion of the particular feature of Work.
 - b. Daily checks shall be made a matter of record in the CQC documentation and shall document specific results of inspections for all features of Work for the day or shift.
 - c. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of Work that will be affected by the deficient Work. Constructing upon or concealing nonconforming Work will not be allowed.
4. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be conducted on the same definable features of Work as determined by Owner if the quality of ongoing Work is unacceptable; or if there are changes in the applicable QC staff or in the onsite production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.05 CONTRACTOR QUALITY CONTROL PLAN

A. General:

1. Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.
2. An interim plan for the first 30 days of operation will be considered.
3. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of Work to be started.
4. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of Work to be started.

B. Content:

1. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
 - a. Organization: Description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three-phase control system (see Article QC Phasing) for all aspects of the Work specified.
 - b. CQC Staff: The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 - c. Letters of Authority: A copy of a letter to the CQC System Manager signed by an authorized official of the firm, describing the responsibilities and delegating sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop Work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to Owner.
 - d. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.
 - e. Testing: Control, verification and acceptance testing procedures for each specific test to include the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required.

- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
 - g. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
 - h. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.
- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. Owner reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance of the CQC plan, Contractor shall notify Construction Manager, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Construction Manager.

3.06 CONTRACTOR QUALITY CONTROL REPORT

- A. As a minimum, prepare a CQC report for every 7 calendar days. Account for all days throughout the life of the Contract. Reports shall be signed and dated by CQC System Manager. Include copies of test reports and copies of reports prepared by QC staff.
- B. Maintain current records of quality control operations, activities, and tests performed, including the Work of subcontractors and suppliers.
- C. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
 - 1. Status of noncompliances issued by the Construction Manager.
 - 2. Contractor/subcontractor and their areas of responsibility.
 - 3. Operating plant/equipment with hours worked, idle, or down for repair.
 - 4. Work performed today, giving location, description, and by whom. When a network schedule is used, identify each phase of Work performed each day by activity number.
 - 5. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
 - 6. Material received with statement as to its acceptability and storage.

7. Identify submittals reviewed, with Contract reference, by whom, and action taken.
8. Offsite surveillance activities, including actions taken.
9. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
10. List instructions given/received and conflicts on Drawings and/or Specifications.
11. Contractor's verification statement.
12. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
13. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

3.07 SUBMITTAL QUALITY CONTROL

- A. Submittals shall be as specified in Section 01 33 00, Submittal Procedures. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

3.08 TESTING QUALITY CONTROL

- A. Testing Procedure:
 1. Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract requirements. Perform the following activities and record the following data:
 - a. Verify testing procedures comply with contract requirements.
 - b. Verify facilities and testing equipment are available and comply with testing standards.
 - c. Check test instrument calibration data against certified standards.
 - d. Verify recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 - e. Documentation:
 - 1) Record results of all tests taken, both passing and failing, on the CQC report for the date taken.
 - 2) Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test.

- 3) Actual test reports may be submitted later, if approved by Construction Manager, with a reference to the test number and date taken.
 - 4) Provide directly to Construction Manager an information copy of tests performed by an offsite or commercial test facility. Test results shall be signed by an engineer registered in the state where the tests are performed.
 - 5) Failure to submit timely test reports, as stated, may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.
- B. Testing Laboratories: Laboratory facilities, including personnel and equipment, utilized for testing soils, concrete, asphalt and steel shall meet criteria detailed in ASTM D3740 and ASTM E329, and be accredited by the American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO), or other approved national accreditation authority. Personnel performing concrete testing shall be certified by the American Concrete Institute (ACI).

3.09 COMPLETION INSPECTION

- A. CQC System Manager shall conduct an inspection of the Work at the completion of all Work or any milestone established by a completion time stated in the Contract.
- B. Punchlist:
1. CQC System Manager shall develop a punchlist of items which do not conform to the Contract requirements.
 2. Include punchlist in the CQC report, indicating the estimated date by which the deficiencies will be corrected.
 3. CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Owner.
 4. These inspections and any deficiency corrections required will be accomplished within the time stated for completion of the entire Work or any particular increment thereof if the Project is divided into increments by separate completion dates.

END OF SECTION

SECTION 01 45 33
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2016 CBC and is in addition to and supplements requirements included in Statement of Special Inspections shown on Drawings.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
 2. 2016 California Building Code (CBC) by California Building Standards Commission.
 3. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

- A. Agencies and Personnel:
1. Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
 2. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 3. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.

4. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of AHJ for inspection of a particular type of construction or operation requiring Special Inspection.
- B. Statement of Special Inspections: Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.
- C. Special Inspection:
1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
 2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in area where the Work is being performed.
 3. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.
- D. Structural Systems and Components:
1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
 2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
 3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
 4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
 5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

E. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical and Plumbing Component Supports: Structural members or assemblies which transmit loads and forces from mechanical or plumbing equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

F. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections provided on Drawings.
3. Geotechnical Observation: Visual observation of formational materials exposed during grading and overexcavation of selected subgrade bearing surfaces and installation of deep foundation elements by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Observation: Visual observation by registered design professional for general conformance to Contract Documents.

1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by entity responsible for construction of and main seismic-force-resisting system, seismic-resisting component listed in Statement of Special Inspections. Refer to Article Supplements, located at end of section.
2. Fabricator's Certificate of Compliance: Form shall be completed by entity responsible for shop fabrication of structural load-bearing members and assemblies. Refer to Article Supplements, located at end

of section. Form must be submitted no less than 2 weeks prior to commencing fabrication to provide for approval by Authority Having Jurisdiction (AHJ) and scheduling of Special Inspection, where required.

1.05 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under CBC Section 1705 and subject to Special Inspection under Section 1705: See Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under CBC Section 1705: None required.
3. Architectural, plumbing, mechanical, and electrical Components subject to Special Inspection under CBC Section 1705.12.5 and 1705.12.6 for Seismic Resistance.
4. As included in Drawings and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge.

B. Statement of Special Inspections:

1. As included on Drawings and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements of inspection, observation, and testing program to be followed in construction of the Work:
 - a. Designated seismic systems and main seismic force resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
 - b. Special Inspection and testing required by CBC Section 1705 and other applicable sections and referenced standards therein.
 - c. Type and frequency of Special Inspection required.
 - d. Type and frequency of testing required.
 - e. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Construction Manager, Design Engineer, Contractor, building official, and Owner.
 - f. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.

- g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.

- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Owner will secure and pay for services of agency to perform Special Inspection and associated testing.

- D. Code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections on Drawings and further provided in this section, is for benefit of Owner and does not:
 - 1. Relieve Contractor of responsibility for providing adequate quality control measures.
 - 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 - 3. Constitute or imply acceptance.
 - 4. Affect continuing rights of Owner after acceptance of completed Work.

- E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.

- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor and Special Inspectors and Professional Observer are onsite, but not able to provide contracted services.

- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and observation and testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Requirements of the Statement of Special Inspections are provided by the Owner. All other testing and inspections, unless noted otherwise, are provided by Contractor.

- B. Provide access to shop or Site for Special Inspection and Testing and Professional Observation requirements.
- C. Notify Construction Manager in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.
- D. Provide access for Special Inspector to construction documents.
- E. Retain special inspection records onsite to be readily available for review.
- F. Cooperate with Special Inspector and provide safe access to the Work to be inspected.
- G. Submit Fabricator's Certificates of Compliance for approved fabricators.
- H. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
 - 2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
 - 3. Providing the Special Inspector with access to all approved submittals.
 - 4. Providing security and protection of samples and test equipment at the Project Site.
 - 5. Provide samples of materials to be tested in required quantities.
- I. When required by Registered Design Professional in Responsible Charge, provide access for plumbing, mechanical and electrical component inspections for those items requiring certification.
- J. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.
- K. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:
 - 1. Schedule inspections for either during or at completion of their placement or a combination or both.
 - 2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.

3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

3.02 AHJ INSPECTIONS

- A. Schedule all AHJ inspections required to fulfill Project permit requirements, including to Building and Fire Department inspections associated with City or County Building Permits, Fire Protection Permits and Hazardous Materials Permitting.

3.03 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification:
 1. Contractor’s Statement of Responsibility.
 2. Fabricator’s Certificate of Compliance.

END OF SECTION

CONTRACTOR’S STATEMENT OF RESPONSIBILITY

(Project)

(Name of Contracting Company)

(Business Address)

(_____) _____
(Telephone)

(_____) _____
(Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation requirements contained in Contract Documents for this Project for seismic force-resisting systems and for components including architectural, mechanical, and electrical components as listed in Statement of Special Inspections on Drawings, and that:

- I, (We) aware of the systems and the requirements of the special inspection and acknowledge our responsibility in the implementation of the Statement of Special Inspections for the construction of the following systems:

Facility	Specification	Lateral Force-Resisting System
12- Flow Equalization Basin Concrete Foot Bridge		Flat-bottom, ground-supported tank – Reinforced or Prestressed Nonsliding Base Concrete Inverted Pendulum Type Structure

- Control of this Work will be exercised to obtain conformance with Contract Documents approved by building official.
- Procedures within the Contractor’s organization to be used for exercising control of the Work, method and frequency of reporting, and distribution of reports required under Statement of Special Inspections for Project are attached to this statement.
- I, (We) will provide 48-hour notification to Construction Manager and approved inspection agency as required for structural tests and Special Inspection for Project.

5. The following person is hereby identified as exercising control over requirements of this section for the Work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____

Date: _____

Project Name: _____

FABRICATOR’S CERTIFICATE OF COMPLIANCE

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per Section 2016 CBC must submit Fabricator’s Certificate of Compliance at the completion of fabrication.

(Project)

(Fabricator’s Name)

(Business Address)

(Certification or Approval Agency)

(Certification Number)

(Date of Last Audit or Approval)

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with approved construction documents.

(Name and Title) type or print

(Signature and Date)

Attach copies of fabricator’s certification or building code evaluation service report and fabricator’s quality control manual.

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of Nurserymen (AAN): American Standards for Nursery Stock.
 2. Federal Emergency Management Agency (FEMA).
 3. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 4. Telecommunications Industry Association (TIA); Electronic Industries Alliance (EIA): 568B, Commercial Building Telecommunications Cabling Standard.
 5. U.S. Department of Agriculture (USDA): Urban Hydrology for Small Watersheds.
 6. U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years.

1.02 SUBMITTALS

- A. Informational Submittals:
1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 2. Temporary Construction Submittals:
 - a. Access Roads: Routes, cross-sections, and drainage facilities.
 - b. Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - c. Fencing and protective barrier locations and details.
 - d. Staging area location plan.
 - e. Traffic and Pedestrian Control and Routing Plans: As specified herein, and proposed revisions thereto.
 - f. Plan for maintenance of existing plant operations.
 3. Temporary Control Submittals:
 - a. Noise control plan.
 - b. Dust control plan.
 - c. Plan for disposal of waste materials and intended haul routes.
 - d. Plan for tank construction safety provisions.

- e. Submittals required as part of the Environmental Mitigation Monitoring and Reporting Program in Supplement 1 – Environmental Monitoring and Reporting Program.
 - f. SWPPP submittals required under Section 01 57 13, Temporary Erosion and Sediment Control.
4. Temporary Utility Submittals:
- a. Electric power supply and distribution plans.
 - b. Water supply and distribution plans.
 - c. Sanitary.

1.03 MOBILIZATION

- A. Mobilization includes, but is not limited to, these principal items:
- 1. Obtaining required permits.
 - 2. Moving Contractor's field office and equipment required for first month operations onto Site.
 - 3. Installing temporary construction power, wiring, and lighting facilities.
 - 4. Providing onsite Internet service and telephones.
 - 5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 - 6. Arranging for and erection of Contractor's work and storage yard.
 - 7. Posting OSHA required notices and establishing safety programs and procedures.
 - 8. Having Contractor's superintendent at Site full time.
- B. Use area designated for Contractor's temporary facilities as shown on Drawings.

1.04 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Keep Owner informed of serious onsite accidents and related claims.
- C. Use of Explosives: No blasting or use of explosives will be allowed onsite.

1.05 VEHICULAR TRAFFIC

- A. Traffic Control Plan: Adhere to traffic control plan reviewed and accepted by the Construction Manager. Changes to this plan shall be made only by written approval of the Construction Manager. Secure approvals for necessary changes so as not to delay progress of the Work.

- B. Traffic Routing Plan: Show sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.

PART 2 PRODUCTS

2.01 PROJECT SIGN

- A. Refer to Whitebook Section 3-11.2 for requirements for City furnished project signs and the Funding Agency provisions for required signage.

PART 3 EXECUTION

3.01 TEMPORARY UTILITIES

- A. Power:
 - 1. Electric power will be available at or near Site. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay costs for electric power used during Contract period, except for portions of the Work designated in writing by Construction Manager as substantially complete.
 - 2. Where grid power is unavailable or impractical, provide diesel fueled standby generators and temporary distribution circuit breaker equipment to maintain continuous power to process facilities as required.
- B. Lighting: Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.
- C. Heating, Cooling, and Ventilating:
 - 1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage because of temperature or humidity. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
 - 2. Pay costs of installation, maintenance, operation, removal, and fuel consumed.

3. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
4. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.

D. Water:

1. Hydrant Water:
 - a. Is available from nearby hydrants. Secure written permission for connection and use from water department and meet requirements for use. Notify fire department before obtaining water from fire hydrants.
 - b. Use only special hydrant-operating wrenches to open hydrants. Make certain hydrant valve is open full, since cracking valve causes damage to hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times.
 - c. Include costs to connect and transport water to construction areas in Contract Price.
2. Owner will provide a place of temporary connection for construction and drinking water at Site. Provide temporary facilities and piping required to bring water to point of use and remove when no longer needed. Install an acceptable metering device and pay for water used at Owner's current rate.
3. Provide and bear costs of necessary water in excess of 100 gpm required for testing equipment, tanks or basins, and piping prior to Substantial Completion, unless otherwise specifically stated in Specifications for equipment, systems, or facilities to be tested.
4. Provide means to prevent water used for testing from flowing back into source pipeline.

E. Sanitary and Personnel Facilities:

1. Provide and maintain facilities for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.
2. Use of Owner's existing sanitary facilities by construction personnel will not be allowed.

F. Telephone Service:

1. Contractor: Arrange and provide onsite telephone service for use during construction. Pay costs of installation and monthly bills.

G. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

3.02 PROTECTION OF WORK AND PROPERTY

A. General:

1. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
2. No business shall be cut off from vehicular traffic. Contractor shall phase work to allow ingress/egress at all times, unless special arrangements have been made.
3. Maintain in continuous service existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
4. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate activities with owner of said utility and perform work to their satisfaction.
5. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
6. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
7. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
8. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.

9. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
10. Maintain original Site drainage wherever possible.

B. Site Security:

1. Erect a temporary security fence at locations shown on Drawings for protection of Owner-furnished products. Maintain fence throughout construction period. Obtain Construction Manager's written permission before removal of temporary security fencing.
2. Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

C. Barricades and Lights:

1. Provide as required by the CalTrans, OSHA Title 8, California Manual on Uniform Traffic Control Devices (CAMUTCD), or other required Vehicle Code and in sufficient quantity to safeguard public and the Work.
2. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of Contractor's employees, other employer's employees, and others who may be affected by the Work.
3. Provide to protect existing facilities and adjacent properties from potential damage.
4. Locate to enable access by facility operators and property owners.
5. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
6. Locate barricades at the nearest intersecting public thoroughfare on each side of blocked section.
7. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

D. Signs and Equipment:

1. Conform to requirements of CAMUTCD.
2. Portable TOW-AWAY-NO STOPPING Signs: Place where approved by police department and Owner.
3. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.

4. High-Level Warning Flag Units: Provide two in advance of traffic approaching the Work, each displaying three flags mounted at a height of 9 feet.
5. DETOUR Signs: Provide two, right arrow or left arrow, placed as approved by Construction Manager.
6. RIGHT or LEFT LANE CLOSED AHEAD Signs: Provide two, place in advance of lane to be closed.
7. Provide at obstructions, such as material piles and equipment.
8. Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.

E. Trees and Plantings:

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on Drawings to remain undisturbed.
 - a. Where practical, tunnel beneath trees when on or near line of trench.
 - b. Employ hand excavation as necessary to prevent tree injury.
 - c. Do not stockpile materials or permit traffic within drip lines of trees.
 - d. Provide and maintain temporary barricades around trees.
 - e. Water vegetation as necessary to maintain health.
 - f. Cover temporarily exposed roots with wet burlap, and keep burlap moist until soil is replaced around roots.
 - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of Construction Manager.
 - h. Dispose of removed trees in a legal manner off the Site.
2. Balling and burlapping of trees indicated for replacement shall conform to recommended specifications set forth in the American Standards for Nursery Stock, published by American Association of Nurserymen. Balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by ball and not by top.
3. In event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
4. Replace each plant that dies as a result of construction activities.

- F. Existing Structures:
1. Where Contractor contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with Contractor's operations, obtain approval of property owner and Construction Manager.
 2. Move mailboxes to temporary locations accessible to postal service.
 3. Replace items removed in their original location and a condition equal to or better than original.
- G. Finished Construction: Protect finished floors and concrete floors exposed as well as those covered with composition tile or other applied surfacing.
- H. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

3.03 TEMPORARY CONTROLS

- A. Air Pollution Control:
1. Minimize air pollution from construction operations.
 2. Burning: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
 3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
 4. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.
- B. Noise Control:
1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
 2. Noise Control Ordinance: San Diego Municipal Code, Section 59.5.01.
 3. Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

- C. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities as required by the Storm Water Pollution Prevention Plan (SWPPP), provided as part of the Contract Documents, to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.
- D. Requirements for the Federal Aviation Administration and Marine Corps Air Station.
 - 1. The Contractor shall comply with all requirements provided in the Environment Impact Report (EIR).
 - 2. Cranes shall have a maximum height limit as required by the ALUC Air Space Obstruction Criteria defined in the EIR. The limit is 200 feet above ground level.
 - 3. All Work shall be provided in accordance with the Compatibility Plan provided within the EIR.
- E. Provide all requirements as required to comply with the Mitigation Monitoring and reporting Program shown on Drawings.

3.04 STORAGE YARDS AND BUILDINGS

- A. Coordinate requirements with Section 01 61 00, Common Product Requirements.
- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- C. Temporary Storage Buildings:
 - 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 - 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
 - 3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

3.05 ACCESS ROADS AND DETOURS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits. Use existing roads where shown. Alignments for new routes shall be approved by the Construction Manager.

- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Coordinate with Construction Manager detours and other operations affecting traffic and access. Provide at least 72 hours' notice to Construction Manager of operations that will alter access to Site.
- F. Where access road crosses existing fences, install and maintain gates.
- G. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.06 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.
- B. If equipment staging and parking facilities are not identified in the Contract Documents, the Contractor's proposed locations for these purposes is subject to City approval.
- C. Provide parking facilities for personnel working on Project. No employee or equipment parking will be permitted on Owner's existing paved areas.
- D. Use area designated on Drawings for parking of Contractor's and Contractor's employees' vehicles.

END OF SECTION

**SECTION 01 56 39
TREE PROTECTION**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Sections:
 - 1. Section 01 50 00, Temporary Facilities and Controls, for temporary site fencing.
 - 2. Section 31 10 00, Site Clearing, for removing existing trees and shrubs.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01, General Requirements Specification Sections, apply to this Section.

1.03 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by the average of the smallest and largest diameters at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.
- B. Tree-Protection Zone: Area surrounding existing trees to be protected during construction, as indicated on Drawings.
- C. Consulting Arborist: Registered with the American Society of Consulting Arborists.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification:
 - 1. For each type of the following:
 - a. Organic Mulch: 1 pint (0.5 L) volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.

- b. Protection-Zone Fencing: Assembled Samples of full-size components.
 - c. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
- C. Tree Pruning and Maintenance Schedule: Verify trees to remain that are affected by construction, and submit written schedule detailing scope and extent of tree protective fencing, pruning, root pruning, and scope of on-going tree maintenance during all phases of construction.
- D. Qualification Data: Submit Certificates for qualified Consulting Arborist and tree service firm.
- E. Maintenance Recommendations: Submit list of Consulting Arborist instructions for care and protection of trees affected by construction during and after completing the Work, with clear definition of standards for prompt and proper treatment and repaired of any trees that are damaged.
- F. Tree Evaluation and Protection Report: Submit Tree Evaluation and Protection Report from Consulting Arborist, certifying that trees indicated to remain have been protected during initial and on-going phases of construction.
- G. Report to include according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- H. Existing Conditions: Submit detailed Photo Documentation Report of each existing tree indicated to remain, which establishes a record of preconstruction conditions, for use in documenting consequential damage caused by construction activities. Report shall include plans and notations include plans and notations indicating specific wounds and damage conditions.

1.05 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- B. Preinstallation Conference:
 - 1. Conduct conference at Project site to review methods and procedures related to temporary tree and plant protection, including the following:
 - a. Construction Schedule: Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.

- c. Arborist's responsibilities.
- d. Field quality control.

1.06 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Erection of sheds or structures.
 - 4. Impoundment of water.
 - 5. Excavation or digging unless otherwise indicated.
 - 6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; 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 more than 1 inch (25 mm) in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.
- B. Topsoil: Imported or manufactured topsoil complying with ASTM D5268.
- C. Organic Mulch:
 - 1. Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - a. Type: Bark chips, natural color (not dyed).
 - b. Particle Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.

- D. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements. Previously used materials may be used when approved by Architect.
1. Chain-Link Fencing: 6-foot high galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch (3.76-mm) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch (60-mm) OD line posts, and 2-7/8-inch (73-mm) OD corner and pull posts; with 1-5/8-inch (42-mm) OD top rails and 0.177-inch (4.5-mm) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
 2. Orange Construction Fence: 48-inch high UV resistant high-tensile-strength polyethylene laminar fabric, mounted on secure steel posts buried 2-foot deep.
 3. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; minimum width 36 inches.
- E. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading letters.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. Submit written report, endorsed by Consulting Arborist, listing all conditions that may be or become detrimental to tree and plant protection.

3.02 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie a 1-inch blue-vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting.

3.03 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations spaced approximately every 35 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Maintain protection-zone fencing and signage in good condition through all phases of construction. Remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.04 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 23 16, Excavation.
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.05 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Section 31 23 23, Fill and Backfill.
- B. Root Pruning at Edge of Protection Zone: Prune roots flush with the edge of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.06 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
 - 1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.

2. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

B. Chip removed branches and dispose of offsite.

3.07 REGRADING

A. Maintain existing grade within tree protection zone at all times during and after construction.

3.08 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.09 REPAIR AND REPLACEMENT

A. General: Repair or replace trees indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Design Build Team.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Arborist perform root cutting, branch pruning, and damage repair of trees.
3. Treat damaged trunks, limbs, and roots according to Arborist written instructions.
4. Perform repairs within 24 hours.

B. Tree Replacement: Remove and replace trees that are more than 25 percent dead or in such unhealthy condition that they are incapable of resuming normal growth patterns.

1. Provide one new tree of similar size for each tree deemed to need replacement.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers Work to implement structural and nonstructural Best Management Practices (BMP) to control soil erosion by wind or water and keep eroded sediments and other construction-generated pollutants from moving off project sites. Requirements described in this specification and shown on Drawings are part of the project Storm Water Pollution Prevention Plan (SWPPP) and are the minimum for all project construction sites and conditions. This specification covers all project activities, including material sources, disposal sites, and offsite mitigation areas unless specific project activities are excluded elsewhere in this specification or in other Contract Documents controlling the Work.
- B. National Pollutant Discharge Elimination System: Comply with Federal, state, and local laws, rules and regulations, and the National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer System (MS4) Permit Draining the Watersheds of the San Diego Region, Order No. R9-2013-0001, NPDES No. CAS0109266 and the California Construction General Permit or Permits applicable to the project. A copy of the Project's General Construction Permit, if applicable to the Project, is available from Owner. NPDES General Construction permits are required on projects that involve disturbance of 1 acre or more with potential to discharge stormwater to surface waters.
- C. Other Regulations: A local government erosion and sediment control permit may apply and some local agency requirements may be more stringent than this specification. Adequate erosion and sediment control is essential for complying with the federal Endangered Species Act where construction runoff enters waters inhabited by protected species.

1.02 REFERENCES

- A. Activities shall conform to the California Construction General Permit, Storm Water Resource Control Board Order No. 2009-009-DWQ as amended by Order 2010-0014-DWQ and Order 2012-0006-DWQ, the 2018 City of San Diego Storm Water Standards Manual, the Storm Water Pollution Prevention Plan, the 2018 "Whitebook" the City of San Diego Standard Specifications for Public Works Construction, the 2018 "Greenbook"

Standard Specifications for Public Works Construction and Drawings. In the event of a conflict, the more stringent requirement shall apply.

- B. The following is a list of standards that may be referenced in this section:
1. California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook for Construction.
 2. Storm Water Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.
 3. National Oceanic and Atmospheric Administration (NOAA) National Weather Service:
 - a. Precipitation-Frequency of the United States by State/Territory, 2012.
 - b. Precipitation Frequency Data Server, 2012.

1.03 SYSTEM DESCRIPTION

- A. Erosion and Sediment Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases during construction period.
- B. Qualified SWPPP Practitioner (QSP):
1. Identify the QSP and the QSD at the preconstruction discussions and in the SWPPP. The QSP shall either be a Qualified SWPPP Developer (QSD), a certified erosion, sediment and stormwater inspector registered through Enviro Cert International, Inc, or a certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc. Additionally, the QSP shall have attended a State Water Board-sponsored or approved QSP training course. See Section D.4 of these specifications for the necessary registrations and certifications to be a QSD.
 2. The QSP shall implement the SWPPP, including, but not limited to:
 - a. Installing and maintaining all temporary erosion and sediment control Best Management Practices (BMPs) included in the SWPPP to assure continued performance of their intended function. Damaged or inadequate SWPPP BMPs shall be corrected immediately.
 - b. QSP shall coordinate with QSD to amend SWPPP to reflect current field conditions.
 - c. Terminating SWPPP Plan with a Notice of Termination through the SMARTS website. Notice of termination shall be certified by the legally responsible person (LRP).

3. When a SWPPP is included in the Contract Plans, QSP shall also inspect all areas disturbed by construction activities, all onsite erosion and sediment control BMPs, all stormwater discharge points, and all temporarily stabilized inactive sites per the schedule in the SWPPP or as directed by QSD. Complete erosion and sediment control inspection forms provided in the SWPPP for each inspection. An annual report of all the stormwater monitoring activities shall be submitted to the California State Water Resources Control Board, via the Storm Water Multiple Application and Report Tracking System (SMARTS). Water Quality Monitoring, Sampling and Analysis are delineated in Section 7 of the SWPPP.

C. Personnel Training:

1. Prior to commencement of construction, applicable personnel must have an understanding of the California Construction General Permit's requirements and their specific responsibilities under the permit. At a minimum, personnel must be trained to understand the following as it relates to the scope of their job duties:
 - a. The location of all stormwater controls and how to maintain them.
 - b. Procedures for complying with the pollution prevention requirements.
 - c. Procedures for conducting inspections, recording findings, and taking corrective action.

D. Temporary Erosion and Sediment Control Plan (Stormwater Pollution Prevention Plan):

1. A SWPPP Plan is furnished as part of the Permit Registration Documents (PRDs), which helps fulfill part of the requirements of the Construction General Permit. This initial SWPPP, when adopted by Contractor, may be used as the basis of the construction SWPPP. Additional or revised erosion and sediment control features, not shown on the initial SWPPP, may be required depending on Contractor's methods of operation and schedule.
2. For each phase of the scheduled work, indicate on the SWPPP all the BMPs proposed and installed for erosion and sediment control to minimize clearing, stabilize exposed soil, divert or temporarily store flows, limit runoff from exposed areas, and filter transported sediment. Include all temporary slopes, constructed for staging or other reasons, which may not have been identified in the original Contract plans. Refer to the City of San Diego 2016 Storm Water Standards Manual as well as the California Construction General Permit, Storm Water Resource

Control Board Order No. 2009-009-DWQ as amended by
Order 2010-0014-DWQ and Order 2012-0006-DWQ.

3. Some SWPPP Required Elements Typically Required by NPDES Permits:
 - a. Narrative Site Description: See Section 2 of SWPPP, Site Map.
 - b. The required BMPs and Procedures for Erosion Prevention, Runoff Control, and Sediment Control.
4. Contractor's construction SWPPP and implementation schedules must be prepared by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:
 - a. A California registered professional engineer.
 - b. A California registered professional geologist or engineering geologist.
 - c. A California registered landscape architect.
 - d. A professional hydrologist registered through the American Institute of Hydrology.
 - e. A certified professional in erosion and sediment control (CPESC) registered through Enviro Cert International, Inc.
 - f. A certified professional in stormwater quality (CPSWQ) registered through Enviro Cert International, Inc.
 - g. A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).
5. The QSD shall furnish a signed copy of the SWPPP Plan with individual's name, title, state certifications, and employing firm if different than Contractor's firm.
6. Prior to construction activities, the legally responsible person (LRP) must obtain coverage under the Construction General Permit.
 - a. The LRP must electronically file Permit Registration Documents (PRDs) on the SMARTS website. The PRDs shall consist of the following:
 - 1) Notice of Intent (NOI).
 - 2) Risk Assessment.
 - 3) Site Maps.
 - 4) Storm Water Pollution Prevention Plan.
 - 5) Annual Fee.
 - 6) Signed Certification Statement.
 - b. Once the California State Water Board receives the PRDs, they will issue a Waste Discharge Identification Number (WDID). Do not begin any Site activities that have potential to cause erosion or sediment movement until permit coverage has been obtained and a WDID number has been issued by the State Water Board.

7. Keep a copy of the approved SWPPP with updated changes onsite during all construction activities. See the SWPPP for retention of records requirements.
- E. If utilized on the Project site, environmental and construction fences shall be depicted in the SWPPP. Space posts and attach fence fabric to posts as shown on Drawings. Do not fasten fence to trees. Throughout the life of the Project, preserve and protect delineated area, acting immediately to repair or restore any fencing damaged or removed.
- F. Erosion and Sediment Control devices and implementation are depicted in the SWPPP. Preventing erosion, and controlling runoff, sedimentation, and nonstormwater pollution, requires Contractor to perform temporary Work items including, but not limited to:
1. Providing ditches, berms, culverts, and other measures to control surface water.
 2. Building dams, settling basins, energy dissipaters, and other measures, to control downstream flows.
 3. Controlling underground water found during construction.
 4. Covering or otherwise protecting slopes until permanent erosion control measures are working.
- G. To the degree possible, coordinate this temporary Work with permanent drainage and erosion control work the Contract requires.
- H. QSD and QSP may require additional temporary control measures if it appears pollution or erosion may result from weather, nature of materials, or progress on the Work.
- I. When natural elements rut or erode the slope, restore and repair damage with eroded material where possible, and remove and dispose of any remaining material found in ditches and culverts. When QSD or QSP orders replacement with additional or other materials, unit Contract prices will cover quantities needed.
- J. Water Management: Manage site water in accordance with the conditions of the General Construction Permit and the SWPPP waste discharge permit from a local permitting authority.
- K. Dispersion/Biofiltration: Convey water only to dispersion or infiltration areas designated in the SWPPP or to sites approved by QSD. Convey stormwater to designated biofiltration areas.

- L. Detention/Retention Pond Construction: Whether permanent or temporary, construct before beginning other grading and excavation Work in the area that drains into that pond. Install temporary conveyances concurrently with grading in accordance with the SWPPP and the grading plans so that newly graded areas drain to the pond as they are exposed.
- M. Pollution Control: Waste Management and Materials Pollution Control BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day to day operations of the construction site and include material delivery and storage as well as various liquid and solid waste management. The project specific waste management BMPs are depicted in the SWPPP. Certain authorized nonstormwater discharges may be necessary for the completion of a construction project. Nonstormwater Management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. Project specific non-stormwater management BMPs are depicted in the SWPPP.
- N. If California State Water Resources Control Board or City of San Diego orders the Work suspended or permit violated, continue to control erosion, pollution, and runoff during the shutdown.
- O. Nothing in this section shall relieve Contractor from complying with other Contract requirements.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. When a SWPPP is included in the Drawings, either adopt or modify the SWPPP. Provide a schedule for SWPPP implementation and incorporate it into Contractor's progress schedule. Obtain Design Engineer's approval of the SWPPP Plan and schedule before any Work begins.
 - 2. Amendments to the SWPPP shall meet all requirements of the Construction General Permit, shall be amended by a QSD and listed in the amendment log in the SWPPP. Some revisions can be field determined by the QSP, see Section 1.4 of the SWPPP.
 - 3. The SWPPP shall cover all areas that may be affected inside and outside the limits of the Project (including all Owner-provided sources, disposal sites, and haul roads, and all nearby land, streams, and other bodies of water).

4. Allow at least 5 working days for the QSD to review any original or revised SWPPP. Failure to approve all or part of any such Plan shall not make Owner liable to Contractor for any Work delays.

PART 2 PRODUCTS

2.01 APPENDIX H

- A. See Appendix H of SWPPP for CASQA Stormwater BMP Handbook Portal Construction Fact Sheets.

PART 3 EXECUTION

3.01 PREPARATION

- A. Construction General Permit Coverage is required prior to starting earth disturbing activities.
- B. The SWPPP shall include proposed stockpile areas and installation of temporary erosion control devices, ditches, or other facilities in Work phasing plans.
- C. Areas designated for Contractor's use during Project may be temporarily developed as specified to provide working, staging, and administrative areas. Include control of sediment from these areas in the SWPPP.
- D. Implementation of erosion and sediment control BMPs are delineated in the SWPPP.

3.02 MAINTENANCE

- A. The erosion and sediment control measures described in the SWPPP are minimum requirements for anticipated Site conditions. During the construction period, upgrade these measures as needed to comply with all applicable local, state, and federal erosion and sediment control regulations.
- B. BMP inspection and maintenance is depicted in the SWPPP.

3.03 REMOVAL

- A. When QSP determines that an erosion control BMP is no longer required, remove BMP and all associated hardware from the Project limits. When materials are biodegradable, QSP may approve leaving temporary BMP in place.

- B. Permanently stabilize all bare and disturbed soil after removal of erosion and sediment control BMPs. Dress sediment deposits remaining after BMPs have been removed to conform to existing grade. Prepare and seed graded area. If installation and use of erosion control BMPs have compacted or otherwise rendered soil inhospitable to plant growth, such as construction entrances, take measures to rehabilitate soil to facilitate plant growth. This may include, but is not limited to, ripping the soil, incorporating soil amendments, or seeding with specified seed.

END OF SECTION

SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 DESIGN REQUIREMENTS

A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of the 2016 California Building Code (CBC) by California Building Standards Commission.

1. Wind: Basic wind speed, V: 115 mph (3-second gust), with exposure Category C, and Risk Category III.
2. Seismic: Risk Category III, importance factor, I, of 1.25, Site Class Definition D, mapped maximum considered earthquake, 5 percent damped, spectral response at short periods, S_s 1.06G, mapped maximum considered earthquake, 5 percent damped, spectral response at a period of 1 second, S₁ 0.41G, unless specified otherwise.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 370 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 36 degrees F to 104 degrees F.

1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by individual Specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site.
 - 5. Notify Construction Manager upon arrival for transfer of materials.
 - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Construction Manager of anticipated date of equipment arrival.
- E. Factory Test Results: Reviewed and accepted by Design Engineer before product shipment as required in individual Specification sections.

1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01 50 00, Temporary Facilities and Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.
- E. Store fabricated products aboveground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject

to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.

- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with finish as approved by Construction Manager.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.
- M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the

maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Design Engineer, Owner, or Construction Manager, notify Construction Manager not less than 30 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When so specified, a Manufacturer's Certificate of Compliance, a copy of which is attached to this section, shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
- B. Construction Manager may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Construction Manager.

3.03 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Install the equipment per Section 01 88 15, Anchorage and Bracing.
- E. Repaint painted surfaces that are damaged prior to equipment acceptance.
- F. Do not cut or notch any structural member or building surface without specific approval of Design Engineer.
- G. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- H. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.

2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.04 FIELD FINISHING

- A. In accordance with Section 09 90 00, Painting and Coating, and individual Specification sections.

3.05 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.06 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.07 ANCHOR BOLTS

- A. Provide anchor bolts as specified in the specification sections and in accordance with Section 05 50 00, Metal Fabrications.

3.08 SUPPLEMENT

- A. The supplement listed below, following “End of Section,” is part of this Specification.

1. Manufacturer’s Certificate of Compliance.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF COMPLIANCE

OWNER: _____ PRODUCT, MATERIAL, OR SERVICE
PROJECT NAME: _____ SUBMITTED: _____
PROJECT NO: _____

Comments: _____

I hereby certify that the above-referenced product, material, or service called for by the Contract for the named Project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the Contract requirements, and are in the quantity shown.

Date of Execution: _____, 20__

Manufacturer: _____

Manufacturer's Authorized Representative (*print*): _____

(Authorized Signature)

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.

1.02 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.
- B. The Section shall be used in conjunction with Section 02 41 00, Demolition.

1.03 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction 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.

1.05 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.06 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit monthly report. Use the City of San Diego's and the California Green Building Code forms for construction waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For waste management coordinator.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference(s):
 - 1. Conduct conference(s) at Project site to review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.

1.08 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to the requirements in this Section and in accordance with the City of San Diego's New Construction and Demolition Debris Diversion Requirement, and the California Green Building Code. Plan shall consist of waste identification, waste reduction work plan, including identification of five material streams. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use the City of San Diego's and the California Green Building Code forms for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use the City of San Diego's and the California Green Building Code forms for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 2. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 3. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 4. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 PRODUCTS

2.01 RECYCLING RECEIVERS AND PROCESSORS

- A. Subject to compliance with requirements, available recycling receivers and processors include, but are not limited to, the following:
 - 1. The City of San Diego's published Certified Construction and Demolition Recycling Facilities.

2.02 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work and separation of four waste streams excluding landfill. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste

from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

- a. Construction Waste:
 - 1) Masonry and CMU.
 - 2) Lumber.
 - 3) Wood sheet materials.
 - 4) Wood trim.
 - 5) Metals.
 - 6) Roofing.
 - 7) Insulation.
 - 8) Carpet and pad.
 - 9) Gypsum board.
 - 10) Piping.
 - 11) Electrical conduit.
 - 12) Packaging:
 - a) Regardless of salvage/recycle goal indicated in Article Performance Requirements, Paragraph General above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - (1) Paper.
 - (2) Cardboard.
 - (3) Boxes.
 - (4) Plastic sheet and film.
 - (5) Polystyrene packaging.
 - (6) Wood crates.
 - (7) Wood pallets.
 - (8) Plastic pails.
 - 13) Construction Office Waste:
 - a) Regardless of salvage/recycle goal indicated in Article Performance Requirements, Paragraph General above, salvage or recycle 100 percent of the following construction office waste materials:
 - (1) Paper.
 - (2) Aluminum cans.
 - (3) Glass containers.

PART 3 EXECUTION

3.01 PLAN IMPLEMENTATION

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

- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within 3 days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 01 50 00, Temporary Facilities and Controls, for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type (minimum allowable is 4 streams) at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.

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

3.03 RECYCLING CONSTRUCTION WASTE

A. Packaging:

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

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

C. Paint: Seal containers and store by type.

3.04 DISPOSAL OF WASTE

A. General:

1. Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
2. Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

B. Burning:

1. Do not burn waste materials.
2. Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

3.05 FINAL STATUS REPORT

- A. A Final Status Report demonstrating final disposition, either diverted or disposed, of materials generated by the Project is required before final payment.

END OF SECTION

**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
 - a. Record Documents: As described in Section 01 33 00, Submittal Procedures.
 - b. Approved Shop Drawings and Samples: As described in Section 01 33 00, Submittal Procedures. Special bonds, Special Guarantees, and Service Agreements and as required in the General Conditions.
 - c. Consent of Surety to Final Payment: As required in General Conditions.
 - d. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - e. Releases from Agreements.
 - f. All documentation as required by all Funding Agencies.
 - g. Final Application for Payment: Submit in accordance with procedures and requirements stated in the General Conditions.
 - h. Extra Materials: As required by individual Specification sections.

1.02 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents and to ensure compliance with the requirements of the Contract Documents and Funding Agencies.
2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.

4. Prior to submitting each request for progress payment, request Construction Manager's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Construction Manager to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.
- B. In the event Contractor is unable to secure written releases:
 1. Inform Owner of the reasons.
 2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
 3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages.
 4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 1. Promptly following commencement of Contract Times, secure from Construction Manager at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
 2. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.

3. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.
- B. Preservation:
1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
 2. Make documents and Samples available at all times for observation by Construction Manager.
- C. Making Entries on Drawings:
1. Clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
 2. Date entries.
 3. Call attention to entry by “cloud” drawn around area or areas affected.
 4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Design Engineer’s written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
 5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as “cast iron drain,” “galv. water,” and the like.

- b. Show, by symbol or note, vertical location of item (“under slab,” “in ceiling plenum,” “exposed,” and the like).
- c. Make identification so descriptive that it may be related reliably to Specifications.

3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor’s request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor’s notice of completion, clean entire Site or parts thereof, as applicable.
 - 1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and Construction Manager.
 - 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 - 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 - 4. Clean all windows.
 - 5. Clean and wax wood, vinyl, or painted floors.
 - 6. Broom clean exterior paved driveways and parking areas.
 - 7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 - 8. Rake clean all other surfaces.
 - 9. Remove snow and ice from access to buildings.
 - 10. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
 - 11. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

3.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Construction Manager in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Construction Manager issue a certificate of Substantial Completion.
- B. Promptly after Contractor’s notification, Owner, Contractor, and Construction Manager shall make an inspection of the Work to determine the status of completion. If Construction Manager does not consider the Work substantially complete, Construction Manager will notify Contractor in writing giving the reasons therefor.

- C. If Construction Manager considers the Work substantially complete, Construction Manager will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the tentative certificate during which to make written objection to Construction Manager as to any provisions of the certificate or attached list. If, after considering such objections, Construction Manager concludes that the Work is not substantially complete, Construction Manager will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Construction Manager considers the Work substantially complete, Construction Manager will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Construction Manager believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Construction Manager will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Construction Manager in writing prior to Construction Manager's issuing the definitive certificate of Substantial Completion, Construction Manager's aforesaid recommendation will be binding on Owner and Contractor until final payment.

3.04 FINAL INSPECTION

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Construction Manager will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Design Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Design Engineer's review.
- B. Final Data: Design Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Design Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Instructional Manual Formatted data not less than 30 days prior to equipment or system field functional testing.
 - 3. Record Data: Submit final Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data in data compilation format and on electronic media.
- B. Instructional Manual Format:
1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 2. Size: 8-1/2 inches by 11 inches, minimum.
 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. Project title.
 - b. Include name of piece of equipment and equipment tag number.
 - c. Designate applicable system, equipment, material, or finish.
 - d. Identity of separate structure as applicable.
 - e. Identify volume number if more than one volume.
 - f. Identity of general subject matter covered in manual. Identity of equipment number and Specification section.
 4. Spine:
 - a. Project title.
 - b. Identify volume number if more than one volume.
 5. Title Page:
 - a. Contractor name, address, email address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
 6. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 7. Paper: 20-pound minimum, white for typed pages.
 8. Text: Manufacturer's printed data, or neatly typewritten.
 9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
 10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs. FAX and thermal copies are not acceptable.

C. Data Compilation Format:

1. Compile all Design Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ___ OF ___", and list:
 - 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of Contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:
 - 1) Heavy, 80-pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Divider Page:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

D. Electronic Media Format:

1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Construction Manager, submit Operation and Maintenance data in PDF format on CD.
 - b. Minimize the number of files in each manual. Files should not be broken up unless the size is greater than 1 GB.
 - c. Files to be exact duplicates of Design Engineer-accepted preliminary data. Arrange by specification number and name.
 - d. Files to be processed for optical character recognition, bookmarked, and viewable in most recent version of Adobe Acrobat.
 - e. Document properties requirements of each file shall be set as follows:
 - 1) Title: Name of the system.
 - 2) Author: Manufacturer's name.
 - 3) Subject: Equipment Service Manual.
 - 4) Keywords: Equipment Tag Number, equipment type.
 - 5) Initial View – Navigation Tab: Bookmarks Panel and Page.
 - 6) Layout: Single Page.
 - 7) Magnification: Fit Page.
 - 8) Window Option: Show document title.
 - 9) Security: No security.

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit two copies and electronic copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
 - a. Submit two copies and electronic copies for Design Engineer's review.
 - b. If data meets conditions of the Contract, Design Engineer will accept manual.
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Construction Manager.
 - 3) One copy will be retained in Design Engineer's file.
 - c. If data does not meet conditions of the Contract, resubmit manual revised in accordance with Design Engineer's comments.
 - 1) All copies will be returned to Contractor with Design Engineer's comments (on separate document) for revision.

- 2) Design Engineer's comments will be retained in Design Engineer's file.
3. Final Data: Submit two printed copies and an electronic copy in format specified herein.
4. Record Data: Submit two printed copies and an electronic copy in format specified herein, incorporating all modifications made during testing and commissioning.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. As-built control and flow diagrams.

- d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
 5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.
 - 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 5) Shutdown instructions for both short and extended duration.
 - 6) Summer and winter operating instructions, as applicable.
 - 7) Safety precautions.
 - 8) Special operating instructions.
 - d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
 6. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Closeout Procedures.
- B. Content for Each Electric or Electronic Item or System:
1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
 2. Circuit directories of panelboards.
 3. Electrical service.
 4. Control requirements and interfaces.
 5. Communication requirements and interfaces.

6. List of electrical relay settings, and control and alarm contact settings.
7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
8. As-installed control diagrams by control manufacturer.
9. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
10. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
11. Manufacturer's printed operating and maintenance instructions.
12. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
 - a. Use Maintenance Summary Form bound with this section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
 - e. Provide in electronic media format.
3. Include manufacturer's detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

- A. Content for Architectural Products, Applied Materials, and Finishes:
1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
 2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.
- B. Content for Moisture Protection and Weather Exposed Products:
1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is part of this Specification.
1. Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION (NOT USED)****END OF SECTION**

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT/TAG NUMBER(S) _____

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

5. NAMEPLATE DATA (hp, voltage, speed, etc.) _____

6. MANUFACTURER'S LOCAL REPRESENTATIVE _____

a. Name _____ Telephone No. _____

b. Address _____

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

Reference Symbol	Shell	Exxon Mobile	Chevron Texaco	BP Amoco	Or Equal
List symbols used in No. 7 above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR OWNER’S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost

Note: Identify parts provided by this Contract with two asterisks.

SECTION 01 88 15
ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the 2016 California Building Code (CBC), for seismic, wind, gravity, soil, and operational loads.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Institute of Steel Construction (AISC) 360, Specification for Structural Steel Buildings.
 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 3. California Building Commission: 2016 CBC.
 4. International Code Council (ICC): International Building Code (IBC).

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
1. Contractor shall be responsible for designing code required gravity, wind and seismic supports, attachments, braces, and anchors to structures including concrete pads and foundations for elements of the architectural, mechanical, and electrical systems included in the Work in

accordance with this section unless a design is specifically provided within the Contract Documents.

2. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of California.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Design seismic anchorage and bracing for modified existing architectural, mechanical, or electrical systems where code requirements would dictate design for similar new components.
6. Anchor and brace piping and ductwork, whether exempt or not exempt for this section, so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
7. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
8. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
9. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
10. Anchor existing equipment as noted on Drawings.
11. Design anchorage and bracing for:
 - a. Equipment and components that weigh more than 400 pounds and have center of mass located 4 feet or less above adjacent finished floor.
 - b. Equipment weighing more than 20 pounds that has center of mass located more than 4 feet above adjacent finished floor.
 - c. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
 - d. Distribution systems that weigh more than 5 pounds per foot that have center of mass located more than 4 feet above adjacent finished floor.
12. Design seismic anchorage and bracing for Designated Seismic Systems regardless of weight or mounting height.
 - a. Component Important Factor:
 - 1) I_p equals 1.0, unless noted otherwise.

- 2) I_p shall be taken as 1.5 if any of the following conditions apply:
 - a) Component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
 - b) Component contains hazardous materials.
 - c) Component is in or attached to Risk Category IV structure and is needed for continued operation of facility or its failure could impair continued operation of facility.
- 3) Per Section 01 61 00, Common Product Requirements.
13. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
2. Wind: Design anchorage and bracing for wind criteria provided in Section 01 61 00, Common Product Requirements and on General Structural Notes on Drawings for architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.
3. Operational:
 - a. For loading supplied by equipment manufacturer for CBC required load cases.
 - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
 - c. Locate braces to minimize vibration to or movement of structure.
 - d. For vibrating loads, use anchors meeting requirements of Section 05 50 00, Metal Fabrications, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
4. Hydraulic: Design of anchorage for submerged gates and other mechanical equipment shall include hydrostatic and hydrodynamic loads determined in accordance with Section 15.7 of ASCE 7-10.
5. Seismic:
 - a. In accordance with 2016 CBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.

- c. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2 or CBC Section 1905.1.9, as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of effective seismic weight of overall structure.
2. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component I_p equals 1.5.
3. The following are exempt from requirements for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
 - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
 - b. Temporary or movable equipment.
4. Fire protection sprinkler systems designed and constructed in accordance with NFPA 13 shall be considered to meet requirements of Chapter 13 of ASCE 7.
5. Provide support drawings and calculations for electrical distribution components if any of the following conditions apply:
 - a. Conduit diameter is greater than 2.5-inch trade size.
 - b. Total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
6. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
7. Other seismic design and detailing information identified in ASCE 7, Chapter 13, is required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.

- b. Manufacturers' engineered seismic and non-seismic hardware product data sealed by a civil or structural engineer registered in the State of California.
- c. Attachment assemblies' drawings including seismic attachments; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
- d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
- e. Drawings for seismic attachment assemblies include connection hardware, braces, and anchors (or anchor bolts) for modified, nonexempt existing components, equipment, and systems where a combination of new and existing systems or components' final condition would require anchorage or bracing under this specification for new equipment.
- f. Submittal will be rejected if proposed anchorage method would create excessive stress to supporting member. Revise anchorages and strengthen structural support to eliminate overstressed condition.

B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of California.
2. Manufacturer's hardware installation requirements.

C. Deferred Submittals:

1. In accordance with the requirements indicated in this section, Drawings, and Section 01 33 00, Submittal Procedures.
2. Submitted seismic anchorage drawings and calculations for Designated Seismic Systems are identified as CBC deferred submittals and will be submitted to and must be accepted by AHJ prior to installation of component, equipment, or distribution system.
3. Submit deferred Action Submittals such as Shop Drawings with supporting deferred informational submittals such as calculations no less than 8 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on Drawings, and Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Provide all other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.
- C. Provide Source Quality Control for welding and hot-dip galvanizing of anchors in accordance with Section 05 50 00, Metal Fabrications.

PART 2 PRODUCTS**2.01 GENERAL**

- A. Design and construct attachments and supports transferring seismic and non-seismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts for anchorage of equipment to concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05 05 19, Post-Installed Anchors. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 hp.

PART 3 EXECUTION**3.01 GENERAL**

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.

- B. Design, provide, and install overall seismic anchorage system to provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Provide snubbers in each horizontal direction and vertical restraints for components mounted on vibration isolation systems where required to resist overturning.
- D. Provide piping anchorage that maintains design flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments unless high or limited deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet or weigh 17 pounds per foot or less.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. In accordance with Section 05 50 00, Metal Fabrications, and Section 05 05 19, Post-Installed Anchors.
- B. Owner-Furnished Quality Assurance, in accordance with CBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.

- C. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections.

END OF SECTION

SECTION 01 91 14
TESTING, INTEGRATION, AND STARTUP

PART 1 GENERAL

1.01 STARTUP

- A. The goal of startup is to verify proper performance and operation of the Facility.
- B. Testing, integration, and startup are complex portions of the Work required for satisfactory completion and require thorough planning and proper execution.

1.02 DEFINITIONS

- A. Acceptance Testing: A contractually required, specific and measurable test, often with liquidated damages attached, to demonstrate a system or facility performs to its intended function (e.g., flow amounts, duration and quality criteria are met). All major defects are resolved at this point.
- B. Auxiliary Systems: Subsystems and systems selected by the Owner as critical to the operation and function of the Work. Auxiliary systems are more specifically identified in the Contract Documents.
- C. Commissioning:
 - 1. The disciplined and systematic process of assuring that all components, subsystems and systems of a constructed unit are designed, installed, tested and operated in conformance with the design intent, and functional intent and operational requirements of the Owner.
 - 2. This includes:
 - a. Proof testing of design intent using static check sheets, dynamic check sheets and defined procedures to ensure compliance with design drawings, data sheets and specifications.
 - b. Achieving a smooth and safe transition from an inert state to a completely tested, clean, leak tight, operable and safe unit ready for start-up and performance testing.
- D. Components: Individual items of equipment or portions of the Work that when combined with other components make up subsystems or systems. Components may be minor items such as pressure gauges, or they may be significant items such as pump motors.
- E. Contract Documents: As specified within the Contract Requirements.

- F. Facility: The combined equipment and systems colocated to perform a specified function, e.g., North City Water Reclamation Plant.
- G. Final Completion: Refer to the Contract Requirements and Supplementary Special Provisions.
- H. Functional Testing: A test of a given component, subsystem or system to confirm its operation meets specifications and Contract requirements. Often a prerequisite to Acceptance Testing.
- I. Major Equipment Systems: Systems, subsystems, or major equipment components selected by the Owner as critical to the operation and function of the Work. Major equipment systems are more specifically identified in the Contract Documents.
- J. Manufacturer's Installation Inspection: Preliminary inspection conducted by Manufacturer or Manufacturer's accepted representative to confirm proper installation of components, systems, and subsystems.
- K. Mechanical/Electrical Functional Testing: Testing performed to confirm general performance of mechanical and electrical systems. Hydrostatic leak testing of pipes is an example. Electrical testing specified in Division 26, Electrical, shall be considered Mechanical/Electrical Functional Testing.
- L. Performance Test: A defined test of a system, systems or facility over a period of 7 days, unless otherwise specified, to demonstrate the system or facility is fully operational and meets all specifications, performance objectives and Contract requirements. Performance testing will be done with clean water and wastewater, as defined with these Contract Documents.
- M. Operational Readiness Test Part 1, See Section 40 90 00, Instrumentation and Control.
- N. Operational Readiness Test Part 2, See Section 40 90 00, Instrumentation and Control.
- O. Process Instrumentation and Control (PIC): Computer-based system whose purpose is to control and supervise the overall Facility operation. See Section 40 90 00, Instrumentation and Control.
- P. Startup: The act of starting or operating a component, subsystem or system and testing its functionality and performance against defined metrics.
- Q. Subsystems: A group of related equipment that performs a defined function and is an element of a larger system.

- R. Substantial Completion: Refer to the Contract Requirements and Supplementary Special Provisions.
- S. Systems: A group of related components, equipment or subsystems that perform a defined function or set of functions within a facility.
- T. Training: Classroom and equipment area instruction by Manufacturer or Manufacturer accepted representative intended to educate the Owner on the proper operation and maintenance of components, systems, and subsystems.
- U. Unit Process: Portion of the facility that performs a specific process function, such as influent pumping, screening and grit removal, chemical feed, blowers, membrane system, and plant water.
- V. Beneficial Use: Utilization of a system, unit process, or facility by the Owner. Refer to Supplemental Special Provisions for further definition and extended warranty requirements for equipment placed into Beneficial Use.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Startup Management Plan: Submitted within 60 days after Notice to Proceed.
- 2. Overall Facility Startup Plan.
- 3. Acceptance Test Plans.
- 4. Startup Schedule:
 - a. Schedule shall be a detailed Oracle Primavera P6 schedule linked to the milestones and key startup activities contained in the Construction Schedule as specified in Section 01 32 00, Construction Progress Documentation.
 - b. The Startup Schedule shall include each phase of testing of for the systems defined herein.
 - c. Schedule shall be submitted in both XER and PDF format and updated monthly.
 - d. The detailed Startup Schedule shall be submitted no later than 6 months prior to the start of ORT Part 1 in the accepted Baseline Schedule, as specified in Section 01 32 00, Construction Progress Documentation.
- 5. Startup Results Submittal:
 - a. Include the following:
 - 1) Completed test plans (endorsed by Construction Manager and Contractor).
 - 2) Record of all Training:
 - a) Training requests.
 - b) Agendas.

- c) Sign in sheets.
- d) Handouts.
- e) Electronic copy of all training presentations.
- 3) Record of all Manufacturer Services/Inspections.
- 4) Record of all testing not covered above.

1.04 ORGANIZATION OF STARTUP PHASES

A. The following table summarizes the various phases of startup:

Description	Duration	Preceding Constraints	Comments
Submittals	As required to meet testing schedule		
Mechanical/Electrical Functional Testing and Equipment Testing	As required to meet testing schedule for individual unit process	Complete all FATs. Complete equipment and piping installation. Approved submittals required prior to testing (including O&Ms).	Includes hydrostatic testing
PIC Operational Readiness Test Part 1	As required to meet testing schedule	Manufacturer's installation assistance and inspection. Approved submittals required prior to testing (including O&Ms).	

Description	Duration	Preceding Constraints	Comments
PIC Operational Readiness Test Part 2	As required to meet testing schedule	Completion of PICS Operational Readiness Test Part 1. Completion of staging site demonstration test and loading of application software. Approved submittals required prior to testing (including O&Ms).	
Functional and Performance Testing on Unit Processes	As required to meet testing schedule	Completion of PIC Operational Readiness Test Part 2. Approved submittals required prior to testing (including O&Ms).	
Training	As specified	Completion of all functional and performance testing.	
Facility Commissioning	30 days	Completion of facility commissioning.	

1.05 WORK RELATED TO THE FACILITY

- A. During the period between Substantial Completion and Final Completion, the Owner will conduct integration procedures associated with the Facility and its coordinated operation with NCPWF, Morena Pump Station, and Metropolitan Biosolids Center, and systems being constructed by others, such as the communications and control interface and COMNET upgrade. This integration will generally consist of communications system verification and a verification that the facilities can operate as one overall system.

1.06 CONTRACTOR STARTUP PERSONNEL

- A. Contractor shall provide personnel, both supervisory and from the applicable trades, who are experienced in startup, testing, and commissioning for the execution of the work described in these Contract Documents.

1.07 THE STARTUP MANAGEMENT PLAN

- A. The Contractor shall conduct a startup coordination workshop and prepare and submit a Startup Management Plan that describes how Contractor will accomplish the minimum scope of services and manage the daily startup activities. The requirements for Startup requirements for the Work will be reviewed at the workshop. The Startup Management Plan shall be prepared immediately following the workshop and shall include a detailed description, including procedures and examples of how the Startup Team will manage the interface between Contractor's trades, Contractor's management, Contractor's subcontractors, Construction Manager's field team, and Owner. The workshop shall be conducted within 4 weeks of Notice to Proceed. The draft Startup Management Plan shall be completed and submitted within 4 weeks of the startup coordination workshop. The plan will be reviewed and processed for acceptance in accordance with Section 01 33 00, Submittal Procedures.

1.08 THE STARTUP AND TEST PLANS

- A. The Contractor will develop specific plans for the testing of all elements of the Facility. These plans shall outline the detailed sequence of activities necessary to confirm the proper operation of every component, system, and subsystem.
- B. Test plans will be prepared for each phase of startup where testing is required including, but not limited to the following:
1. Manufacturer's installation inspection.
 2. Mechanical/electrical functional testing.
 3. Operational Readiness Test Part 1.
 4. Operational Readiness Test Part 2.
 5. Functional and performance testing on unit processes.
 6. Facility commissioning.
- C. Test plans will be developed as described below:
1. The Overall Startup Plan shall include six main sections arranged as follows:
 - a. Overall Startup Plan Summary.
 - b. Operational Readiness Testing.
 - c. Functional and Performance Testing.
 - d. Commissioning and Acceptance Testing.
 - e. Startup Schedule.
 2. The contents and requirements pertaining to each section are described below. It is expected that each section could require multiple volumes, depending on the size and complexity of the Work.

3. Overall Startup Plan Summary:
 - a. The Overall Startup Plan Summary is the master startup plan document. It includes a brief summary of all testing and startup activities and provides the basic organization of the startup and testing program. It shall be submitted in advance of any other test plans except for Factory Acceptance Test Plans as described herein.
 - b. The Overall Startup Plan Summary shall include the following:
 - 1) Introduction with a narrative description of the overall testing and startup program planned for implementation by the Contractor. Tables and flowcharts in addition to those described below should be included to clearly illustrate the Contractor's intent for the testing and startup program.
 - 2) List of major Acceptance Test Plan categories. At a minimum, a separate acceptance test plan shall be prepared for the following four categories:
 - a) All PIC and DCS testing specified in Division 40, Process Interconnections, of the specifications and including all related testing referring to Division 40, Process Interconnections, from other specification sections and divisions.
 - b) All electrical testing specified in Division 26, Electrical, of the specifications and including all related testing referring to Division 26, Electrical, from other specification sections and divisions.
 - c) All hydrostatic testing of piping and appurtenances, pipelines, aqueducts, valves, water holding structures, pressure vessels, tanks, and any other component, subsystem, or system specified to be hydrostatic or pressure tested.
 - d) Unless otherwise indicated in the Contract Documents, all other testing.
 - c. In addition to the breakdown listed above, the Contractor may propose to further divide, or group, the testing into categories assigned by process area or physical site delineation. However, said division or grouping must be agreed to, in writing, by the Construction Manager prior to the initial submittal of the Overall Startup Plan Summary. The Construction Manager will be the sole judge as to the acceptability of the additional division or grouping of testing proposed by the Contractor.
 - 1) Complete listing of component, subsystem, and system tests within each Test Plan category. Special focus should be placed on a complete listing of tests for all major equipment items and all auxiliary systems identified in the Contract Document. In any case, all components, subsystems, and

- systems and their associated testing shall be included in the listing.
- 2) Flowchart the full testing program from Factory Acceptance Testing and initial shakedown through Acceptance Testing, and ending at Substantial Completion. The flowchart shall demonstrate the precedence, or order, by which the testing will take place. The order of testing shall be such that it is consistent with the requirements of the Contract Documents.
 - 3) Provide a preliminary schedule illustrating the timeline associated with the flowchart described above. This schedule does not need to be CPM based as it will be replaced with schedules developed according to requirements stated below for the Startup Schedule.
- D. Contractor shall execute these test plans with the witnessing of the Construction Manager and/or Engineer and/or Owner.
- E. For startup and testing purposes, the following designations are made:
1. Main Unit Processes:
 - a. 12 – Flow Equalization:
 - 1) Tank washdown.
 - 2) Tank level control.
 - b. DCS/Control:
 - 1) DCS with UPS.
 - 2) Instruments.
 - 3) Interconnection and control cables/wiring.
 - 4) Appurtenant communication and interconnection devices and equipment.
 - 5) Fiber Optic Communications Systems.
 2. Auxiliary Systems:
 - a. Main Piping:
 - 1) Associated main discharge pipe valves and piping out to the existing system and other facility interfaces.
 - 2) Yard piping.
 - 3) Appurtenant instruments, devices, valves, and piping.
 - b. Building Systems (all structures, as applicable):
 - 1) Utility water – potable.
 - 2) Nonpotable water utility piping.
 - 3) Lighting.
 - 4) Miscellaneous instruments and devices (i.e., flood switches).
 - c. Corrosion Control: Coating materials.

- F. Contractor shall submit the completed test reports as part of the Startup Results Submittal.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL STARTUP AND TESTING REQUIREMENTS

- A. Contractor is responsible for the complete testing, check out, startup, and commissioning of all elements of the Facility. Verify these activities through daily inspection reports, test records/reports, onsite vendor certifications, specified testing, and by other appropriate means. Startup and Testing Plans and Test Reports shall include specific language to demonstrate that the requirements stated herein are planned, executed, and accomplished. The requirements below are complementary to those indicated elsewhere in the Contract Documents.
- B. Engineer and Construction Manager shall be solely responsible for determining the party responsible for conducting any and all corrective actions and for determining the party responsible for any and all delays.
- C. Facility Startup Meetings: Schedule, in accordance with requirements of Section 01 31 19, Project Meetings, to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement.
- D. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- E. Owner will:
 - 1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated.
 - 2. Operate process units and facility with support of Contractor.
 - 3. Provide labor and materials as required for laboratory analyses.

3.02 MANUFACTURER'S INSTALLATION INSPECTION

- A. When Contractor has completed installation of components, systems, or subsystems, they shall schedule a manufacturer inspection. This manufacturer or approved manufacturer's representative shall certify that the component, system, or subsystem is properly installed and that testing of the component, system, or subsystem may commence.

B. Preparation:

1. Complete installation before testing.
2. Furnish qualified manufacturers' representatives, when required by individual Specification sections.
3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01 43 33, Manufacturers' Field Services, when required by individual Specification sections.
4. Cleaning and Checking: Prior to beginning functional testing:
 - a. Calibrate testing equipment in accordance with manufacturer's instructions.
 - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - c. Lubricate equipment in accordance with manufacturer's instructions.
 - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
 - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
 - f. Check power supply to electric-powered equipment for correct voltage.
 - g. Adjust clearances and torque.
 - h. Test piping for leaks.
5. Ready-to-test determination will be by Engineer and Construction Manager based at least on the following:
 - a. Acceptable Operation and Maintenance Data.
 - b. Notification by Contractor of equipment readiness for testing.
 - c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
 - d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested, including Membrane Equipment System.
 - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
 - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
 - g. Equipment and electrical tagging complete.
 - h. Delivery of all spare parts and special tools.

3.03 MECHANICAL/ELECTRICAL FUNCTIONAL TESTING

- A. After each mechanical system is completely installed, the Contractor shall confirm proper installation according to these Contract Documents. Mechanical system testing shall include, but not be limited to the following system types:
 - 1. Piping (buried and exposed).
 - 2. Freestanding tanks.
- B. After the complete installation of electrical systems (or portions thereof), the Contractor shall conduct all testing, including the independent electrical testing, as specified in Division 26, Electrical.

3.04 OPERATIONAL READINESS TEST PART 1

- A. The Operational Readiness Test Part 1 shall be performed by the Contractor to test and document the PIC, excluding Owner provided applications software, is ready for operation. This test is fully described in Division 40, Process Interconnections.

3.05 OPERATIONAL READINESS TEST PART 2

- A. The Operational Readiness Test Part 2 shall be a coordinated effort between the Contractor and Owner to confirm the PIC, including the applications software is ready for operation. This testing is described in Division 40, Process Interconnections.

3.06 FACILITY COMMISSIONING

- A. Facility Commissioning Testing:
 - 1. The disciplined and systematic process of assuring that all components, sub-systems and systems of a constructed unit are designed, installed, tested and operated in conformance with the design intent, and functional intent and operational requirements of the Owner.
 - 2. Notify Construction Manager, Engineer, and Owner in writing at least 10 days prior to scheduled date of test.
 - 3. Commissioning shall not commence until equipment has been accepted by Construction Manager and Engineer as having satisfied performance test requirements specified.
 - 4. Type of fluid, gas, or solid for testing shall be as specified.
 - 5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
 - 6. Prepare Test Reports summarizing test method and results.

7. When, in Construction Manager's and Engineer's opinion, the integrated facility operates as specified and is accepted as conforming to Contract requirements. Such acceptance will be evidenced by Construction Manager's and Engineer's signature on Facility Commissioning Report.

3.07 TRAINING

- A. All components, systems, or subsystems require separate training by the manufacturer.
- B. Training for each component, system, or subsystem shall be a minimum of 4 hours if no specific requirements are described in the individual specification sections.
- C. All training shall be requested at least 14 days in advance of proposed training date.
 1. Proposed training shall be requested by the Contractor in an acceptable format including the following information as a minimum:
 - a. Description of training.
 - b. Name and contact information of trainer.
 - c. Location of training.
 - d. Proposed date.
 - e. Alternative dates (if applicable).
 - f. Proposed start time.
 - g. Proposed duration.
 - h. Proposed detailed agenda including topics, times, breaks, etc.
- D. All training shall be scheduled through the Construction Manager.
- E. If suitable training facilities are not available at the Facility, Contractor shall arrange and pay for training offsite.

3.08 WITNESSING AND SUPERINTENDENCE

- A. The Engineer, Owner, Construction Manager, and others as necessary shall be allowed to witness all testing conducted during any phase of startup.
- B. The Contractor shall maintain overall superintendence of the Work during all phases of startup.

- C. The Contractor shall promptly and permanently repair damage to any portion of the Work during startup and testing.
 - 1. All repair work shall be performed by the manufacturer or with manufacturer's approved published methods.
- D. The Contractor shall perform all scheduled maintenance in strict compliance with manufacturers' published procedures and with products acceptable to manufacturers.
- E. Authorized representatives of equipment suppliers or manufacturers shall certify that all corrective actions for all defects, malfunctions, faulty equipment operation, calibration, adjustment, or related flaws are complete and acceptable.
- F. The Contractor shall keep on 24-hour local standby and provide all crews, materials, and equipment required to repair, replace adjust, balance, modify and provide other services as may be required to immediately correct all failures or malfunctions of any kind.

END OF SECTION

TECHNICALS (VOLUME 2)

PURE WATER PROGRAM
FOR
GREATER SAN DIEGO, CALIFORNIA

BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS

for the construction of the

SAN DIEGO NCWRP EXPANSION AND
NCPWF INFLUENT PUMP STATION AND PIPELINE

PACKAGE 1
FLOW EQUALIZATION

VOLUME 2
SPECIFICATIONS
DIVISIONS 02 THROUGH 21

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SECTION 00 01 07
SEALS PAGE

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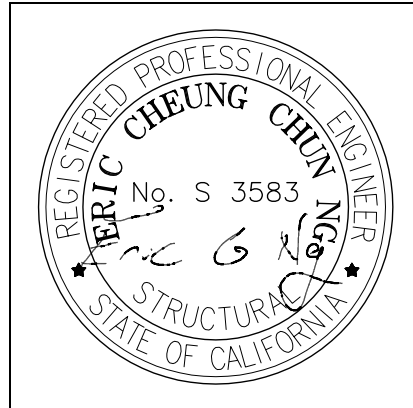
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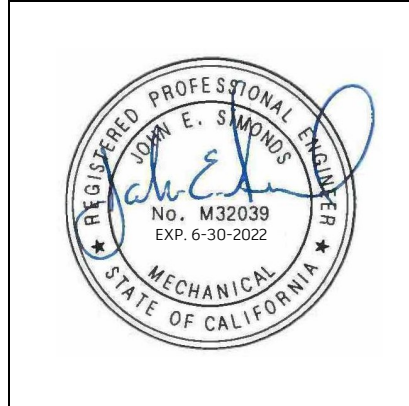
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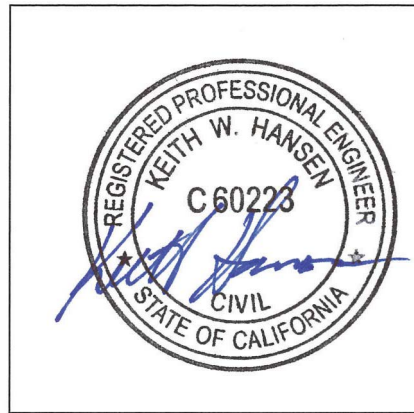
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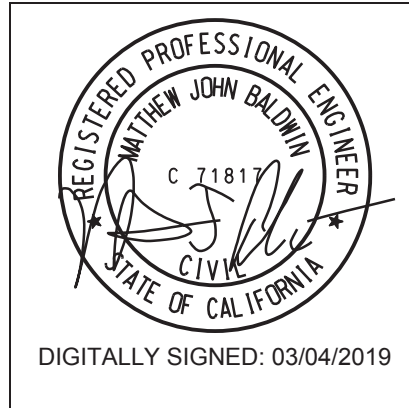
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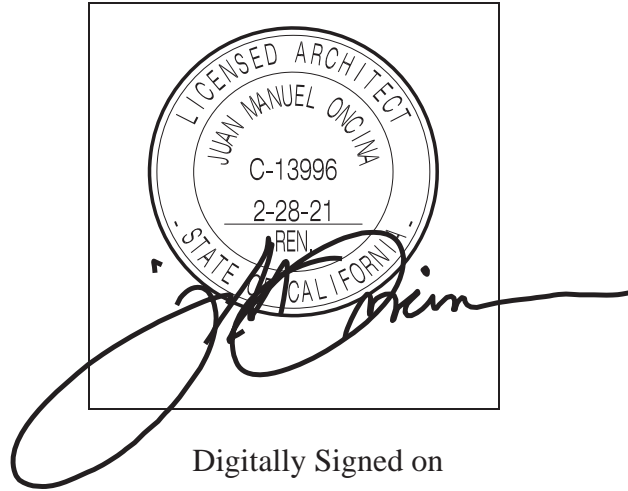
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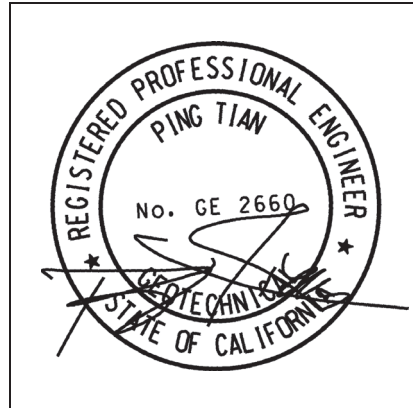


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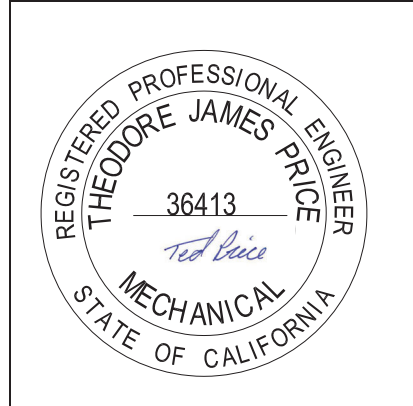
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**SECTION 02 41 00
DEMOLITION**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI): A10.6, Safety Requirements for Demolition Operations.
 2. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40:
 - a. Part 61—National Emission Standards for Hazardous Air Pollutants.
 - b. Part 82—Protection of Stratospheric Ozone.
 - c. Part 273—Standards for Universal Waste Management.
 3. Occupational Safety and Health Administration (OSHA), U.S. Code of Federal Regulations (CFR) Title 29 Part 1926—Occupational Safety and Health Regulations for Construction.

1.02 DEFINITIONS

- A. ACM: Asbestos-containing material.
- B. Demolition: Dismantling, razing, destroying, or wrecking of any fixed building or structure or any part thereof. Demolition also includes removal of pipes, manholes tanks, conduit, and other underground facilities, whether as a separate activity or in conjunction with construction of new facilities.
- C. Modify: Provide all necessary material and labor to modify an existing item to the condition indicated or specified.
- D. Relocate: Remove, protect, clean and reinstall equipment, including electrical, instrumentation, and all ancillary components required to make the equipment fully functional, to the new location identified on Drawings.
- E. Renovation: Altering a facility or one or more facility components in any way.
- F. Salvage/Salvageable: Remove and deliver, to the specified location(s), the equipment, building materials, or other items so identified to be saved from destruction, damage, or waste; such property to remain that of Owner. Unless otherwise specified, title to items identified for demolition shall revert to Contractor.

- G. Universal Waste Lamp: In accordance with 40 CFR 273, the bulb or tube portion of an electric lighting device, examples of which include, but are not limited to, fluorescent, high-intensity discharge, neon, mercury vapor, high-pressure sodium, and metal halide lamps.
- H. Universal Waste Thermostat: A temperature control device that contains metallic mercury in an ampule attached to a bimetal sensing element, and mercury-containing ampules that have been removed from these temperature control devices in compliance with the requirements of 40 CFR 273.

1.03 SUBMITTALS

A. Informational Submittals:

- 1. Submit proposed Demolition/Renovation Plan, in accordance with requirements specified herein, for approval before such Work is started.
- 2. Submit copies of any notifications, authorizations, and permits required to perform the Work.
- 3. Copies of reports and other documentation required for abandoning wells.
- 4. Submit a shipping receipt or bill of lading for all containers of ACM shipped.
- 5. Submit a shipping receipt or bill of lading for all universal waste shipped.

1.04 REGULATORY AND SAFETY REQUIREMENTS

- A. When applicable, demolition Work shall be accomplished in strict accordance with 29 CFR 1926-Subpart T.
- B. Comply with federal, state, and local hauling and disposal regulations. Contractor's safety requirements shall conform to ANSI A10.6.
- C. Furnish timely notification of this project to applicable federal, state, regional, and local authorities in accordance with 40 CFR 61-Subpart M.

1.05 DEMOLITION/RENOVATION PLAN

- A. Demolition/Renovation Plan shall provide for safe conduct of the Work and shall include:
 - 1. Detailed description of methods and equipment to be used for each operation.
 - 2. The Contractor's planned sequence of operations, including coordination with other work in progress.

3. Procedures for removal and disposition of materials specified to be salvaged.
4. Disconnection schedule of utility services.
5. Contractor shall submit proposed methods, equipment, and operating sequences for demolition or tie-ins to existing facilities, including coordination requirements with Owner for shut-offs, temporary services, continuation of utility services, and other applicable items to ensure continuous and safe operation of existing facilities affected by Contractor's work.

1.06 SEQUENCING AND SCHEDULING

- A. The Work of this Specification shall not commence until Contractor's Demolition/Renovation Plan has been approved by Design Engineer.
- B. Include the Work of this Specification in the progress schedule, as specified in Section 01 32 00, Construction Progress Documentation.

1.07 USE OF EXPLOSIVES

- A. Shall not be used.

1.08 ENVIRONMENTAL PROTECTION

- A. Comply with applicable federal, state, and local regulations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXISTING FACILITIES TO BE DEMOLISHED OR RENOVATED

- A. Utilities and Related Equipment:
 1. Notify Construction Manager or appropriate utilities to turn off affected services at least 48 hours before starting demolition or renovation activities.
 2. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by Design Engineer.
 3. When utility lines are encountered that are not indicated on Drawings, notify Construction Manager prior to further work in that area.
 4. Remove meters and related equipment and deliver to a location as determined by the Construction Manager.
 5. Provide a permanent leak-proof closure for water and gas lines.

6. Plug sewer lines with concrete to a minimum plug length of 6 feet to prevent groundwater infiltration.
7. See Section 33 41 01, Storm Drain Conveyance, for removal and abandonment of existing conduit and structures.
8. Drawings show the location of known existing structures, utilities, and facilities. The information on exposed and buried objects has been obtained from field investigations, observations, and available Record Drawings and shown as a screened background. The information is not guaranteed to be either complete or accurate and must be verified by the Contractor via potholing and hand excavation, and field measurements as required prior to starting demolition work. The Contractor shall include field verified measurements and as-built documentation with the required submittals defined under Article Demolition/Renovation Plan.
9. Prior to performing any demolition work on the existing utilities or facilities, the Contractor shall coordinate all efforts with Owner to define details and schedules of temporary shutdowns of existing utilities or facilities or maintaining of continuous plant operation.

B. Paving and Slabs:

1. Sawcut concrete and asphaltic concrete paving and slabs as indicated.
2. Provide neat sawcuts at limits of pavement removal as indicated.

C. Concrete:

1. Core drill corners of new opening to avoid overcutting adjacent reinforcing in existing concrete to remain. Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished Work, and the remaining concrete is sound.
2. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Repair exposed rebar ends and embeds as shown on Drawings.
3. Where new concrete adjoins existing concrete, thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 3/16 inch. Rebar and small embeds at existing concrete may be required to be left to engage new concrete. Saturate surface with water for 24 hours prior to placing new concrete. The new Work shall tie into the existing construction as shown on Drawings.

D. Patching:

1. Where removals leave holes and damaged surfaces exposed in the finished Work, patch and repair to match adjacent finished surfaces as to texture and finish.
2. Where new Work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new Work.
3. Patching shall be as specified and indicated, and shall include fill holes and depressions left as a result of removals in existing concrete walls with an approved patching material, applied in accordance with the manufacturer's printed instructions.

E. Electrical:

1. Cut off concealed or embedded conduit, boxes, or other materials a minimum of 3/4 inch below final finished surface.
2. When removing designated equipment, conduit and wiring may require rework to maintain service to other equipment.
3. Rework existing circuits, or provide temporary circuits as necessary during renovation to maintain service to existing lighting and equipment not scheduled to be renovated. Existing equipment and circuiting shown are based upon limited field surveys. Verify existing conditions, make all necessary adjustments, and record the Work on Record Drawings. This shall include, but is not limited to, swapping and other adjustments to branch circuits and relocation of branch circuit breakers within panelboards as required to accomplish the finished work.
4. Reuse of existing luminaires, devices, conduits, boxes, or equipment will be permitted only where specifically indicated.
5. Raceways and cabling not scheduled for reuse.
6. Inaccessibly Concealed: Cut off and abandon in place.
7. Exposed or Concealed Above Accessible Ceilings: Remove.
8. Raceways and Cabling Scheduled for Future Use: Cap/seal and tag.
9. Relocating Equipment: Extend existing wiring or run new wiring from the source.
10. Where the existing raceway is concealed, the outlet box shall be cleaned, and a blank cover plate installed.
11. Where the concealed raceway is uncovered, remove raceway (or extended to new location if appropriate).
12. Provide new typewritten panelboard circuit directory cards.

F. Universal Waste Lamps and Thermostats: Manage, contain, package, and label in strict accordance with 40 CFR 273.

3.02 PROTECTION

- A. Dust and Debris Control: Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to vehicular traffic.
- B. Traffic Control Signs: Where pedestrian and driver safety is endangered in the area of removal Work, use traffic barricades with flashing lights.
- C. Existing Work:
 - 1. Survey the Site and examine Drawings and Specifications to determine the extent of the Work before beginning any demolition or renovation.
 - 2. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain the property of Owner; any Contractor-damaged items shall be repaired or replaced as directed by Construction Manager.
 - 3. Provide temporary weather protection during interval between removal of existing exterior surfaces and installation of new to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 - 4. Ensure that structural elements are not overloaded as a result of or during performance of the Work. Responsibility for additional structural elements or increasing the strength of existing structural elements as may be required as a result of any Work performed under this Contract shall be that of the Contractor. Repairs, reinforcement, or structural replacement must have Design Engineer approval.
 - 5. Do not overload pavements to remain.
- D. Weather Protection: For portions of the building scheduled to remain, protect building interior and materials and equipment from weather at all times. Where removal of existing roofing is necessary to accomplish the Work, have materials and workmen ready to provide adequate and temporary covering of exposed areas so as to ensure effectiveness and to prevent loss.
- E. Trees: Protect trees within the Site that might be damaged during demolition and are indicated to be left in place, by a 6-foot-high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the Work shall be replaced in kind, as approved by the Design Engineer.

F. Facilities:

1. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.
2. Floors, roofs, walls, columns, pilasters, and other structural elements that are designed and constructed to stand without lateral support or shoring, and are determined by Contractor to be in stable condition, shall remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Design Engineer.
3. Protect all facility elements not scheduled for demolition.
4. Provide interior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities.

G. Protection of Personnel:

1. During demolition, continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.
2. Provide temporary barricades and other forms of protection to protect Owner's personnel and the general public from injury due to demolition Work.
3. Provide protective measures as required to provide free and safe passage of Owner's personnel and the general public to occupied portions of the structure.

3.03 BURNING

- A. The use of burning at the Site for the disposal of refuse and debris will not be permitted.

3.04 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Clean all items to be relocated prior to reinstallation to the satisfaction of Construction Manager. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by Design Engineer.

3.05 BACKFILL

- A. Do not use demolition debris as backfill material.
- B. Fill excavations, open basements, and other hazardous openings to existing ground level or foundation level of new construction in accordance with Section 31 23 23, Fill and Backfill.

3.06 DISPOSITION OF MATERIAL

- A. Do not remove equipment and materials without approval of Contractor's Demolition/Renovation Plan by Design Engineer.

3.07 CLEANUP

- A. Debris and rubbish shall be removed from basement and similar excavations. Debris and rubbish shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply.

END OF SECTION

SECTION 03 01 32
REPAIR OF VERTICAL AND OVERHEAD CONCRETE SURFACES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 301, Specifications for Structural Concrete.
 - b. 506.2, Specification for Shotcrete.
 2. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - g. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C293/C293M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading).
 - j. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - k. C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - l. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - m. C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
 - n. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

- o. C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
- p. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
- q. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
- r. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
- s. D4259, Standard Practice for Abrading Concrete.
- t. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and steel reinforcement. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting: Sometimes referred to as hydro-demolition. Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.
- E. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.
- F. Rebound: Shotcrete material, mostly aggregates, that bounce off a surface against which shotcrete was projected.
- G. Shotcrete: Mortar pumped through hose and projected at high velocity.

1.03 OWNER PERFORMED CONCRETE TESTS

- A. Portions of specified Concrete Tests will be performed by the Owner and listed in Section 01 31 13, Project Coordination. All other tests specified herein but not listed in Section 01 31 13, Project Coordination shall be the responsibility of the Contractor.

1.04 SUBMITTALS

A. Action Submittals:

1. Product data sheets for each material supplied.
2. Drawings supplemented by photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location.

B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Mesh manufacturer's installation instructions and allowable load criteria.
3. Written description of equipment proposed for concrete removal and surface preparation.
4. Certificates:
 - a. Shotcrete Nozzleman: Current ACI Certification for each nozzleman.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces and final exposure conditions.
 - c. Mortar Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Repair mortar system manufacturer's representative.
 - c. Independent testing laboratory.
6. Repair mortar system manufacturer's proposed modified test procedures for ASTM C109/C109M, ASTM C882/C882M, and ASTM C157/C157M test methods.
7. Field and laboratory test reports.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator:
 - a. For Repair System A – Shotcrete Mortar, trained and experienced applicator recognized or certified by repair mortar system manufacturer.
 - b. For Repair System B – Low-Pressure Spray Mortar, in lieu of recognition or certification, demonstrate application of repair mortar manufacturer’s system and obtain Certification of Proper Installation, in accordance with Article Manufacturer’s Services.
2. Repair Mortar System Manufacturer’s Representative: Knowledgeable and experienced on technical data and application requirements for specified products.

B. Independent Testing Laboratory: Meet criteria stated in ASTM E699.

C. Demonstration Mockup for Repair System A – Shotcrete Mortar and Repair System B – Low-Pressure Spray Mortar Repair System:

1. For each noted type of repair mortar system to be used, prepare one demonstration mockup in each vertical and overhead orientation of at least 10 feet by 10 feet with average thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in each vertical and overhead orientation that is representative of areas to be repaired in terms of size, thickness, and reinforcement, may be used for demonstration in lieu of mockups; subject to acceptance by Design Engineer. Repair Mortar System Manufacturer’s Demonstration:
 - a. Schedule time for manufacturer’s demonstration of repair system proposed for Project.
 - b. Prepare mortar to specified consistency for testing and placement.
 - c. Cure portions of each type of surface to be repaired using manufacturer approved curing procedure and materials, including overhead and vertical applications.
 - d. Prepare surface area in advance of demonstration and obtain manufacturer’s acceptance of preparation for each type of application.
 - e. Demonstrate the following:
 - 1) Mixing and application equipment capabilities and procedures, including flow of material from nozzle or sprayer.

- 2) Nozzle operator and person in charge of low-pressure sprayer capabilities and ability to follow prescribed application procedures and properly operate equipment and apply surface repair materials.
- f. Compression Strength Test: Take core samples from demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
- g. Tensile Bond Test: Test in situ or take a core of demonstration placement and test as specified herein below for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

D. Where Required by Design Engineer:

1. Demonstration Mockup for Repair System C – Polymer Modified Repair Mortar System:

- a. Prepare one demonstration mockup in each vertical and overhead orientation of average size and thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in each vertical and overhead orientation that is representative of areas to be repaired in terms of size, thickness, and reinforcement, may be used for demonstration in lieu of mockups; subject to acceptance by Design Engineer.
Repair Mortar System Manufacturer's Demonstration:
 - 1) Schedule time for manufacturer's demonstration of repair system proposed for Project.
 - 2) Prepare mortar to specified consistency.
 - 3) Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
 - 4) Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
 - 5) Demonstrate mixing and application procedures.
 - 6) Compression Strength Test: Take core samples from demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - 7) Tensile Bond Test: Test in situ or take a core of demonstration placement and test for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

- E. Pre-repair Conference:
1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Design Engineer.
 - e. Construction Manager.
 2. Schedule and conduct prior to conducting mockups and incorporation of respective products into Project. Notify Construction Manager of location and time.
 3. Agenda shall include, but not limited to:
 - a. Review of field conditions. Conduct field observations of Work to be performed.
 - b. Based on above observations, repair material manufacturer's technical representative shall confirm material selection and make Project-specific repair method recommendations.
 - c. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - d. Other specified requirements requiring coordination.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 REPAIR SYSTEM A – SHOTCRETE MORTAR

- A. Mortar Materials:
 1. Blend of selected portland cements, microsilica, and specially graded aggregates and fibers applicable for vertical and overhead surfaces.
 2. Materials shall not contain asbestos, chlorides, nitrates, added gypsum, added lime, or high aluminum cements, or other hazardous materials.
 3. Noncombustible before and after cure.
 4. Furnish in factory proportioned unit.
 5. Workability from 1/4 inch in depth and greater.

B. Mixed Mortar Properties:

1. Working Time: 5 minutes to 10 minutes.
2. Finishing Time: 10 minutes to 20 minutes.
3. Color: Dark gray.

C. Cured Mortar Properties:

1. Compressive strength for 2-inch cubes in accordance with ASTM C109/C109M, or 3-inch cubes in accordance with manufacturer's modification to ASTM C109/C109M:
 - a. 7 Days: 6,000 psi minimum.
 - b. 28 Days: 7,000 psi minimum.
2. Flexural Strength (Modulus of Rupture), ASTM C78/C78M or ASTM C348 (Modified) at 28 Days: 1,100 psi minimum.
3. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 400 psi minimum.
4. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 800 coulombs maximum.

D. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco S 211SP.
2. Sika Corp., Lyndhurst, NJ; SIKACEM 103F.
3. Euclid Chemical Co., Cleveland, OH; Eucoshot F Eucoshot with Tuf-Strand SF added per manufacturer's recommendations.
4. Or approved equal.

2.02 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR

- A. One- or two-component, cement based, fiber reinforced, shrinkage compensated, gray in color, with a minimum 30-minute working time.
- B. Cured materials mixed in accordance with manufacturer's instructions shall meet the following criteria:

1. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 psi minimum.
2. Flexural Strength, ASTM C348 at 28 Days: 1,100 psi minimum.
3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent at 28 Days: 3,000 psi minimum.
4. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.

5. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
6. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,000 coulombs maximum.
7. Free of chlorides and other chemicals causing corrosion to reinforcing.

C. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco S 488CI.
2. Sika Corp., Lyndhurst, NJ; SikaRepair 224.
3. Euclid Chemical Co., Cleveland, OH; Tamms Structural Mortar.
4. Or approved equal.

2.03 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR

- A. Polymer-modified, one- or two-component, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface repair mortar.

B. Cured Mortar Properties:

1. Compressive Strength, ASTM C109/C109M at 28 Days: 7,000 psi minimum.
2. Flexural Strength, ASTM C348 at 28 Days: 1,200 psi minimum.
3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent at 28 Days: 2,000 psi minimum.
4. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
5. Drying Shrinkage, ASTM C596 at 28 Days: 0.12 percent maximum. Not required for small repair areas approximately 1 square foot in area or less.
6. Freeze Thaw Resistance, ASTM C666/C666M, at 300 Cycles: 90 percent RDM.
7. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 800 coulombs maximum for liquid holding and below-grade repairs.

C. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco N 300CI.
2. Sika Corp., Lyndhurst, NJ; SikaTop 123 PLUS.
3. Euclid Chemical Co., Cleveland, OH; DuralTop Gel.
4. Or approved equal.

2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.05 REINFORCEMENT

- A. Deformed Steel Reinforcement: Per Section 03 21 00, Steel Reinforcement.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A185/A185M, wire 75 ksi minimum tensile strength per ASTM A82/A82M, and repair mortar system manufacturer's recommendations.
- C. Tie Wire: 16-gauge, galvanized.
- D. Mesh Anchors:
 - 1. Manufacturers and Products:
 - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
 - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDCA, 1/4-inch ceiling hanger.
 - c. Or approved equal.

2.06 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
 - 1. Mixed Bonding Agent Properties:
 - a. Pot Life: 75 minutes to 105 minutes.
 - b. Contact Time: 24 hours.
 - c. Color: Concrete gray.
 - 2. Cured Cementitious Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
 - b. Flexural Strength, ASTM C348: 1,000 psi minimum.
 - c. Slant Shear Bond Strength, ASTM C882/C882M at 14 Days:
 - 1) 2-Hour Open Time: 2,500 psi minimum.
 - 2) 24-Hour Open Time: 2,000 psi minimum.
 - 3. Compatible with and from same manufacturer as the approved repair system used.

B. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco P 124.
2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
3. Euclid Chemical Co., Cleveland, OH; Dural Prep AC.
4. Or approved equal.

2.07 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.08 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 EXECUTION**3.01 GENERAL**

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system. Refer to Section 03 30 00, Cast-in-Place Concrete.

3.02 APPLICATION**A. General:**

1. Repair System A: Large areas and number of repair areas.
2. Repair System B: Medium to large areas and number of repair areas.
3. Repair System C: Small and limited areas and number of repair areas.
4. Repair System D: Small and limited areas and number of repair areas.

3.03 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Design Engineer, and review proposed extent of repair with Design Engineer.
- B. Remove unsound, honeycombed, deteriorated, or otherwise defective areas of concrete from work areas.
1. Use 8,000 psi minimum high-pressure water blasting machine as required for Site conditions.
 2. Remove concrete to create abraded substrate concrete surfaces with a minimum amplitude roughness of 3/16 inch measured between high and

- low points with a 3-foot-long straightedge, in accordance with ASTM D4259.
3. Where final surface is required to be flush with adjacent surface remove concrete to depth as required for application of minimum thickness of repair mortar.
- C. Do not use power-driven jackhammers, chipping hammers, or scabblers unless water blasting is not permitted or practical because of Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
- D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
- E. Remove unsound concrete to satisfaction of Design Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or featheredges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water blasting or abrasive blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.
 2. 25 percent or more of circumference around steel reinforcement is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
 3. Evidence exists that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by Design Engineer.
- H. Clean exposed steel reinforcement of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
- I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminates from prepared areas.

- J. Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar as required by and in accordance with repair mortar manufacturer's printed instructions.
- K. Collect and dispose of spent water and concrete debris from removal operations offsite.

3.04 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing reinforcement is not exposed, and when mortar application is more than 3 inches deep.
- B. Replace deteriorated steel reinforcement with new steel reinforcement equivalent in cross-sectional area to original steel reinforcement.
- C. Install mesh anchors in accordance with mesh manufacturer's instructions.
- D. Fasten steel reinforcement to mesh anchors with tie wire to prevent from moving during placement of repair mortar.
- E. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- F. Coat exposed new and existing steel reinforcement and reinforcement mesh with cementitious reinforcement coating at same time as substrate concrete is coated, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions.

3.05 PROTECTION

- A. If cementitious coating or bonding agent is used, protect adjacent surfaces from over-application. Promptly remove bonding agent applied beyond repair area.
- B. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, as applicable for repair mortar system used, from shotcrete mortar or low-pressure spray mortar.

3.06 REPAIR SYSTEM A – SHOTCRETE MORTAR PLACEMENT

- A. Apply shotcrete mortar in accordance with manufacturer's instructions.
- B. Do not reuse rebound materials.

- C. Apply mortar using dry mix process, in accordance with ACI 506.2.
- D. Shotcrete mortar shall emerge from nozzle in a steady, uninterrupted flow. If flow becomes intermittent, direct flow away from the Work until flow of mortar becomes constant.
- E. Applied Shotcrete Mortar: Minimum thickness of 1-1/2 inches to 2 inches of cover over existing reinforcement, or to level of surrounding concrete surface, whichever results in thicker coat.
- F. Nozzle Position: Hold nozzle approximately at right angles to and at a distance from surface in accordance with shotcrete repair mortar system manufacturer's instructions for type of application, nozzle, and air pressure used.
- G. Steel Reinforcement Encasement:
 - 1. Modify procedure of shooting shotcrete mortar to better direct material around reinforcement bars.
 - 2. Prevent shotcrete mortar from building up on reinforcement steel when shooting on, around, through, and behind steel to eliminate voids in repair area.
 - 3. Provide dense void-free encasement of reinforcement steel.
- H. Shotcreting More than One Layer: In accordance with shotcrete repair mortar system manufacturer's printed instructions.
- I. Slice off excess material with a wire screed approximately 5 minutes to 10 minutes after initial set.
- J. Apply finish to exposed shotcrete mortar surface to match existing surface natural gun finish and in accordance with manufacturer's instructions.
- K. Rebound Removal: Continuously throughout shotcrete mortar application, remove rebound, sand, and miscellaneous debris, and dispose offsite at an approved disposal facility.
- L. Cure as specified in Article Curing.

3.07 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR PLACEMENT

- A. Mix mortar in accordance with manufacturer's printed instructions.

- B. After priming prepared substrate concrete surface per manufacturer's recommendations, apply mortar by low-pressure spraying equipment or per approved application procedure.
- C. Bonding Agent:
 - 1. Use bonding agent when required by manufacture for hand applied areas, in accordance with repair mortar manufacturer's instructions.
 - 2. Application of repair mortar over bonding agent shall be completed within time frame recommended by bonding agent manufacturer.
- D. Work mortar into repair area.
- E. Finish repair mortar to match adjacent concrete surface in measurements and appearance.
- F. Provide evaporation retardant at full strength.
- G. Cure as specified in Article Curing.

3.08 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR PLACEMENT

- A. Mix mortar in accordance with manufacturer's printed instructions.
- B. Bond Coat: Apply to prepared substrate concrete surface before application of mortar in accordance with repair mortar manufacturer's printed instructions. Do not apply more bond coat than can be covered with mortar before bond coat dries. Do not retemper bond coat.
- C. Place mortar by hand or low-pressure spray and trowel surface in accordance with requirements of repair material's printed instructions.
- D. Finish repair mortar to match adjacent concrete surface in measurements and appearance.
- E. Cure as specified in Article Curing, and in accordance with manufacturer's printed instructions.

3.09 CURING

- A. Prior to final curing, apply water fog to repair mortar system in accordance with repair mortar system manufacturer's printed instructions.
- B. Cure in accordance with repair mortar manufacturer's printed instructions.

- C. Where permitted by repair mortar manufacturer's printed instructions, commence water curing after repair mortar system application and when curing will not cause erosion of mortar.
- D. Continuously water fog cure repair mortar system for a period of 7 days.
- E. Do not cure using curing compound or membrane, unless method is part of repair mortar system manufacturer's printed instructions and prior approval is obtained from Design Engineer.
- F. Cure intermediate layers of repair mortar in accordance with repair mortar manufacturer's printed instructions.
- G. Where curing compound is permitted by repair mortar system manufacturer, apply curing compound in accordance with Section 03 39 00, Concrete Curing.

3.10 FIELD QUALITY CONTROL

- A. Sounding for Hollow Areas:
 - 1. Light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
 - 2. Mark hollow areas for removal and replacement.
- B. Compression Strength Test:
 - 1. Test in accordance with ASTM C109/C109M, except modify by making samples using repair mortar.
 - 2. Obtain production test samples of mixed wet mortar materials from nozzle, or mixer, during construction application for compliance with Specifications for testing at 7 days and 28 days. Alternatively, take core samples in accordance with ASTM C42/C42M from applied mortar material for testing at 7 days and 28 days where approved by Construction Manager.
 - 3. Provide a minimum of three samples for each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing.
 - 4. Record location, date, and time where repair mortar is being applied at time production samples are obtained.

C. Direct Tension Bond Test:

1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M, where required by Construction Manager.
2. Record locations, date, and time of sampling on in situ bond tests on each type of applied repair mortar.
3. Laboratory Bond Testing, where required by Construction Manager:
 - a. Core two 2-1/2-inch or 3-inch-diameter core drilled samples per ASTM C42/C42M for each 2,000 square feet of repair work for direct tension bond testing. Where total area repaired is less than 2,000 square feet, core two 2-1/2-inch or 3-inch diameter samples for direct tension bond testing. Record locations, date, and time of core drilled samples extracted from each type of applied repair mortar.
 - b. Cut core samples through cured mortar repair and into base concrete to total depth equal to at least 2.5 times repair mortar thickness. Avoid core drilling through reinforcing.
 - c. Saw cut core samples after removal to trim concrete thickness to same thickness as mortar so bond line is at center of prepared core sample.
 - d. Bond core samples to steel plates at each end using epoxy bonding agent.
 - e. Perform tension bond testing using calibrated independent test laboratory equipment and eyebolts or threaded connectors tapped and threaded into baseplate in order that tension load is concentric with center of core sample.
 - f. Bond Strength of Repair Mortar to Concrete: 300 psi minimum in direct tension without failure or movement.

D. Testing laboratory retained by Contractor shall provide the following:

1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of prepared mortar shall be obtained from each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days and 28 days. Alternatively, take core samples in accordance with ASTM C42/C42M from applied mortar material for testing at 7 days and 28 days, where approved by Construction Manager.
 - c. Record location, date, and time where repair mortar is being applied at time production samples are obtained.

2. Direct Tension Bond Test:
 - a. Two core samples shall be obtained and tested for each 2,000 square feet of repair work, where required by Construction Manager.
 - b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
 - c. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.
 - d. Record locations of bond tests on each type of applied repair mortar tested.
- E. Retest mortar repairs that do not meet test requirements in a method approved by Construction Manager.
- F. Repair and fill holes using same repair mortar and system where core samples have been removed.

3.11 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work as specified.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas of the repair areas to a new square edge. Remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified.
- C. Failed Compression Strength Test: Remove repair mortar areas that correspond with failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified.
- D. Failed Bond Tests: Remove repair mortar areas that correspond with failed bond test results. Prepare substrate surface and reapply repair mortar as specified.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified.

3.12 MANUFACTURER'S SERVICES

- A. Provide repair mortar system manufacturer's representative at Site to review acceptability of surface preparation and mixing and to provide installation assistance, training of repair mortar system applicators, inspection, and Certification of Proper Installation.

3.13 CLEANING

- A. Remove overshot shotcrete, rebound materials, and mortar outside of repaired surfaces as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or on repair areas for finishing and curing. Dispose offsite at an approved disposal site.

END OF SECTION

SECTION 03 01 33
REPAIR OF HORIZONTAL CONCRETE SURFACES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): T277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
 2. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - g. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - j. C469, Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
 - k. C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - l. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
 - m. C779/C779M, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - n. C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

- o. C928/C928M, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.
 - p. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - q. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
 - r. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
 - s. D638, Standard Test Method for Tensile Properties of Plastics.
 - t. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - u. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - v. D4259, Standard Practice for Abrading Concrete.
 - w. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
3. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40: 52.254, Approval and Promulgation of Implementation Plans.

1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and steel reinforcement. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting (sometimes referred to as hydro-demolition): Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.

1.03 OWNER PERFORMED CONCRETE TESTS

- A. Portions of specified Concrete Tests will be performed by the Owner and listed in Section 01 31 13, Project Coordination. All other tests specified herein but not listed in Section 01 31 13, Project Coordination shall be the responsibility of the Contractor.

1.04 SUBMITTALS

A. Action Submittals:

1. Product data sheets for each material supplied.
2. Drawings supplemented by photographs indicating location, size, estimated quantity, and proposed repair mortar system for each repair location.

B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Written description of equipment proposed for concrete removal and surface preparation.
3. Certificates:
 - a. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements, that repair mortar systems meet requirements of ASTM C928/C928M.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on horizontal surfaces for final exposure conditions, and receive traffic.
 - c. Mortar Manufacturer's Certificate of Proper Installation.
 - d. Confirmation epoxy resin bonding agents conform to ASTM C882/C882M.
4. Statements of Qualification:
 - a. Repair mortar system applicator.
 - b. Independent Testing Laboratory.
5. Field and laboratory test results.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator: Trained and experienced applicator endorsed by repair mortar system manufacturer.

2. Repair Mortar System Manufacturer's Representative: Knowledgeable and experienced on technical data and application requirements for specified products.
- B. Independent Testing Laboratory: Meet criteria stated in ASTM E699.
- C. Prerepair Conference:
1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Design Engineer.
 - e. Construction Manager.
 2. Schedule and conduct prior to incorporation of respective products into Project. Notify Construction Manager of location and time.
 3. Agenda shall include, but not limited to:
 - a. Review of field conditions. Conduct field observations of the Work to be performed.
 - b. Based on above observations, repair material manufacturer's technical representative shall confirm material selection and make Project-specific repair method recommendations.
 - c. Technical representative for repair material manufacturer shall review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - d. Other specified requirements requiring coordination.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

PART 2 PRODUCTS

2.01 REPAIR MORTAR SYSTEM NO. 1—MAGNESIUM PHOSPHATE REPAIR MORTAR

- A. One or two-component, magnesium-ammonium-phosphate concrete mortar.

- B. Compressive Strength, ASTM C109/C109M modified:
 - 1. 1 Hour: 2,000 psi minimum.
 - 2. 3 Hours: 5,000 psi minimum.
 - 3. 1 Day: 6,000 psi minimum.
 - 4. 28 Days: 7,500 psi minimum.
- C. Flexural Strength, ASTM C78/C78M Modified (3-inch by 4-inch by 16-inch prism) at 1 Day: 550 psi minimum.
- D. Modulus of Elasticity, ASTM C469 at 7 Days: 4.18 by 10⁶ psi minimum.
- E. Freeze-thaw Resistance and Resistance to Deicing Chemicals, ASTM C666/C666M, Procedure A, at 300 Cycles: 80 percent RDM minimum.
- F. Sulfate Resistance, ASTM C1012/C1012M, Length Change after 52 Weeks: 0.09 percent maximum.
- G. Application Temperature Range: 20 degrees F to 85 degrees F for normal weather applications 85 degrees F to 100 degrees F for hot weather applications.
- H. Manufacturers and Products:
 - 1. BASF Construction Chemicals, LLC - Building System, Shakopee, MN; MasterEmaco T 545 or T 545HT.
 - 2. Euclid Chemical Co., Cleveland, OH; Eucospeed MP Eucospeed MP Hot Weather.
 - 3. Or approved equal.

2.02 REPAIR MORTAR SYSTEM NO. 2—HIGH EARLY STRENGTH REPAIR MORTAR

- A. One or two-component, fast-setting, high early strength repair mortar.
- B. Compressive Strength, ASTM C109/C109M:
 - 1. 2 Hours: 1,500 psi minimum.
 - 2. 1 Day: 4,500 psi minimum.
 - 3. 7 Days: 8,000 psi minimum.
 - 4. 28 Days: 9,000 psi minimum.

- C. Flexural Strength, ASTM C348:
 - 1. 1 Day: 850 psi minimum.
 - 2. 7 Days: 1,000 psi minimum.
 - 3. 28 Days: 1,100 psi minimum.
 - D. Modulus of Elasticity, ASTM C469:
 - 1. 1 Day: 3.8 by 10⁶ psi minimum.
 - 2. 28 Days: 4.5 by 10⁶ psi minimum.
 - E. Slant Shear Bond Strength, ASTM C882/C882M (Modified):
 - 1. 1 Day: 2,500 psi minimum.
 - 2. 7 Days: 2,900 psi minimum.
 - 3. 28 Days: 3,100 psi minimum.
 - F. Splitting Tensile Strength, ASTM C496/C496M:
 - 1. 1 Day: 850 psi minimum.
 - 2. 7 Days: 1,200 psi minimum.
 - 3. 28 Days: 1,300 psi minimum.
 - G. Freeze-thaw Resistance, ASTM C666/C666M, Procedure A, at 300 Cycles:
98 percent RDM.
 - H. Chloride Ion Permeability Based on Charge Passed, ASTM C1202 or
AASHTO T277, 28 Days: 960 coulombs maximum.
 - I. Manufacturers and Products:
 - 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee,
MN; MasterEmaco T 415.
 - 2. Euclid Chemical Co., Cleveland, OH; VersaSpeed.
 - 3. Or approved equal.
- 2.03 REPAIR MORTAR SYSTEM NO. 3—SHRINKAGE COMPENSATED REPAIR
MORTAR
- A. One or two-component cement-based, flowable, shrinkage compensated repair
mortar system.
 - B. Compressive Strength, ASTM C109/C109M:
 - 1. 1 Day: 2,500 psi minimum.
 - 2. 7 Days: 6,000 psi minimum.

3. 28 Days: 8,000 psi minimum.
 - C. Flexural Strength, ASTM C348 at 28 Days: 770 psi minimum.
 - D. Modulus of Elasticity, ASTM C469 at 28 Days: 5.9 by 10⁶ psi minimum.
 - E. Slant Shear Bond Strength, ASTM C882/C882M Modified:
 1. 7 Days: 2,150 psi minimum.
 2. 28 Days: 3,000 psi minimum.
 - F. Freeze-thaw Resistance, ASTM C666/C666M, Procedure A, at 300 Cycles: 97.0 percent RDM.
 - G. Chloride Ion Permeability Based on Charge Passed, ASTM C1202 at 28 Days: 650 coulombs maximum.
 - H. Sulfate Resistance, ASTM C1012/C1012M after 6 Months: 0.01 percent length change maximum.
 - I. Manufacturers and Products:
 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco S 466 CI.
 2. Euclid Chemical Co., Cleveland, OH; Eucocrete Supreme.
 3. Or approved equal.
- 2.04 REPAIR MORTAR SYSTEM NO. 4—METALLIC AGGREGATE REPAIR MORTAR
- A. One or two-component cement-based, flowable, metallic-aggregate repair mortar system.
 - B. Compressive Strength, ASTM C109/C109M:
 1. 1 Day: 5,000 psi minimum.
 2. 7 Days: 8,800 psi minimum.
 3. 28 Days: 12,000 psi minimum.
 - C. Abrasion Resistance, ASTM C779/C779M, Procedure A: Eight times more wear resistance than plain concrete, 0.017 inch maximum.
 - D. Density: 215 pounds per cubic foot.

E. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; Master T 300.
2. Euclid Chemical Co. (The), Cleveland, OH; Super Euco-Top.
3. Or approved equal.

2.05 REPAIR MORTAR SYSTEM NO. 5—POLYMER MODIFIED REPAIR
MORTAR

A. One or two-component, fast-setting, polymer modified cementitious based repair mortar system.

B. Compressive Strength, ASTM C109/C109M:

1. 1 Day: 2,500 psi minimum.
2. 7 Days: 5,000 psi minimum.
3. 28 Days: 7,000 psi minimum.

C. Flexural Strength, ASTM C348 at 28 Days: 1,500 psi minimum.

D. Slant Shear Bond Strength, ASTM C882/C882M Modified at 28 Days:
2,000 psi minimum.E. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi
minimum.F. Abrasion Resistance Depth of Wear, ASTM C779/C779M, Procedure A, at
60 Minutes: 0.033 inch maximum.G. Drying Shrinkage, ASTM C157/C157M Modified, at 28 Days: 0.09 percent
maximum.H. Rapid Chloride Ion Permeability Based on Charge Passed, ASTM C1202 at
28 Days: Under 850 coulombs maximum.

I. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco T 310 CI.
2. Euclid Chemical Co., Cleveland, OH; Duraltop Flowable Mortar.
3. Sika Corp., Lyndhurst, NJ; SikaTop111 and 122PLUS.
4. Or approved equal.

2.06 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.07 REINFORCEMENT

- A. Deformed Steel Reinforcement: Per Section 03 21 00, Steel Reinforcement.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A185/A185M, wire 75 ksi minimum tensile strength per ASTM A82/A82M, and repair mortar system manufacturer's recommendations.
- C. Tie Wire: 16-gauge, galvanized.
- D. Mesh Anchors:
 - 1. Manufacturers and Products:
 - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
 - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDC, 1/4-inch ceiling hanger.
 - c. Or approved equal.

2.08 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
 - 1. Mixed Bonding Agent Properties:
 - a. Pot Life: 75 minutes to 105 minutes.
 - b. Contact Time: 24 hours.
 - c. Color: Concrete gray.
 - 2. Cured Cementitious Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.
 - b. Flexural Strength, ASTM C348: 1,000 psi minimum.
 - c. Slant Shear Bond Strength, ASTM C882/C882M:
 - 1) 2-Hour Open Time: 2,500 psi minimum.
 - 2) 24-Hour Open Time: 2,000 psi minimum.
 - 3. Compatible with, and from same manufacturer as the approved repair mortar system used.

B. Manufacturers and Products:

1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco P 124.
2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
3. Euclid Chemical Co., Cleveland, OH; Dural Prep AC.
4. Or approved equal.

2.09 EPOXY BONDING AGENT

- A. Two-component, moisture insensitive, 100 percent solids epoxy resin.
- B. Tensile Strength, ASTM D638, at 14 Days: 3,800 psi minimum.
- C. Elongation at Break, ASTM D638: 1.49 percent minimum.
- D. Compressive Strength, ASTM D695, at 28 Days for Application Temperature of 73 Degrees F to 77 Degrees F: 8,000 psi minimum.
- E. Bond Strength, ASTM C882/C882M, at 14 Days: 1,800 psi minimum.
- F. Pot Life, at 73 Degrees F to 77 Degrees F: 75 minutes minimum.
- G. Manufacturers and Products:
 1. BASF Construction Chemicals, LLC - Building Systems, Shakopee, MN; MasterEmaco ADH 326 when ambient temperature is 73 degrees F or higher.
 2. Sika Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod LPL.

2.10 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.11 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 EXECUTION**3.01 GENERAL**

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system.

3.02 APPLICATION

A. General:

1. Repair Mortar System No. 1: Patches, joints, and overlays 1/2 inch to 3 inches thick. Return to service in 1 hour.
2. Repair Mortar System No. 2: Patches, joints, or overlays 1/2 inch to 3 inches thick. Return to service in 3 hours to 7 days.
3. Repair Mortar System No. 3: Patches, joints, or overlays 1 inch thick or greater. Return to service in 7 days or more.
4. Repair Mortar System No. 4: Heavy-duty joints or overlays 2 inches thick or greater. Return to service in 7 days or more. Not allowed in submerged condition.
5. Repair Mortar System No. 5:
 - a. Patches and Overlays: 1/4 inch to 3 inches thick.
 - b. Return to service for foot traffic in 4 hours; wheel traffic in 7 days.
 - c. Working Time: 30 minutes at 70 degrees F.
 - d. Application Temperature Range: 45 degrees F to 90 degrees F.

3.03 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Design Engineer. Review proposed extent of repair with Design Engineer.
- B. Remove unsound, deteriorated, or otherwise defective areas of concrete from Work areas.
 1. Use 8,000 psi minimum high-pressure water abrasive blasting machine, as appropriate to suit Site conditions.
 2. Remove concrete to create abraded substrate concrete surface with a minimum amplitude roughness of 3/16 inch measured between high and low points with a 3-foot-long straightedge, in accordance with ASTM D4259.
 3. Where final surface is required to be flush with adjacent surface, remove to concrete depth as required for application of minimum thickness of repair mortar.

- C. Do not use power-driven jackhammers, chipping hammers, scabblers, or scarifiers unless water blasting is not permitted or practical because of Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
- D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
- E. Remove unsound concrete to satisfaction of Design Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or featheredges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water blasting or abrasive blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to entire circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
 - 1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.
 - 2. 25 percent or more of circumference around steel reinforcement is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
 - 3. Evidence exists that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by Design Engineer.
- H. Clean exposed steel reinforcement of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
- I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.
- J. Preparation of Substrate Concrete Surface in Areas to Receive Repair Mortar System Nos. 1, 2, 3, and 5: Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar, as required by and in accordance with repair mortar manufacturer's printed instructions.

- K. Preparation of Substrate Concrete Surface in Areas to Receive Repair Mortar System No. 4 Repair Mortar: Dry, in accordance with material manufacturer's printed instructions.
- L. Spalled Joints:
 - 1. Saw cut edge 1 inch deep and 6 inches back from joint edge.
 - 2. Remove unsound concrete and concrete between saw cut and joint.
 - 3. Place wood or fiber spacer to thickness of joint at joint line.
- M. Overlays:
 - 1. Square cut edges to a minimum of 1/4 inch deep.
 - 2. Do not feather edge area.
 - 3. Perform special preparation recommended by mortar manufacturer.
- N. Collect and dispose of spent water and concrete debris from removal operations offsite.

3.04 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing steel reinforcement is not exposed and when mortar application is more than 4 inches deep.
- B. Replace deteriorated steel reinforcement with new steel reinforcement equivalent in cross-sectional area to original steel reinforcement.
- C. Install mesh anchors in accordance with mesh manufacturer's instructions.
- D. Fasten steel reinforcement to chairs or mesh anchors with tie wire to prevent from moving during placement of repair mortar.
- E. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to steel reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- F. Coat exposed new and existing steel reinforcement with cementitious reinforcement coating at the same time as substrate concrete is coated, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions.

3.05 PROTECTION

- A. If cementitious coating or bonding agent is used, protect adjacent surfaces from over-application. Promptly remove bonding agent applied beyond repair area.
- B. Protect adjacent surfaces and equipment from spillage of repair mortar and dust, as applicable for repair mortar system used.

3.06 PLACEMENT

- A. Repair Mortar System Nos. 1, 2, 3, and 5:
 - 1. Remove standing and free water from prepared area.
 - 2. Apply bond scrub coat of mortar to prepared surface in accordance with manufacturer's instructions. Do not apply more scrub coat of mortar than can be covered with repair mortar before scrub coat begins drying.
 - 3. Immediately place mixed repair mortar into prepared area from one side to the other side.
 - 4. Work material firmly into bottom and sides of patch to ensure a good continuous bond.
 - 5. Level repair mortar and screed to elevation of existing concrete.
 - 6. Finish to same texture as existing concrete around patch.
 - 7. Repair Mortar System No. 5: Screed or use self-leveling mixture to obtain a uniform and plane surface.
- B. Repair Mortar System No. 4:
 - 1. Remove free water from prepared area.
 - 2. Apply bonding agent to prepared surface in accordance with manufacturer's instructions. Do not apply more bonding agent than can be covered with mortar before bonding agent cures past tacky to the touch.
 - 3. Immediately place mixed repair mortar into prepared area from one side to the other side.
 - 4. Work material firmly into bottom and sides of patch to ensure a good continuous bond.
 - 5. Level repair mortar and screed to elevation of existing concrete.
 - 6. Finish to same texture as existing concrete around patch.

C. Joint Repair:

1. Remove joint spacer when repair mortar is hard enough that a pointed trowel will penetrate surface less than 1/2 inch.
2. When repair mortar is cured and ready for use, fill joint in accordance with repair mortar system manufacturer's instructions.

3.07 FINISHING

- A. Spray full strength evaporation retardant on fresh repair mortar to prevent rapid drying during hot and windy weather.

3.08 CURING

A. Repair Mortar System No. 1:

1. No curing is required.
2. Protect from rain immediately after placing.
3. Liquid-membrane curing compounds or plastic sheeting may be used in accordance with repair mortar manufacturer's instructions to protect the surface from precipitation.
4. Never wet cure.

- B. Repair Mortar System Nos. 2, 3, 4, or 5: Apply curing compound in accordance with Section 03 39 00, Concrete Curing.

3.09 FIELD QUALITY CONTROL

A. Sounding for Hollow Areas:

1. Chain drag or light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
2. Mark hollow areas for removal and replacement.

B. Compression Strength Test:

1. Test in accordance with ASTM C109/C109M, except modify by making samples using repair mortar.
2. Obtain production test samples of mixed materials from mixer during construction application for compliance with Specifications.
3. Provide minimum of three samples for each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater for testing.

4. Record location, date, and time where repair mortar is being applied at time production samples are obtained.

C. Direct Tension Bond Test:

1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M, where required by Construction Manager.
2. Record locations, date, and time on in-situ bond tests on each type of applied repair mortar.
3. Laboratory Bond Testing, where required by Construction Manager:
 - a. Core two 2-1/2-inch or 3-inch diameter core drilled samples per ASTM C42/C42M for each 2,000 square feet of repair work for direct tension bond testing. Where total area repaired is less than 2,000 square feet, core two 2-1/2-inch or 3-inch diameter samples for direct tension bond testing. Record locations, date, and time of core drilled samples extracted from each type of applied repair mortar.
 - b. Cut core samples through cured mortar repair and into base concrete to total depth equal to at least 2.5 times repair mortar thickness.
 - c. Saw cut core samples after removal to trim concrete thickness to same thickness as mortar so bond line is at center of prepared core sample.
 - d. Bond core samples to steel plates at each end using epoxy bonding agent.
 - e. Perform tension bond testing using calibrated independent test laboratory equipment and eyebolts or threaded connectors tapped and threaded into baseplate in order that tension load is concentric with the center of the core sample.
 - f. Bond Strength of Repair Mortar to Concrete: 300 psi minimum in direct tension without failure or movement.

D. Testing laboratory retained by Contractor shall provide the following:

1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of prepared mortar shall be obtained from each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days and 28 days. Alternatively, take core samples in accordance with ASTM C42/C42M from applied mortar material for testing at 7 days and 28 days. Record location, date, and time where repair mortar is being applied at time production samples are obtained, where approved by Construction Manager.

2. Direct Tension Bond Test:
 - a. Two core samples shall be obtained and tested for each 2,000 square feet of repair work, where required by Construction Manager.
 - b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
 - c. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.
 - d. Record locations of bond tests on each type of applied repair mortar tested.
- E. Retest mortar repairs that do not meet test requirements, in a method approved by Construction Manager.
- F. Repair and fill holes using same repair mortar and system where core samples have been removed.

3.10 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work as specified.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas of the repair areas to a new square edge, remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified.
- C. Failed Compression Strength Test: Remove repair mortar areas that correspond with failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified.
- D. Failed Bond Tests: Remove repair mortar areas that correspond with failed bond test results. Prepare substrate surface and reapply repair mortar as specified.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified.

3.11 MANUFACTURERS' SERVICES

- A. Provide mortar manufacturer's representative at Site to advise on product selection, review acceptability of surface preparation and mixing, and to provide installation assistance, inspection, and Certification of Proper Installation.

3.12 CLEANING

- A. Remove excess repair mortar materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or on repair areas for finishing and curing. Dispose offsite at approved disposal site.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 301, Specifications for Structural Concrete.
 - c. 318, Building Code Requirements for Structural Concrete and Commentary.

1.02 DEFINITIONS

- A. Architectural Concrete: See definition in Section 03 30 00, Cast-in-Place Concrete.
- B. Defective Areas: See definition in Section 03 30 00, Cast-in-Place Concrete.
- C. Exposed Concrete: See definition in Section 03 30 00, Cast-in-Place Concrete.

1.03 DESIGN REQUIREMENTS

- A. Design formwork in accordance with ACI 301 and ACI 318 to provide concrete finishes specified in Section 03 30 00, Cast-in-Place Concrete.
- B. When high-range water reducer (superplasticizer) is used in concrete mix, form design shall account for increased hydrostatic pressures.
- C. Joints in forms shall be watertight, meaning no seepage through forms during wet concreting.
- D. Limit panel deflection to 1/360th of each component span to achieve tolerances specified.
- E. Reservoir Wall Forms.
 1. All reservoir walls shall be formed based on the requirements of this Section and to the correct elevations and location shown on Drawings.

2. Pouring Openings:
 - a. Pouring of walls may be done only through pouring openings on one of the wall sides, and may not be pumped or poured from the top through the use of “elephant trunks” or tremies.
 - b. The horizontal centerline distance between such openings shall not exceed 96 inches nor shall the distance between the nearest opening and the bulkhead for the vertical joint exceed 36 inches.
 - c. The vertical centerline distance between horizontal rows of openings shall not exceed 96 inches.
 - d. The minimum pouring opening size shall be 18 inches by 18 inches.
 - e. The bottom of the lower openings shall be no more than 48 inches from the top of the wall-footing.
 - f. Under no circumstances shall forming be such that the drop of concrete in the forms will exceed 8 feet in any one place.
3. Blockouts: There shall be no blockouts or other types of wall-openings other than those shown on Drawings.
4. Bulkheads:
 - a. Bulkheads to form vertical wall joints shall be strong enough to withstand concrete pressures during pouring and vibrating, and shall be properly placed between the forms and against the waterstop to avoid mortar seepage.
 - b. Holes shall be provided in the bulkheads to permit passage of horizontal mild steel reinforcing where required by Drawings.
 - c. Unless these are specifically called for on Drawings, no chamfer strips shall be placed in the corners of vertical construction joints of reservoir walls.
5. Form Removal:
 - a. Forms may be removed as soon as the concrete has developed sufficient strength to prevent sagging, excess deflection, misalignment, spalling, cracking, breaking of edges and surfaces, and any other damage to the concrete.
 - b. Removal of wall and column forms shall not be started any sooner than 12 hours of accumulated time with the ambient air temperature above 50 degrees F after the completion of the wall or column pour, respectively.
6. Alignment and Tolerances:
 - a. Every precaution shall be taken to see that all forms are in the proper alignment, plumb, placed to correct radius, and that all form supports are secure and tight.
 - b. Form sills shall be used to contain or hold down neoprene pads and facilitate proper alignment of forms. The maximum permissible variation in the horizontal and vertical location of the waterstops, neoprene pads and seismic cables (if required) from where shown on Drawings is plus or minus a 1/4 inch.

- c. The maximum permissible variation in tank radius per Drawings, as measured from the center of the tank to the inside wall surface at the bottom, is plus or minus 3/8 inch.
 - d. The out-of-round maximum permissible variation is 3/4 inch in 50 feet, 3/8 inch in 10 feet, and 3/16 inch in 24 inches from the true curvature specified at any point on the wall.
 - e. The maximum permissible variation in the vertical alignment, from the bottom to the top of the wall, is plus or minus 3/8 inch.
 - f. The maximum permissible variation in the average wall thickness for poured walls shall not vary more than 1/8 inch either way. All transitions from plus to minus shall be gradual, even and smooth, and without abrupt changes in the surfaces.
 - g. The City shall inspect the above prior to closing up the forms and pouring the concrete.
7. Slipform: The use of slipform construction on liquid-retaining walls will not be permitted on any part of the tank.
 8. Gaps Between Wall and Wrapped Strand: The forming and bracing method shall be such the maximum allowable gap between the wrapped strand and core wall is 3/8-inch. This requirement takes precedence over any other specification.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Formwork drawings sealed by a licensed professional engineer, where required by state professional engineering regulations.
2. Product Data:
 - a. Form release agent.
 - b. Form ties.
 - c. Products to be used for sealing tie holes.
 - d. Rustification grooves and beveled edge corner strips.
3. Samples:
 - a. One each as follows:
 - 1) Form ties.

B. Informational Submittals: Statement of qualifications for formwork designer.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Formwork Designer: Where required by state professional civil or structural engineering regulations, formwork, falsework, and shoring design shall be designed by an engineer licensed in the state of Project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect form liners from damage during delivery, storage, and handling.
- B. Store form liners in accordance with manufacturer's written instructions.

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Wall Forms and Underside of Slabs and Beams:
 - 1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel in "new and undamaged" condition, of sufficient strength and surface smoothness to produce specified finish. Use plywood forms when using form liners. Plywood may be of lower finish grade when used in conjunction with form liners.
 - 2. Where steel forms or form liners are used, treat steel surfaces to prevent rusting using products approved for use on steel forms.
 - 3. Circular Structure:
 - a. Wall forms shall conform to circular shape of structure.
 - b. Straight panels may be substituted for circular forms provided panels do not exceed 2 feet in horizontal width and angular deflection is no greater than 3-1/2 degrees per joint.
- B. Column Forms:
 - 1. Rectangular Columns: As specified for walls.
 - 2. Circular Columns: Fabricated steel or fiber-reinforced plastic with bolted sections or spirally wound laminated fiber form. Internally treat with release agent for full height of column.
- C. Sandblasted Surface Forms: Medium density overlay plywood for flat concrete surfaces to be sandblasted.
- D. Painted Surface Forms: High-density overlay plywood for flat concrete surfaces to be painted.
- E. All Other Forms: Materials as specified for wall forms.

2.02 ACCESSORIES

A. Form Release Agent:

1. Material:
 - a. Shall not bond with, stain, or adversely affect concrete surfaces.
 - b. Shall not impair subsequent treatments of concrete surfaces when applied to forms or form liners.
 - c. Water based material formulated to reduce or eliminate surface imperfections.
 - d. Contain no mineral oil or organic solvents.
2. Manufacturers and Products: Not for surfaces exposed to potable water.
 - a. BASF, Shakopee, MN; MBT MasterFinish RL 211.
 - b. Cresset Chemical Company; Crete-Lease 20-VOC-Xtra.
 - c. Or approved equal.

B. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides preventing loss of paste or water between the two surfaces.

C. Form Snap-Ties:

1. Material: Stainless steel tie for form liner forms and steel tie for all other types of forms.
2. Spreader Inserts:
 - a. Conical or spherical type.
 - b. Design to maintain positive contact with forming material.
 - c. Furnish units that will leave no metal closer than 1.5 inches to concrete surface when forms, inserts, and tie ends are removed.
3. Wire ties not permitted.
4. Flat bar ties for panel forms; furnish plastic or rubber inserts with minimum 1.5-inch depth and sufficient dimensions to permit patching of tie hole.

D. Form Snap-Ties with Water Stop:

1. For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
 - a. Integral steel waterstop 0.103-inch thick and 0.625-inch diameter tightly and continuously welded to tie.
 - b. Neoprene waterstop 3/16-inch thick and 15/16-inch diameter whose center hole is one half diameter of tie, or molded plastic water stop of comparable size.
 - c. Orient waterstop perpendicular to tie and symmetrical about center of tie.

- d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
- E. Through-Bolts:
1. At Contractor's option, may be used as alternate to form snap-tie or form snap-tie with waterstop.
 2. Tapered minimum 1-inch diameter at smallest end.
 3. Plug for Through-Bolt Tie Holes:
 - a. Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length and diameter upon removal; forms watertight seal.
 - b. Manufacturers and Products:
 - 1) Dayton Superior, Miamisburg, OH; A58 Sure Plug.
 - 2) Greenstreak Group, Inc., St Louis, MO; X-Plug.
 - 3) Or approved equal.

PART 3 EXECUTION

3.01 FORM SURFACE PREPARATION

- A. Prior to coating surface, thoroughly clean form surfaces that will be in contact with concrete or that have been in contact with previously cast concrete, dirt, and other surface contaminants.
- B. Exposed Wood Forms in Contact with Concrete: Apply form release agent as recommended by manufacturer.
- C. Steel Forms: Apply form release agent as soon as they are cleaned to prevent rust on forms and discoloration of concrete due to rust.

3.02 ERECTION

- A. General: In accordance with ACI 301, unless otherwise specified.
- B. Beveled Edges (Chamfer):
 1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
 2. Where beveled edges on existing adjacent structures are other than 3/4 inch, obtain Design Engineer's approval of size prior to placement of beveled edge.
- C. Wall Forms:
 1. Do not reuse forms with damaged surfaces.
 2. Install form ties and joints in uninterrupted uniform pattern.

3. Inspect form surfaces prior to installation to ensure conformance with specified tolerances.

D. Curb, Sidewalk, and Driveway Forms:

1. Provide steel or wood forms.
2. Set forms to true lines and grades, and securely stake in position.

E. Form Tolerances:

1. Provide forms in accordance with ACI 117 and ACI 318, and the following tolerances for finishes specified:
 - a. See the Schedule of Concrete Finishes in Section 03 30 00, Cast-in-Place Concrete, for beam, column, and wall types related to required form tolerances.
 - b. Wall Tolerances:
 - 1) Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
 - c. Wall Type W-A:
 - 1) Plumb within 1/4 inch in 10 feet or within 1 inch from top to bottom for walls over 40 feet high.
 - 2) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
 - d. Wall Type W-B:
 - 1) Plumb within 1/8 inch in 10 feet or within 1/2 inch from top to bottom for walls over 40 feet high.
 - 2) Depressions in Wall Surface: Maximum 1/8 inch when 10-foot straightedge is placed on high points in all directions.
 - e. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - f. Form Offset: Between adjacent pieces of formwork, facing material shall not exceed 1/8 inch for architectural concrete, otherwise 1/4 inch.
2. Beams and Columns Tolerances:
 - a. Exposed Straight Horizontal and Vertical Surfaces: Flat planes within tolerances specified.
 - b. Lateral Alignment:
 - 1) Centerlines shall be within plus or minus 1/2 inch from dimensions shown.
 - 2) At intersections, centerlines shall intersect within plus or minus 1/2 inch of dimensions shown.

- c. Beam Type B-A:
 - 1) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - 2) Elevations: Within plus or minus 1/2 inch, except where tops of beams intersect slab. In this case, refer to slab tolerances.
- d. Column Type C-A:
 - 1) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - 2) Plumb within 1/4 inch in 10 feet in all directions with maximum 1/2 inch out-of-plumb at top with respect to bottom.

3.03 FORM REMOVAL

- A. Nonsupporting forms, sides of beams, walls, columns, and similar parts of Work, may be removed after curing for 24 hours past the end of installation at a temperature that is continuously greater than 50 degrees F for the 24 hour period:
 - 1. Concrete is sufficiently hard so as not to sustain damage by form removal operations.
 - 2. Curing and protection operations are maintained.
- B. Elevated Structural Slabs or Beams: Remove forms in accordance with ACI 318, Chapter 6, and at such time as concrete has reached compressive strength equal to 80 percent of specified 28-day compressive strength as determined by test cylinders.
- C. Form Ties: Remove conical inserts or through bolts and plug holes as specified in Section 03 30 00, Cast-in-Place Concrete.

3.04 MANUFACTURER'S SERVICES

- A. Provide form liner manufacturer's representative at Site for installation, assistance, and inspection.

3.05 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with CBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.

- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

SECTION 03 15 00
CONCRETE JOINTS AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A36/A36M, Specification for Carbon Structural Steel.
 - b. A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - c. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - d. A767/A767M, Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - e. C920, Specification for Elastomeric Joint Sealants.
 - f. D226, Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
 - g. D227, Specification for Coal-Tar Saturated Organic Felt Used in Roofing and Waterproofing.
 - h. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - i. D1056, Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
 - j. D1171, Standard Guide for Evaluating Nonwoven Fabrics.
 - k. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - l. D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - m. D2240, Standard Test Method for Rubber Property – Durometer Hardness.
 2. Corps of Engineers (COE): CRD-C-572, Corps of Engineers Specifications for Polyvinylchloride Waterstop.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Waterstop: Details of splices, method of securing and supporting waterstop in forms to maintain proper orientation and location during concrete placement.
 - b. Construction Joints, Expansion Joints, and Control Joints: Layout and location for each type. Include joints locations shown on Drawings, additional required joint locations and any proposed alternate locations.
2. Product Data:
 - a. Waterstops.
 - b. Bond breaker.
 - c. Premolded joint fillers.
 - d. Pourable joint fillers.
 - e. Preformed control joints.
 - f. Epoxy-coated dowels.
 - g. Roofing felt.
 - h. Accessories not specified in other sections.
3. Samples: PVC waterstop splice, joint, and fabricated cross of each size, shape, and fitting of waterstop.

B. Informational Submittals:

1. Certification:
 - a. Letter stating compatibility between liquids being contained and materials used for:
 - 1) Waterstops.
 - 2) Joint fillers.
 - b. Manufacturer's application instructions for:
 - 1) Bonding agent.
 - 2) Bond breaker.
2. Manufacturer's written instructions for product shipment, storage, handling, installation/application, and repair for:
 - a. Waterstops.
 - b. Bond breaker.
 - c. Bonding agent.
 - d. Premolded joint fillers.
 - e. Pourable joint fillers (sealant proportions not required as products used only as a filler).
 - f. Preformed control joints.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site: Verify delivered materials are in accordance with Specifications, regulatory agencies, and Manufacturer's product data sheets prior to unloading and storing onsite.
- B. Storage: Store materials under tarps to protect from oil, dirt, and sunlight or as required by Manufacturer.

PART 2 PRODUCTS

2.01 PLASTIC WATERSTOP

- A. Extruded from elastomeric plastic compound of which basic resin shall be prime virgin polyvinyl chloride (PVC). Compound shall not contain scrapped material, reclaimed material, or pigment.
- B. Specific Gravity: Approximately 1.37.
- C. Shore Durometer Type A Hardness: Approximately 80.
- D. Performance Requirements: COE Specification CRD-C-572.
- E. Type Required in All Expansion, Contraction, and Control Joints: 6 inches wide or 9 inches wide with center bulb and parallel longitudinal ribs or protrusions on each side of strip center, as indicated on Drawings.
- F. Type Required in Construction Joints: Flat ribbed, 6 inches wide or 9 inches wide with parallel longitudinal ribs or protrusions on each side of strip center. Center bulb is optional.
- G. Corrugated or tapered type waterstops are not acceptable.
- H. Thickness: Constant from bulb edge (or center of waterstop) to outside stop edge.
- I. Minimum Weight per Foot of Waterstop:
 - 1. 0.50 pound for 3/16 inch by 4 inches.
 - 2. 1.60 pounds for 3/8 inch by 6 inches.
 - 3. 2.30 pounds for 3/8 inch by 9 inches.
- J. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction.

K. Manufacturers and Products for Center Bulb Type:

1. Use same manufacturers for flat ribbed profile:
 - a. Vinylex Corp., St Louis, MO; No. RB638H (6 inches by 3/8 inch) and No. RB938H (9 inches by 3/8 inch).
 - b. Greenstreak, St. Louis, MO; Style No. 702 (4 inches by 3/16 inch), Style 732 (6 inches by 3/8 inch), and Style 735 (9 inches by 3/8 inch).
 - c. Durajoint, Garrettsville, OH; Type 3 (4 inches by 3/16 inch), Type 9 (6 inches by 3/8 inch), and Type 10 (9 inches by 3/8 inch).
 - d. BoMetals, Carrollton, GA; No. RCB-4316LB (4 inches by 3/16 inch), No. RCB-638LB (6 inches by 3/8 inch), and No. RCB-938NT (9 inches by 3/8 inch).
 - e. Dacon Plastics LLC, Jacksonville, TX; No. RCB11 (4 inches by 3/16 inch), No. RCB17 (6 inches by 3/8 inch), and No. RCB18 (9 inches by 3/8 inch).
 - f. Or approved equal.

2.02 HYDROPHILIC WATERSTOP

- A. For use at construction joints only, where new concrete is placed against existing concrete and as shown on Drawings.
- B. Material shall be a nonbentonite hydrophilic rubber compound.
- C. Manufacturers and Products:
 1. Greenstreak Plastic Products, St. Louis, MO; Hydrotite CJ-1020-2K with Leakmaster LV-1 adhesive and sealant.
 2. Adeka Ultra Seal, JLM Associates, Spearfish, SD; MC-2010M with 3M-2141 adhesive and P-201 sealant.
 3. Or approved equal.

2.03 BOND BREAKER

- A. Tape for Joints: Adhesive-backed glazed butyl or polyethylene tape. Same width as joint that will adhere to premolded joint material or concrete surface.
- B. Use bond prevention material as specified in Section 03 30 00, Cast-in-Place Concrete, except where bond breaker tape is specifically called for on Drawings.

2.04 PREMOLDED JOINT FILLER

- A. Bituminous Type: ASTM D994 or ASTM D1751.
- B. Sponge Rubber:
 - 1. Neoprene, closed-cell, expanded; ASTM D1056, Type 2C5, with compression deflection, 25 percent deflection (limits), 119 kPa to 168 kPa (17 psi to 24 psi) minimum. Use in joints for potable and nonpotable water containment structures.
 - 2. Manufacturer and Product:
 - a. Monmouth Rubber and Plastics, Corp, Long Branch, NJ; Durafoam DK5151.
 - b. Or approved equal.
- C. Self-Expanding Cork:
 - 1. ASTM D1752, Type III.
 - 2. Manufacturer and Product:
 - a. WR Meadows, Inc., York, PA; self-expanding cork.
 - b. Or approved equal.

2.05 POURABLE JOINT FILLERS

- A. General: Although product is a sealant, it is being specified as a filler to prevent debris accumulation and allow expansion and contraction under shrinkage and thermal loads. It does not need to meet proportional sealant geometry requirements.
- B. Filler for Nonpotable Water Containment Structures Only:
 - 1. Pourable, two-component, cold-applied compound meeting ASTM C920, Type M, Grade P, Class 25, Use T.
 - 2. Color: Black.
 - 3. Manufacturer and Product:
 - a. W.R. Meadows, Inc., Elgin, IL; Gardox.
 - b. Or approved equal.
- C. Urethane or Polyurethane Filler for Aeration or Oxygenation Basins: Two-component, pourable, immersible, and compatible with Project-specific, high-purity oxygen environment, of self-leveling or nonsag consistency.
 - 1. Example Manufacturer and Product:
 - a. Sika Corp., Lyndhurst, NJ; Sikaflex 2c SL.
 - b. Or approved equal.
 - 2. Primer: As recommended by manufacturer.

2.06 STEEL EXPANSION JOINT DOWELS

- A. Dowels: ASTM A36/A36M round smooth steel bars.
- B. Bar Coating: As specified in Section 09 90 00, Painting and Coating, with factory-applied epoxy coating and factory or field applied lubrication coating.

2.07 ACCESSORIES

- A. Joint Sealant: Polyurethane as specified in Section 07 92 00, Joint Sealants.
- B. One-Part Polyurethane, Immersible:
 - 1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS or P, Class 25.
 - 2. Capable of being continuously immersed in water.
 - 3. Manufacturers and Products for Nonsag:
 - a. Sika Chemical Corp.; Sikaflex-1a.
 - b. Tremco; Vulkem 116.
 - c. Or approved equal.
 - 4. Manufacturers and Products for Self-leveling:
 - a. BASF; Sonneborn, SL-1.
 - b. Tremco; Vulkem 45.
 - c. Sika Chemical Corp.; Sikaflex 1c SL.
 - d. Or approved equal.
- C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.
- D. Steel Reinforcement: As specified in Section 03 21 00, Steel Reinforcement.
- E. Nails: Galvanized, as required for securing premolded joint filler.
- F. Galvanized Rebar at Control Joints: ASTM A767/A767M and ASTM A615/A615M Grade 60 prior to galvanizing.
- G. Ties for PVC Waterstop: "Hog Rings" or grommets for each edge at 12-inch maximum spacing.

PART 3 EXECUTION**3.01 GENERAL**

- A. Commence concrete placement after joint preparation is complete.
- B. Time Between Concrete Pours: As specified in Section 03 30 00, Cast-in-Place Concrete.

C. Prestressed Reservoir Walls:

1. Horizontal construction joints are not permitted.
2. Vertical joints in addition to those shown may be used; meet design requirements for joints in walls.
3. As specified in Section 03 25 50, Tank Wall Base and Top Joint.

3.02 SURFACE PREPARATION

A. Construction Joints: Prior to placement of abutting concrete, clean contact surface.

1. Remove laitance and spillage from steel reinforcement and dowels.
2. Roughen surface to minimum of 1/4-inch amplitude:
 - a. Sandblast after concrete has fully cured.
 - b. Water blast after concrete has partially cured.
 - c. Green cut fresh concrete with high-pressure water and hand tools.
3. Perform cleaning so as not to damage waterstop, if one is present.

B. Expansion Joint:

1. Use wire brush or motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic waterstop to top of joint.
2. Use dry, high-pressure air to remove dust and foreign material, and dry joint.
3. Prime surfaces as required before placing joint filler.
4. Avoid damage to waterstop.

C. Construction Joint with Hydrophilic Waterstop:

1. Follow hydrophilic waterstop manufacturer's written instructions.
2. Clean debris, dirt, dust, and foreign material from concrete surface. Concrete surface must be smooth, clean, and dry. Grind concrete as required.

3.03 INSTALLATION OF WATERSTOPS

A. General:

1. Continuous waterstop shall be installed in all construction joints in walls and slabs of water holding basins and channels and in walls of belowgrade structures, unless specifically noted otherwise.
2. Join waterstop at intersections to provide continuous seal.
3. Center waterstop on joint.

4. Secure waterstop in correct position. Tie waterstop to steel reinforcement using grommets, "Hog Rings," or tiewire at maximum spacing of 12 inches. Do not displace waterstop during concrete placement.
5. Repair or replace damaged waterstop.
6. Place concrete and vibrate to obtain impervious concrete in vicinity of joints.
7. Joints in Footings and Slabs:
 - a. Ensure that space beneath horizontal waterstop is completely filled with concrete.
 - b. During concrete placement, make visual inspection of waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift ribbed waterstop to confirm full consolidation without voids, then place remaining concrete to full height of slab.

B. Plastic Waterstops:

1. Install in accordance with manufacturer's written instructions.
2. Splice in accordance with waterstop manufacturer's written instructions using Teflon-coated thermostatically controlled heating iron at approximately 380 degrees F.
 - a. Allow at least 10 minutes before new splice is pulled or strained in any way.
 - b. Finished splices shall provide cross section that is dense and free of porosity with tensile strength of not less than 80 percent of unspliced materials.
 - c. Use only factory made waterstop fabrications for all intersections, changes of directions, and transitions.
 - d. Field splice permitted only for straight butt welds.
3. Wire looped plastic waterstop may be substituted for plastic waterstop.

C. Hydrophilic Waterstop:

1. Install in accordance with manufacturer's written instructions.
2. Provide minimum of 2-1/2 inches of concrete cover over waterstop. When structure has two layers of steel reinforcement, locate centered between layers of steel or as shown.
3. Apply adhesive to concrete surface and allow to dry for specified time before applying waterstop strip.
4. Lap ends of waterstop strip together at splices and corners and join with sealant.
5. Verify that waterstop is anchored firmly in place before placing concrete. Do not allow vibrator to come into contact with waterstop.

6. Lap hydrophilic waterstop 2 feet minimum with intersecting plastic waterstops.

3.04 EXPANSION JOINT INSTALLATION

A. Premolded Joint Filler:

1. Sufficient in width to completely fill joint space where shown.
2. Install per manufacturer's written instructions.
3. If waterstop is in joint, cut premolded joint filler to butt tightly against waterstop and concrete face.
4. Precut premolded joint filler to required depth at locations where joint filler or sealant is to be applied.
5. Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above waterstop, in slabs, shall be formed and removed so that entire space down to waterstop can be filled with the pourable joint filler.
6. Vibrate concrete thoroughly along joint form to produce dense, smooth surface.

B. Bituminous Type Premolded Joint Filler:

1. Drive nails approximately 1 foot 6 inches on center through filler, prior to installing, to provide anchorage embedment into concrete during concrete placement.
2. Secure premolded joint filler in forms before concrete is placed.
3. Install in walkways, at changes in direction, at intersections, at each side of driveway entrances, and at 45-foot intervals, maximum.

C. Sponge Rubber Joint Filler: Install per manufacturer's written instructions.

D. Self-Expanding Cork Premolded Joint Filler: Install per manufacturer's written instructions.

E. Pourable Joint Filler:

1. General:
 - a. Install in accordance with the manufacturer's written instructions, except as specified below:
 - 1) Apply primer prior to pouring joint filler.
 - 2) Fill entire joint above the waterstop with joint filler as shown.
 - 3) Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
 - 4) Sealant products used as fillers need not meet sealant geometry parameters. Do not use backing rods.

F. Steel Expansion Joint Dowels:

1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to joint in both plan and section view, so as to permit joint to expand or contract without bending dowels.
2. Secure dowels tightly in forms with rigid ties.
3. Install steel reinforcement in concrete as shown.

3.05 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.

3.06 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with CBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

SECTION 03 21 00
STEEL REINFORCEMENT

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete and Commentary.
 - b. SP-66, Detailing Manual.
 2. American Welding Society (AWS): D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
 3. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185/A185M, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - d. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - e. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - f. A767/767M, Standard Specification for Zinc-Coated (Galvanized) Steel bars for Concrete Reinforcement.
 - g. A775/A775M, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. Placing Reinforcing Bars.
 - b. Manual of Standard Practice.
 5. International Code Council (ICC): Evaluation Services Report.
 6. Wire Reinforcement Institute (WRI): WWR-500, Manual of Standard Practice, Structural Welded Wire Reinforcement.

1.02 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings prepared in accordance with CRSI Manual of Standard Practice and ACI SP-66:
 - a. Bending lists.
 - b. Placing drawings.

2. Welded, metallic sleeve splice, and mechanical threaded connection.

B. Informational Submittals:

1. Lab test reports for steel reinforcement showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
 - a. Current ICC Evaluation Services Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
 - b. Verification device threads have been tested and meet requirements for thread quality, in accordance with manufacturer's published methods.
 - c. Manufacturer's instructions.
3. Epoxy-Coated Reinforcing Bars: Written certification in accordance with Paragraph 14.1 of ASTM A775/A775M.
4. Test results of field testing.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."
- B. Epoxy-coated Reinforcing Bars:
1. Protect contact areas of epoxy-coated bars from handling equipment.
 2. Lift bundles of bars at multiple pickup points to minimize bar-to-bar abrasion from sags in bundles.
 3. Do not drop or drag bars or bundles of bars.
 4. Store bars on protective cribbing.
 5. Color fading of coating is not cause for rejection of epoxy-coated reinforcing bars.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
2. ASTM A615/A615M, Grade 60, where welding is not required.
3. ASTM A767/767M, Grade 60, for galvanized bars.
4. ASTM A775/A775M, for epoxy-coated bars.

B. Mechanical Splices and Connections:

1. Metal Sleeve Splice:
 - a. Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of bar.
 - b. Manufacturer and Product:
 - 1) Erico Products, Inc., Cleveland, OH; Cadweld T-Series.
 - 2) Or approved equal.
2. Mechanical Threaded Connections:
 - a. Furnish metal coupling sleeve with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
 - b. Manufacturers and Products:
 - 1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
 - 2) Erico Products, Inc., Cleveland, OH; Lenton Lock Mechanical Rebar Splicing System.
 - 3) Richmond Screw Anchor Co., Inc., Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.
 - 4) Or approved equal.

C. Welded Wire Fabric:

1. ASTM A185 or ASTM A497 and ACI 318, using ASTM A82 wire of 75 ksi minimum tensile strength.
2. Furnish flat sheets only, rolled sheets not permitted.

2.02 ACCESSORIES

A. Tie Wire:

1. Black, soft-annealed 16-gauge wire.
2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:

1. Use precast concrete bar supports or all-plastic bar supports and side form spacers, unless noted otherwise. Do not use other types of supports or spacers.
2. Bar supports shall have sufficient strength and stiffness to carry loads without failure, displacement, or significant deformation. Space bar supports so minimum concrete cover is maintained for reinforcing between supports.
3. Use only precast concrete bar supports where concrete surfaces are exposed to weather, earth, water, chloride intrusion, or corrosive chemicals. Bar supports shall be nonconductive and have geometry and

bond characteristics that deter movement of moisture from the surface to the reinforcement.

4. Precast concrete supports shall have same minimum strength and shall be made from same materials as that of the concrete in which they are to be embedded. Precast concrete supports shall be cast and properly cured for at least 7 days before use and shall have a wire or other device cast into each block for the purpose of attaching them securely to steel reinforcement.
5. In Beams, Columns, Walls, and Slabs Exposed to View after Form Removal: Use small precast concrete blocks made of same color as concrete in which they are embedded. All-plastic bar supports and side form spacers may be used, except where surface is exposed as described above.
6. Design and fabricate special bar supports for top reinforcing bars in slabs where standard bar supports do not possess necessary geometry, strength, or stiffness.
7. Use supports made of dielectric material for epoxy-coated reinforcing bars supported from formwork.
8. If epoxy-coated reinforcing is used, furnish epoxy-coated reinforcing bars for spreader bars.
9. Plastic Bar Supports: Manufactured by Aztec Concrete Accessories, Bloomington, CA.
10. Precast Concrete Supports:
 - a. Total bond precast, high-performance concrete bar supports as supplied by:
 - 1) Con Sys Inc., Pinawa, MB, Canada.
 - 2) Dayton Superior, Miamisburg, OH, Dobies.

2.03 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend bars cold.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify Construction Manager when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Repair epoxy coating damaged as a result of handling, shipment, and placing. Repair with patching material in accordance with ASTM A775/A775M and manufacturer's recommendations.
- C. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.

- D. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

3.02 INSTALLATION

- A. Bundle or space bars, instead of field bending where construction access through reinforcing is necessary.
- B. Spacing and Positioning: Conform to ACI 318.
- C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars."
- D. Splicing:
 - 1. Follow ACI 318.
 - 2. Use lap splices, unless otherwise shown or permitted in writing by Design Engineer.
 - 3. Stagger splices in adjacent bars where indicated on Drawings.
- E. Mechanical Splices and Connections:
 - 1. Use only in areas specifically approved in writing by Design Engineer.
 - 2. Install threaded rods as recommended by manufacturer with threads totally engaged into coupling sleeve and in accordance with ICC Evaluation Services Report or equivalent code agency report.
 - 3. For metal sleeve splice, follow manufacturer's installation recommendations.
 - 4. Maintain minimum edge distance and concrete cover where indicated on Drawings.
- F. Tying Reinforcing Bars:
 - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
 - 2. Bend tie wire away from concrete surface to provide clearance of 1 inch from surface of concrete to tie wire.
 - 3. Epoxy-coated Reinforcing Bars:
 - a. Use epoxy-coated or nonmetallic clips.
 - b. Repair coating damage at clipped or welded intersections.
- G. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.

- H. Straightening and Rebending: Field bending of steel reinforcement bars is not permitted.
- I. Unless permitted by Design Engineer, do not cut reinforcing bars in field. When epoxy-coated reinforcing bars are cut in field, coat ends of bars with same material specified for repair of epoxy coating damage.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with CBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

**SECTION 03 23 00
SEISMIC CABLING**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section covers the work necessary for the prestressed tank earthquake cables, complete.

1.02 RELATED SECTIONS

- A. Related sections include the following:
1. Section 03 10 00, Concrete Forming and Accessories.
 2. Section 03 21 00, Steel Reinforcement.
 3. Section 03 25 50, Tank Wall Base and Top Joint.
 4. Section 03 31 40, Prestressed Concrete Tank.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM): D1056, Standard Specifications for Flexible Cellular Materials - Sponge or Expanded Rubber.

1.04 SUBMITTALS

- A. Submit the quantity, location, and details for the Design Engineer's approval before the earthquake cables are fabricated.

PART 2 PRODUCTS

2.01 EARTHQUAKE CABLES

- A. Earthquake cables shall consist of 7-wire galvanized strands meeting the requirements of Section 03 31 40, Prestressed Concrete Tank, shall be installed to connect the core wall and wall footing. If no strength requirements are shown on Drawings, the minimum ultimate strength for 3/8-inch and 1/2-inch strand shall be 21,400 pounds and 38,200 pounds, respectively.
- B. Galvanized strands for earthquake cables shall meet the quantity and spacing outlined on Drawings. Strands shall be hot-dipped galvanized before stranding with a minimum zinc coating of 0.85 ounce per square feet.

2.02 CLOSED CELL NEOPRENE SEISMIC CABLE SLEEVES

- A. Neoprene sleeves for seismic cables, which encase the galvanized strands, shall conform to the minimum dimensions shown on Drawings to permit unrestrained flexing of the strands inside the sleeves under the maximum projected radial wall movements.
- B. The material shall be medium grade closed cell neoprene conforming to 2A3 of ASTM D1056 and as further specified as follows and on Drawings.
 - 1. Compression Deflection (25 percent deflection limit): 9 psi to 13 psi.
 - 2. Shore 00 Durometer: 60 pcf to 80 pcf.
 - 3. Density: 12 pcf to 28 pcf.
 - 4. Water Absorption by Weight: 5 percent.
 - 5. Temperature Range:
 - a. Low (flex without cracking): Minus 30 degrees F.
 - b. High Continuous: 150 degrees F.
 - c. High Intermittent: 200 degrees F.
 - 6. Compression Set (average):
 - a. 2-inch Sample Compressed 50 Percent for 22 Hours at 70 Degrees F and 24 Hours Recovery: 15 percent to 25 percent.
 - 7. Heat Aging (7 days at 158 degrees F lineal shrinkage, maximum): 5 percent.
 - 8. Tensile Strength: 115 psi minimum.
 - 9. Elongation: 180 percent minimum.
 - 10. Resilience (bayshore percent rebound average 2-inch thickness at 72 degrees F): 20 percent to 40 percent.
- C. Monarch No. 5013 is an acceptable material.

2.03 MILD STEEL REINFORCING BARS

- A. The mild steel reinforcing bars for the support of the earthquake cable anchors shall be provided under Section 03 21 00, Steel Reinforcement.

PART 3 EXECUTION**3.01 EARTHQUAKE CABLES**

- A. The cables may be cut to length with a burning torch.
- B. Where necessary, the strands shall be prebent before placing the units in wall and wall footings, as called for on Drawings.

- C. The strands shall be tied with tie wire per Section 03 21 00, Steel Reinforcement, to the lower horizontal circumferential tie-bar on the vertical prestress tendons as shown on Drawings.
- D. In the footing, the strands shall be tied with tie wire per Section 03 21 00, Steel Reinforcement, to the radial footing bars at the bottom of the footing.
- E. The strands shall be fanned out to provide separation between adjacent strands.
- F. The strands shall not be kinked when curved to avoid crossing vertical wall joints.
- G. At vertical wall joints, the strands can continue through the joint if less than 2 feet of the strand from the end of the neoprene cable sleeve is on one side of the joint prior to crossing the joint. If more than 2 feet is in the first wall section, the strand shall be curved up to be contained entirely in the originating wall section.

END OF SECTION

SECTION 03 25 50
TANK WALL BASE AND TOP JOINT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section covers the work necessary for the prestressed tank wall base and top joints, complete.

1.02 RELATED SECTIONS

- A. Related sections include the following:
1. Section 03 15 00, Concrete Joints and Accessories.
 2. Section 03 23 00, Seismic Cabling.
 3. Section 03 30 00, Cast-in-Place Concrete.
 4. Section 03 31 40, Prestressed Concrete Tank.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. D1056, Standard Specifications for Flexible Cellular Materials Sponge or Expanded Rubber.
 - b. D2000, Classification System for Rubber Products in Automotive Applications.

1.04 SUBMITTALS

- A. Submittals shall be in accordance with the Submittal Procedures and the following:
1. Provide a 5-foot minimum length of each of the closed cell neoprene pads and the neoprene bearing pads in order that the Construction Manager or Design Engineer can test the pads for compliance with these Specifications.
 2. Furnish certified mill certificates showing that the material meets all of the requirements specified herein. The Construction Manager, at their option, may take samples of any materials and have them tested by an independent testing laboratory to verify their compliance with these Specifications. All such costs shall be borne by the Contractor.

PART 2 PRODUCTS

2.01 PVC WATERSTOPS

- A. Waterstops shall conform to requirements in Section 03 15 00, Concrete Joints and Accessories. The size and location of the waterstop shall be as shown on Drawings.

2.02 NEOPRENE BEARING PAD

- A. Neoprene pads shall be of dimensions and hardness shown on Drawings and shall be made by an approved manufacturer.
- B. The material for 40 durometer neoprene pads shall conform to ASTM D2000 M2BC414A14C12F17.
- C. Unless otherwise specified on Drawings, neoprene pads shall be of 40 durometer.
- D. Kirkhill Elastomers, 300 E. Cypress Street, Brea, CA 92621, telephone (714) 529-4901, Construction Products Department, is one of several suppliers who can furnish neoprene pads meeting these requirements.

2.03 CLOSED CELL NEOPRENE PADS

- A. Closed cell neoprene pads shall be used as a filler material in the flexible joints between the wall and wall footing and between the wall and roof connection in the areas not taken up by the solid neoprene bearing pads and waterstop.
- B. The material shall be medium grade conforming to 2A3 of ASTM D1056. Monarch No. 5013 is an acceptable product, telephone (800) 638-6312, unless otherwise noted.

2.04 SOFT MASTIC

- A. Soft mastic shall be installed in all voids and cavities around bearing pads, waterstops and seismic cable sleeves. Such material shall be installed with a consistency that will not adversely affect the quality of PVC and neoprene materials.
- B. Manufacturer and Product:
 - 1. Sika Corporation; Sikaflex 1A.
 - 2. Or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION OF PVC WATERSTOP

- A. PVC waterstops shall be continuous and shall be installed where shown. The method of installation shall be as specified in Section 03 15 00, Concrete Joints and Accessories.

3.02 BEARING AND FILLER PADS

- A. Bearing and filler pads shall be installed in widths and in areas as indicated on Drawings.
- B. Bearing and filler pads shall be glued to the concrete with an approved rubber cement material to prevent uplift of the pads during concrete pouring.
- C. Pads at the base of the wall shall be held down with approved plastic shim plates placed under the vertical reinforcing steel bars.
- D. Nailing down pads will not be permitted.
- E. All voids and cavities between bearing and filler pads, waterstop and seismic cable sleeves, irrespective of whether these voids are large or small, shall be filled with a soft mastic of a consistency that will not adversely affect the quality of plastic and neoprene materials.
- F. Closed cell neoprene shall be ordered at least 1/4-inch wider than theoretically required to facilitate placing and to reduce development of voids between filler pads, bearing pads and waterstops.
- G. Contractor's workmanship shall be such that no cement grout or concrete seepage will occur through the bearing and filler pad area resulting in a restraint of radial wall movements.
- H. A continuous neoprene pad and one or more sponge filler pads are required between the top of the wall and the underside of the roof. Any void areas between such pads shall be filled with soft mastic to prevent any concrete mortar from the roof pour to seep into voids at the top of the wall.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 301, Specifications for Structural Concrete.
 - c. 350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.
 - d. CP-1, Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1.
 2. ASTM International (ASTM):
 - a. C31/C31M, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - b. C33/C33M, Standard Specification for Concrete Aggregates.
 - c. C39/C39M, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - e. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - f. C143/C143M, Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - g. C150/C150M, Standard Specification for Portland Cement.
 - h. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - i. C227, Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
 - j. C231/C231M, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - k. C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
 - l. C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
 - m. C595/C595M, Standard Specification for Blended Hydraulic Cements.
 - n. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

- o. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - p. C979/C979M, Standard Specification for Pigments for Integrally Colored Concrete.
 - q. C989, Standard Specification for Slag Cement for Use in Concrete and Mortars.
 - r. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - s. C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - t. C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method.
 - u. C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
 - v. C1218/C1218M, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - w. C1240, Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - x. C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
 - y. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - z. C1567, Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
 - aa. C1582/C1582M, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.
 - bb. C1602/C1602M, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
 - cc. D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
 - dd. E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
 - ee. E1155, Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
3. National Ready Mixed Concrete Association (NRMCA).

1.02 DEFINITIONS

- A. Architectural Concrete: Concrete indicated as such in Contract Documents. Requires specified care in selection of concrete materials, forming, placing, and finishing in order to obtain desired architectural appearance.

- B. Basin Train: Series of interconnected basins that operate as a unit with same water level.
- C. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in state or jurisdiction in which Project is to be constructed.
- D. Defective Area: Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4 inch in diameter, cracks in liquid containment structures and below grade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include, but are not limited to, fins, form pop-outs, and other projections. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning. Any leaking or damp crack, tiehole, construction joint, or other area of the basin shall be considered a defect.
- E. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained.
- F. Hydraulic Structure: Liquid containment structure.
- G. New Concrete: Less than 60 days old.
- H. Slurry Mixture: Mixture of sand, 3/8-inch maximum nominal aggregate size, cement, and water for wall construction joints with waterstop.

1.03 OWNER PERFORMED CONCRETE TESTS

- A. Portions of specified Concrete Tests will be performed by the Owner and listed in Section 01 31 13, Project Coordination. All other tests specified herein but not listed in Section 01 31 13, Project Coordination shall be the responsibility of the Contractor.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Mix Designs:
 - a. Contain proportions of materials and admixtures to be used on Project, signed by mix designer.

- b. Documentation of average strength for each proposed mix design in accordance with ACI 301.
- c. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for the following:
 - 1) Portland cement.
 - 2) Fly ash.
 - 3) Slag cement.
 - 4) Silica fume.
 - 5) Aggregates, including specified class designation for coarse aggregate.
 - 6) Admixtures.
 - 7) Concrete producer has verified compatibility of constituent materials in design mix.
- d. Test Reports:
 - 1) Cement: Chemical analysis report.
 - 2) Supplementary Cementitious Materials: Chemical analysis report and report of other specified test analyses.
 - 3) Water-Soluble Chloride-Ion Content in Hardened Concrete: Unless otherwise permitted, in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
 - 4) Shrinkage Test Results: In accordance with ASTM C157/C157M as modified herein.
- e. Aggregates:
 - 1) Coarse Aggregate Gradation: List gradings and percent passing through each sieve.
 - 2) Fine Aggregate Gradation: List gradings and percent passing through each sieve.
 - 3) Combined gradation for coarse and fine aggregates. List gradings and percent passing through each sieve.
 - 4) Deleterious substances in fine aggregate per ASTM C33/C33M, Table 2.
 - 5) Deleterious substances in coarse aggregate per ASTM C33/C33M, Table 4.
 - 6) Test Reports:
 - a) Alkali Aggregate Reactivity: Aggregate shall be classified as nonpotentially reactive in accordance with Article Concrete Mix Design. Include documentation of test results per applicable standards.

- f. Admixtures:
 - 1) Manufacturer's catalog cut sheets and product data sheets for each admixture used in proposed mix designs.
 - 2) Color Pigment: Product data including application rate and color chart.
 - 2. Product Data: Specified ancillary materials.
 - 3. Samples: Prior to starting work on mockup panel, one Sample of each type of architectural concrete wall finish and color, 24 inches by 24 inches square by 1-1/2 inches thick.
 - 4. Concrete repair techniques.
- B. Informational Submittals:
- 1. Preinstallation Conference minutes.
 - 2. Manufacturer's application instructions for bonding agent and bond breaker.
 - 3. Manufacturer's Certificate of Compliance to specified standards:
 - a. Bonding agent.
 - b. Bond breaker.
 - c. Repair materials.
 - 4. Statement of Qualification:
 - a. Batch Plant: Certification as specified herein.
 - b. Mix designer.
 - c. Installer.
 - d. Testing agency.
 - 5. Field test reports.
 - 6. Recorded temperature data from concrete placement where specified.
 - 7. Tightness test results.
 - 8. Concrete Delivery Tickets:
 - a. For each batch of concrete before unloading at Site.
 - b. In accordance with ASTM C94/C94M, including requirements 14.2.1 through 14.2.10.
 - c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.05 QUALITY ASSURANCE

- A. Concrete construction shall conform to requirements of ACI 117 and ACI 301, except as modified herein.
- B. Qualifications:
 - 1. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.

2. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
3. Testing Agency: Unless otherwise permitted, an independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 - a. Where field testing is required of Contractor, personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Mockup Panels:

1. Construct in accordance with requirements of Contract Documents to demonstrate wall finish.
 - a. Dimensions: 10 feet by 8 feet, minimum.
 - b. Demonstrate sandblasting on Type W-11 to show how uniform appearance will be achieved regardless of age of concrete.
2. Before concrete work starts, construct panels with specified materials, forming systems, reinforcing details, and leakage prevention techniques.
3. Show architectural details, joints, form ties, and rebar spacers to produce finished surface required.
4. Test form release agent on one mockup panel to ensure no adverse effects are caused on form or form liner materials.
5. Cast panels from minimum of 3-cubic-yard truck mixer load.
6. Surface finish and color shall be uniform in appearance to Samples.
7. Approved panels shall establish standards of quality by which Work will be judged.
8. Replace panels if not representative of Work as specified.
9. Use mockup panel(s) or Construction Manager-selected portion of as-cast wall surface hidden from view to develop and test patching techniques and mixes.
 - a. Obtain Construction Manager approval prior to using material to repair Project structures.
 - b. Demonstrate application, curing, and finishing procedures of repair material.
 - c. Approved repairs shall establish standards of quality by which Work will be judged.

D. Preinstallation Conference:

1. Required Meeting Attendees:
 - a. Contractor, including pumping, placing and finishing, and curing subcontractors.
 - b. Ready-mix producer.
 - c. Admixture representative.
 - d. Testing and sampling personnel.
 - e. Personnel who authored Statement of Special Inspection Plan or appropriate designee.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Construction Manager of location and time.
3. Agenda shall include:
 - a. Admixture types, dosage, performance, and redosing at Site.
 - b. Mix designs, test of mixes, and Submittals.
 - c. Placement methods, techniques, equipment, consolidation, and form pressures.
 - d. Slump and placement time to maintain slump.
 - e. Finish, curing, and water retention.
 - f. Thermal control plan.
 - g. Protection procedures for weather conditions.
 - h. Other specified requirements requiring coordination.
4. Conference minutes as specified in Section 01 31 19, Project Meetings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cementitious Materials:

1. Cement:
 - a. Portland Cement: Unless otherwise specified, conform to requirements of ASTM C150/C150M.
 - b. Blended Hydraulic Cement:
 - 1) Unless otherwise specified, conform to requirements of ASTM C595/C595M.
 - 2) Portland cement used in blended hydraulic cement, conform to requirements of ASTM C150/C150M.
 - c. Furnish from one source.
2. Supplementary Cementitious Materials (SCM):
 - a. Fly Ash (Pozzolan):
 - 1) Class F and Class C fly ash in accordance with ASTM C618, except as modified herein:
 - a) Shall not be produced from process that has utilized hazardous or potentially hazardous materials.

- b) ASTM C618, Table 1, Loss on Ignition: Unless permitted otherwise, maximum 3 percent.
 - b. Slag Cement: In accordance with ASTM C989, Grade 100 or Grade 120.
 - 1) Shall not be produced from process that has utilized hazardous or potentially hazardous materials.
 - c. Silica Fume: ASTM C1240.
- B. Aggregates: Furnish unless otherwise permitted, furnish from one source for each aggregate type used in a mix design.
- 1. Normal-Weight Aggregates:
 - a. In accordance with ASTM C33/C33M, except as modified herein.
 - 1) Class Designation: 4S unless otherwise specified.
 - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
 - c. Alkali Silica Reactivity: See Article Concrete Mix Design.
 - d. Import aggregates for Project.
 - 2. Fine Aggregates:
 - a. Clean, sharp, natural sand.
 - b. ASTM C33/C33M.
 - c. Limit deleterious substances in accordance with ASTM C33/C33M, Table 2 and as follows:
 - 1) Limit material finer than 75- μ m (No. 200) sieve to 5 percent mass of total sample.
 - 2) Limit coal and lignite to 1.0 percent.
 - 3. Coarse Aggregate:
 - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
 - b. Limit deleterious substances in accordance with ASTM C33/C33M, Table 4 for specified class designation.
 - 4. Aggregate Color: Coarse and fine aggregates for all architectural concrete shall be warm, brown color produced by a mixture of yellow, brown, and red rocks matching local aggregate known as 'Poway Conglomerate,' or similar variety upon approval of Design Engineer.
 - 5. Nonslip Aggregate:
 - a. Hard, homogeneous, nonglazing, rustproof, unaffected by freezing, moisture, or cleaning compounds.
 - b. Fully graded between 1/32-inch to 1/4-inch size and composed of minimum 60 percent aluminum oxide or silicon carbide abrasive bonded by vitreous ceramic material.

- C. Admixtures: Unless otherwise permitted, furnish from one manufacturer.
1. Characteristics:
 - a. Compatible with other constituents in mix.
 - b. Contain at most, only trace amount chlorides in solution.
 - c. Do not use admixtures known to be toxic after concrete is 30 days.
 - d. Furnish type of admixture as recommended by manufacturer for anticipated temperature ranges.
 2. Air-Entraining Admixture: ASTM C260/C260M.
 3. Water-Reducing Admixture: ASTM C494/C494M, Type A or Type D.
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Pozzolith Series or PolyHeed Series.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Daracem Series or Mira Series.
 - 4) Or approved equal.
 4. Retarding Admixture: ASTM C494/C494M, Type B.
 5. Accelerating Admixture: ASTM C494/C494M, Type C.
 6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F or Type G.
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Glenium Series, PS 1460, or Rheobuild 1000.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon Series or Plastol Series.
 - 3) W. R. Grace & Co., Cambridge, MA; ADVA Series, Daracem Series, or EXP 950.
 - 4) Or approved equal.
 7. Plasticizing Admixture: ASTM C1017/C1017M, Type I or Type II.
 8. Shrinkage Reducing Admixture:
 - a. Manufacturers and Products:
 - 1) BASF Admixtures Inc., Shakopee, MN; Tetraguard AS20.
 - 2) Euclid Chemical Co., Cleveland, OH; Eucon SRA Series.
 - 3) W. R. Grace & Co., Cambridge, MA; Eclipse Series.
 - 4) Or approved equal.
 9. Do not use calcium chloride as an admixture.
 10. Admixtures with no standard, ASTM or other, designation may be used where permitted.

- D. Water and Ice: Mixing water for concrete and water used to make ice shall be potable water, unless alternative sources of water are permitted.
1. Water from alternative sources shall comply with requirements of ASTM C1602/C1602M, and concentration of chemicals in combined mixing water shall be less than:
 - a. Chloride Content: 1,000 ppm.
 - b. Sulfate Content as SO₄: 3,000 ppm.
 - c. Alkalis as (Na₂O + 0.658 K₂O): 600 ppm.
 - d. Total Solids by Mass: Less than 50,000 ppm.

2.02 ANCILLARY MATERIALS

A. Bonding Agent:

1. Unless otherwise specified, in accordance with the following:
 - a. ASTM C881/C881M, Type V.
 - b. Two-component, moisture insensitive, 100 percent solids epoxy.
 - c. Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
 - d. Manufacturers and Products:
 - 1) BASF Building Systems Inc., Shakopee, MN; Concrevice Standard LVI.
 - 2) Euclid Chemical Co., Cleveland, OH; Euco # 352 Epoxy System LV.
 - 3) Prime Resins, Conyers, GA; Prime Bond 3000 to 3900 Series.
 - 4) Sika Chemical Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod.
 - 5) Or approved equal.

B. Bond Breaker:

1. Nonstaining type, providing positive bond prevention.
2. Manufacturers and Products:
 - a. Dayton Superior Corporation, Kansas City, KS; EDOCO Clean Lift Bond Breaker.
 - b. Nox-Crete Products Group, Omaha, NE; Silcoseal Select.
 - c. Or approved equal.

C. Repair Material:

1. In accordance with requirements of Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
2. In accordance with requirements of Section 03 01 33, Repair of Horizontal Concrete Surfaces.

- D. Crack Repair: In accordance with requirements of Section 03 64 23, Epoxy Resin Injection Grouting.

2.03 CONCRETE MIX DESIGN

A. General:

1. See Supplements at the end of this section for mix design requirements for each class of concrete used on Project.
2. Prepare design mixtures for each type and strength of concrete, selecting and proportioning ingredients in accordance with requirements of ACI 301, unless otherwise specified.
3. Selection of constituent materials and products in mix design are optional, unless specified otherwise.
4. Unless otherwise permitted, use water-reducing admixture or water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in pumped concrete, in concrete with a water-cementitious materials ratio below 0.50, and in concrete that is part of a liquid-containment structure.
5. Unless otherwise permitted, use water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture in columns, piers, pilasters, and walls.
6. Use water-reducing admixture or high-range, water-reducing admixture, or plasticizing admixture to achieve fresh properties that facilitate handling, placing, and consolidating of concrete, and specified hardened properties.
7. Use water-reducing and retarding admixture when anticipated high temperatures, low humidity, or other adverse placement conditions can adversely affect fresh properties of concrete.
8. Unless otherwise specified, desired fresh properties of concrete shall be determined by Contractor, and coordinated with concrete producer. Fresh properties of concrete shall remain stable to satisfaction of Contractor, for duration of placement and consolidation, and shall remain in conformance with requirements of Contract Documents.

B. Potential Alkali-Aggregate Reactivity of Concrete:

1. Do not use aggregates known to be susceptible to alkali-carbonate reaction (ACR).
2. Aggregates shall have been tested to determine potential alkali-aggregate reactivity in concrete in accordance with ASTM C1260 or ASTM C1567.
 - a. Aggregates that indicate expansion greater than 0.10 percent at 16 days after casting shall not be used unless they have been shown to be nondeleteriously reactive in accordance with

ASTM C227 or ASTM C1293, with less than 0.04 percent expansion at 1 year for cement-aggregate combinations or less than 0.04 percent expansion at 2 years for combinations with pozzolan or slag.

- b. Alkali content of cement used in proposed concrete mixture shall not be greater than alkali content of cement used in test for potential alkali-aggregate reactivity.
- c. Use low-alkali cement or incorporate pozzolans into concrete mixture as necessary to satisfy testing for potential alkali reactivity. Alternately, a chemical inhibitor such as a lithium based admixture may be proposed.

C. Proportions:

1. Design mix to meet aesthetic, durability, and strength requirements.
2. Fly ash is not permitted in mix.

D. Concrete Shrinkage Limits:

1. Where shrinkage limits are specified, design mix for following shrinkage limits and test in accordance with ASTM C157/C157M, with the following modifications:
 - a. Prisms shall be moist cured for 7 days prior to 28-day drying period.
 - b. Comparator reading at end of 7-day moist cure shall be used as initial length in length change calculation.
 - c. Reported results shall be average of three prisms.
 - d. If shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
 - e. Unless otherwise specified, results at end of 28-day drying period shall not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.038 percent if 4-inch prisms are used. Aggregate will be rejected if test values exceed these limits.

E. Slump Range at Site:

1. Prior to submitting mix design, consult with concrete producer and select a target slump value at point of delivery, for each application of each design mix. Unless otherwise permitted, target slump value will then be enforced for duration of Project. Unless otherwise permitted, target slump value is 4 inches at point of delivery, for concrete without high-range, water reducing admixture.

2. Design mixes that include a high-range, water-reducing or a plasticizing admixture shall have a minimum slump of 2 inches prior to addition of admixture. Unless otherwise permitted, slump shall be 8 inches maximum at point of delivery, for concrete with a high-range, water-reducing admixture.
 3. Slump tolerance shall meet requirements of ACI 117.
- F. Combined Aggregate Gradation:
1. Combined Gradation Limits:
 - a. Limits shown are for coarse aggregates and fine aggregates mixed together (combined). Select one of the gradations shown in the following table:

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
2"	100	-	-
1-1/2"	95 - 100	100	-
1"	65 - 85	90 - 100	100
3/4"	55 - 75	70 - 90	92 - 100
1/2"	-	-	68 - 86
3/8"	40 - 55	45 - 65	57 - 74
No. 4	30 - 45	31 - 47	38 - 57
No. 8	23 - 38	23 - 40	28 - 46
No. 16	16 - 30	17 - 35	20 - 36
No. 30	10 - 20	10 - 23	14 - 25
No. 50	4 - 10	2 - 10	5 - 14
No. 100	0 - 3	0 - 3	0 - 5
No. 200	0 - 2	0 - 2	0 - 2

2.04 CONCRETE MIXING

- A. General: In accordance with ACI 301, except as modified herein.

- B. Truck Mixers:
 - 1. For every truck, test slump of samples taken per ASTM C94/C94M, Paragraph 12.5.1.
 - 2. Where specified slump is more than 4 inches, and if slump tests differ by more than 2 inches, discontinue use of truck mixer, unless causing condition is corrected and satisfactory performance is verified by additional slump tests.
- C. For concrete sections with a minimum specified dimension that is greater than 2 feet 6 inches, and unless otherwise permitted, provide documentation that maximum concrete temperature in structure will not exceed 158 degrees F, and maximum temperature differential between center of section and external surfaces of concrete will not exceed 35 degrees F.

2.05 SOURCE QUALITY CONTROL

- A. Source Quality Control Inspection: Construction Manager shall have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in this section.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Preparation: Meet requirements of ACI 301, except as modified herein.
- B. Inspection: Notify Construction Manager and Special Inspector at least 1 full working day in advance before starting to place concrete.
- C. Placement into Formwork:
 - 1. Reinforcement: Secure in position before placing concrete.
 - 2. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs which shall be placed full depth. Place and consolidate successive layers prior to initial set of previous layer to prevent cold joints.
 - 3. Placement frequency shall be such that lift lines will not be visible in exposed and architectural concrete finishes.
 - 4. Use placement devices, for example chutes, pouring spouts, and pumps as required to prevent segregation.

5. Vertical Free Fall Drop to Final Placement:
 - a. Forms 8 Inches or Less Wide: 5 feet.
 - b. Forms Wider than 8 Inches: 8 feet, except as specified.
 6. For placements where drops are greater than specified, use placement device such that free fall below placement device conforms to required value.
 - a. Limit free fall to prevent segregation caused by aggregates hitting steel reinforcement.
 7. Do not use aluminum conveying devices.
 8. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.
 9. Joints in Footings and Slabs:
 - a. Ensure space beneath plastic waterstop completely fills with concrete.
 - b. During concrete placement, make visual inspection of entire waterstop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, and place remaining concrete to full height of slab.
 - d. Apply procedure to full length of waterstop.
 10. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
 11. Cure concrete as specified in Section 03 39 00, Concrete Curing.
- D. Conveyor Belts and Chutes:
1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
 2. Do not use chutes longer than 50 feet.
 3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
 4. Conveyor Belts:
 - a. Approved by Design Engineer.
 - b. Wipe clean with device that does not allow mortar to adhere to belt.
 - c. Cover conveyor belts and chutes.
- E. Retempering: Not permitted for concrete where cement has partially hydrated.

F. Pumping of Concrete:

1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
3. Replace pumping equipment and hoses (conduits) that are not functioning properly.

G. Maximum Size of Concrete Placements:

1. Limit size of each placement to allow for strength gain and volume change as a result of shrinkage.
2. Locate expansion, control, and contraction joints where shown on Drawings.
3. Construction Joints:
 - a. Unless otherwise shown or permitted, locate construction joints as follows:
 - 1) Locate construction joints as shown on Drawings or where approved in joint location submittal required in Section 03 15 00, Concrete Joints and Accessories.
 - 2) Provide vertical construction joints in walls and slabs at maximum spacing of 40 feet, unless shown or approved otherwise.
 - 3) When vertical expansion, contraction, or control joint spacing does not exceed 60 feet, intermediate construction joints are not required.
 - 4) Uniformly space vertical construction joints within straight sections of walls and slabs, avoiding penetrations.
4. Consider beams, girders, brackets, column capitals, and haunches as part of floor or roof system and place monolithically with floor or roof system.
5. Should placement sequence result in cold joint located below finished water surface, install waterstop in joint.

H. Minimum Time between Adjacent Placements:

1. Construction or Control Joints: 14 days (7 days wet cure and 7 days dry cure) unless otherwise specified.
2. Construction Joint between Top of Footing or Slab, and Column or Wall: As soon as can safely be done without damaging previously cast concrete or interrupting curing thereof, but not less than 24 hours.
3. Expansion or Contraction Joints: 1 day.

4. For columns and walls with a height in excess of 10 feet, wait at least 2 hours before depositing concrete in beams, girders, or slabs supported thereon.
5. For columns and walls 10 feet in height or less, wait at least 1 hour prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.

I. Consolidation and Visual Observation:

1. Consolidation Equipment and Methods: ACI 301.
2. Provide at least one standby vibrator in operable condition at Site prior to placing concrete.
3. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete.
4. Vibrate concrete in vicinity of joints to obtain impervious concrete.

3.02 CONCRETE BONDING

A. Construction Joints in New Concrete Members:

1. Prepare surface of construction joint as specified in Section 03 15 00, Concrete Joints and Accessories.
2. Horizontal Construction Joints Containing Waterstop in New Concrete Walls:
 - a. Use positive measuring device such as bucket or other device that will contain only enough slurry mixture for depositing in visually measurable area of wall to ensure that portion of form receives appropriate amount of slurry mixture to satisfy placement thickness requirements.
 - b. Do not deposit slurry mixture from pump hoses or large concrete buckets, unless specified placement thickness can be maintained and verified through inspection windows close to joint, or by other means.
 - c. Limit concrete placed immediately on top of slurry mixture to 12 inches thick. Thoroughly vibrate to mix concrete and slurry mixture together.

B. Construction Joints at Existing Concrete:

1. Thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 1/4 inch.
2. Saturate surface with water for 24 hours prior to placing new concrete.

3.03 REPAIRING CONCRETE

A. General:

1. Inject cracks that leak with crack repair epoxy as specified in Section 03 64 23, Epoxy Resin Injection Grouting.
2. Repair defective areas of concrete.
3. Repair horizontal concrete surfaces in accordance with Section 03 01 33, Repair of Horizontal Concrete Surfaces.
4. Repair vertical and overhead concrete surfaces in accordance with Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
5. Develop repair techniques with material manufacturer on surface that will not be visible in final construction or on mockup panels prior to starting actual repair work and show how finish color will blend with adjacent surfaces. Obtain approval from Design Engineer.
6. Obtain quantities of repair material and manufacturer's detailed instructions for use and to repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.
7. Repair of concrete shall provide structurally sound surface finish, uniform in appearance until acceptable to Design Engineer.

B. Tie Holes:

1. Unless otherwise specified, fill with specified repair material.
 - a. Prepare substrate and mix, place, and cure repair material per manufacturer's written recommendations.
2. When required, color of tie-hole patch shall match adjacent concrete.
 - a. Demonstrate patch of tie hole on mockup panels.
 - b. Clean and dampen tie holes before applying mortar. Do not use separate bonding agent.
 - c. Fill with site-mixed portland-cement repair mortar per ACI 301.
 - d. Cure repair mortar with water.

C. Alternate Form Ties, Through-Bolts:

1. Mechanically roughen entire interior surface of through hole.
2. Apply bonding agent to roughened surface and drive elastic vinyl plug to half depth.
3. Dry pack entire hole from both sides of plug with nonshrink grout.
4. Use only enough water to dry pack grout.
5. Dry pack while bonding agent is still tacky.
6. If bonding agent has dried, remove bonding agent by mechanical means and reapply new coat of bonding agent.

7. Compact grout using steel hammer and steel tool to drive grout to high density.
8. Cure grout with water.
9. When specified, color of alternate form tie-hole patch shall match adjacent concrete.
 - a. Demonstrate patch of hole on mockup panels.
 - b. Fill hole with nonshrink grout as described in paragraph above, except hold materials back 1 inch from concrete surfaces.
 - c. Allow nonshrink grout to fully cure.
 - d. Remove dried bonding agent by mechanical means.
 - e. Clean and dampen remaining depressions before applying mortar.
 - f. Do not use separate bonding agent on existing surfaces in remaining depression.
 - g. Fill with site-mixed portland-cement repair mortar per ACI 301.
 - h. Cure repair mortar with water.

D. Exposed Metal Objects:

1. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.
2. Repair area of chipped-out concrete as specified for defective areas.

E. Blockouts at Pipes or Other Penetrations: Where shown install in accordance with requirements of Drawings.

3.04 CONCRETE WALL FINISHES

A. Type W-1 (Ordinary Wall Finish):

1. Patch tie holes.
2. Knock off projections.
3. Repair defective areas.
4. Inject cracks in accordance with requirements of Section 03 64 23, Epoxy Resin Injection Grouting.

B. Type W-2 (Smooth Wall Finish):

1. Patch tie holes.
2. Grind off fins and other projections.
3. Repair defective areas to provide smooth uniform appearance.
4. Inject cracks in accordance with requirements of Section 03 64 23, Epoxy Resin Injection Grouting.

- C. Type W-6 (Finish for Prestressed Tanks):
1. Remove form ridges, pieces of wood, and excess concrete from formed surfaces same day forms are removed.
 2. If forms are removed within 7 days of placement, minimize interruption of curing.
 3. In accordance with requirements for Type W-2 except as follows:
 - a. Sandblast core wall exterior surface.
- D. Type W-11 (Abrasive Blast Wall Finish):
1. Repair cracks before abrasive blasting.
 2. Perform abrasive blasting on concrete surfaces in same area of view, at same time, to obtain uniformity of appearance.
 3. Same person shall accomplish sandblasting on one structure and on concrete in same area.
 4. Perform abrasive blasting to match approved mockup panel.
 5. Abrasive: Use clean silica sand, free of foreign materials, and supplied in sealed sacks.
 6. When specified, begin abrasive blasting to expose aggregate when concrete has a compressive strength of at least 2,000 psi and after safe removal of forms and supports. Blast to match mockup. Achieve degree of abrasive blasting as specified in Contract Documents:
 - a. Brush: Dull surface sheen.
 - b. Light: Exposure of fine aggregate.
 - c. Medium: Coarse aggregate exposure.
 - d. Heavy: Coarse aggregate revealed.
 7. When abrasive grits contain free water for dust abatement, wash abrasive blasting debris off finished wall surface before drying occurs.

3.05 CONCRETE SLAB FINISHES

- A. General:
1. Use manual screeds, vibrating screeds, or roller compacting screeds to place concrete level and smooth.
 2. Do not use “jitterbugs” or other special tools designed for the purpose of forcing coarse aggregate away from the surface and allowing layer of mortar. It will weaken the concrete and cause surface cracks or delamination, to accumulate.
 3. Finish slab in accordance with specified slab finish.
 4. Do not dust surfaces with dry materials nor add water to surfaces.
 5. Cure concrete as specified in Section 03 39 00, Concrete Curing.

B. Type S-1 (Steel Troweled Finish):

1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation.
2. Wood float to true, even plane with no coarse aggregate visible.
3. Use sufficient pressure on wood floats to bring moisture to surface.
4. After surface moisture has disappeared, hand steel trowel concrete to produce smooth, smooth dense surface, free from trowel marks.
5. Provide light steel-troweled finish (two trowelings) at air-entrained slabs. Provide hard steel-troweled finish (ringing sound from the trowel) for nonair-entrained slabs.
6. Do not use dry cement or additional water during troweling. Excessive troweling will not be permitted.
7. Power Finishing:
 - a. Approved power machine may be used in lieu of or in addition to hand finishing in accordance with directions of machine manufacturer.
 - b. Do not use power machine when concrete has not attained necessary set to allow finishing without introducing high and low spots in slab.
 - c. Do first steel troweling for slab S-1 finish by hand.

C. Type S-2 (Wood Float Finish):

1. Finish slab to receive fill and mortar setting bed by screeding with straightedges to bring surface to required finish plane.
2. Wood float finish to compact and seal surface.
3. Remove laitance and leave surface clean.

D. Type S-3 (Underside Elevated Slab Finish):

1. When forming is removed, grind off projections on underside of slab and repair defective areas, including small shallow air pockets where schedule of concrete finishes requires:
 - a. Prepare surfaces to match Type W-2 (Smooth Wall Finish).

E. Type S-5 (Broomed Finish):

1. Finish as specified for Type S-1 floor finish, except use only a light-steel troweled finish, and then finish surface by drawing fine-hair broom lightly across surface.
2. Broom in same direction and parallel to expansion joints, or, in case of inclined slabs, perpendicular to slope, except for round roof slab, broom surface in radial direction.

F. Type S-6 (Sidewalk Finish):

1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
2. Strike off surface by means of strike board and float with wood or cork float to true plane, then flat steel trowel before brooming.
3. Broom surface at right angles to direction of traffic or as shown.
4. Lay out sidewalk surfaces in blocks, as shown or as directed by Design Engineer, with grooving tool.

G. Concrete Curbs:

1. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
2. After concrete has taken its initial set, remove front form and give exposed vertical surface an ordinary wall finish, Type W-1.

3.06 CONCRETE SLAB TOLERANCES

A. Slab Tolerances:

1. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
2. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straightedge from resting on end blocks, nor low spots that allow block of twice the tolerance in thickness to pass under supported 10-foot straightedge.
3. Slab Type S-A: Steel gauge block 5/16 inch thick.
4. Slab Type S-B: Steel gauge block 1/8 inch thick.
5. Slab Type S-A and S-B:
 - a. Finish Slab Elevation: Slope slabs to floor drain and gutter. Floor slab shall drain after water stops flow regardless of tolerances.
6. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

B. Slab Elevation and Thickness:

1. Finish Slab Elevation: Slope slabs to floor drains and gutter. Slabs shall drain regardless of tolerances after water stops flow.
2. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown on Drawings. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

3.07 BEAM AND COLUMN FINISHES

- A. Type B-1: Match wall Type W-1.
- B. Type B-2: Match wall Type W-2.
- C. Type B-3:
 - 1. Repair rock pockets.
 - 2. Fill air voids.
 - 3. Match wall Type W-11.
- D. Type C-1: Match wall Type W-1.
- E. Type C-2: Match wall Type W-2.
- F. Type C-3:
 - 1. Fill air pockets.
 - 2. Match wall Type W-11.

3.08 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- B. Refer to General Structural Notes on Drawings for additional requirements, including elevated slab and diaphragm completion prior to backfill.
- C. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

3.09 FIELD QUALITY CONTROL

- A. General:
 - 1. Owner performed concrete tests are indicated in Section 01 31 13, Project Coordination. All other tests specified in this section but not listed in Section 01 31 13, Project Coordination shall be the responsibility of the Contractor.
 - 2. Provide adequate facilities for safe storage and proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
 - 3. Unless otherwise specified, sample concrete for testing for making test specimens, from point of delivery.

4. When concrete is pumped, sample and test air content at point of delivery and at point of placement.
 - a. For Each Concrete Mixture: Provided results of air content tests for first load of the day are within specified limits, testing need only be performed at point of delivery for subsequent loads of that concrete mixture except that testing should be performed at point of placement every 4 hours.
5. Evaluation will be in accordance with ACI 301 and Specifications.
6. Test specimens shall be made, cured, and tested in accordance with ASTM C31/C31M and ASTM C39/C39M.
7. Frequency of testing may be changed at discretion of Design Engineer.
8. Pumped Concrete: Take concrete samples for slump, ASTM C143/C143M, and test specimens, ASTM C31/C31M and ASTM C39/C39M, and shrinkage specimens (ASTM C157/C157M) at placement (discharge) end of line.
9. If measured air content at delivery is greater than specified limit, check test of air content will be performed immediately on a new sample from delivery unit. If check test fails, concrete has failed to meet requirements of Contract Documents. If measured air content is less than lower specified limit, adjustments will be permitted in accordance with ASTM C94/C94M, unless otherwise specified. If check test of adjusted mixture fails, concrete has failed to meet requirements of Contract Documents. Concrete that has failed to meet requirements of Contract Documents shall be rejected.

B. Concrete Strength Test:

1. Unless otherwise specified, one specimen at age of 7 days for information, and two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 28 days for acceptance.
2. Concrete with specified 56-day strength, test one specimen at age of 7 days for information, two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 28 days for acceptance, and two 6-inch diameter or when permitted three 4-inch diameter test specimens at age of 56 days for acceptance. Should results of 28-day tests meet specified requirement for 56-day strength, 56-day tests will not be required.
3. If result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of moist curing specified in Section 03 39 00, Concrete Curing, by 7 additional days.
4. Provide a minimum of one spare test specimen per sample. Test spare cylinder as directed by Design Engineer.

C. Shrinkage Tests:

1. When required to conform to shrinkage limits, collect actual concrete materials being batched and before liquids have been added to mix.
2. Mix sampled material in a laboratory at proportions matching batched concrete.
3. Test shrinkage characteristics every 5,000 cubic yards of concrete used on job and every 3 months during construction when compression test cylinders are made.
4. Concrete Shrinkage Limits:
 - a. Test in accordance with ASTM C157/C157M, with the following modifications:
 - 1) Prisms shall be moist cured for 7 days prior to 28-day drying period.
 - 2) Comparator reading at end of 7-day moist cure shall be used as initial length in length change calculation.
 - 3) Reported results shall be average of three prisms.
 - 4) If drying shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
 - 5) Results at end of 28-day drying period shall not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.038 percent if 4-inch prisms are used.
 - 6) If 7-day or 14-day shrinkage tests results exceed shrinkage limits established by design mix testing, furnish additional 14 days of water curing beyond original curing period, for concrete surfaces of hydraulic structures represented by prisms. Modify concrete mix design to reduce shrinkage prior to casting additional concrete on Project.

D. High-Range, Water-Reducer (Superplasticizer) Admixture Segregation Test:
Test each truck prior to use on Project.

1. Segregation Test Objective: Concrete with 4-inch to 8-inch slump shall stay together when slumped. Segregation is assumed to cause mortar to flow out of mix even though aggregate may stay piled enough to meet slump test.
2. Test Procedure: Make slump test and check for excessive slump and observe to see if mortar or moisture flows from slumped concrete.
3. Reject concrete if mortar or moisture separates and flows out of mix.

E. Tolerances:

1. Walls: Measure and inspect walls for compliance with tolerances specified in Section 03 10 00, Concrete Forming and Accessories.

2. Slab Finish Tolerances and Slope Tolerances:
 - a. Take floor flatness measurements day after floor is finished and before shoring is removed to eliminate effects of shrinkage, curing, and deflection.
 - b. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
 - c. Compliance with designated limits in four of five consecutive measurements is satisfactory, unless defective conditions are observed.

F. Liquid-Tightness Tests:

1. Purpose: To determine integrity and liquid-tightness of finished exterior and interior concrete surfaces of liquid containment structures.
2. Test ALL liquid holding structures for liquid-tightness.
3. Water for initial tightness test will be provided by Owner.
4. Contractor shall:
 - a. Provide means to transport water to structure to be tested.
 - b. If additional tightness tests are required because of failure to meet criteria, provide water for subsequent tests.
5. After testing has been completed, dispose of test water in a manner approved by Owner.
6. Liquid-Tightness Test Requirement:
 - a. Perform leakage test after concrete structure is complete and capable of resisting hydrostatic pressure of water test. Concrete shall have achieved its full design strength.
 - b. Perform tightness tests in accordance with ACI 350.1 and as specified herein.
 - c. Do not place backfill or install brick facing, grout topping slab, coatings, or other work that will cover concrete surfaces until tightness testing has been completed and approved.
 - d. Measure evaporation, precipitation, and temperature as specified.
7. Measure water surface at two points 180 degrees apart when possible where attachments, such as ladders exist, at 24-hour intervals.
8. Acceptance Criteria:
 - a. Volume loss shall not exceed 0.050 percent of contained liquid volume per 24-hour period, adjusted for evaporation, precipitation, and temperature.
 - b. Acceptance that structure has passed tightness test shall be based on total volume loss at end of specified test period.
 - c. No damp spots or seepage visible on exposed surfaces. Damp spot is defined as sufficient moisture to be transferred to dry hand upon touching.

9. Repairs When Test Fails:
 - a. Dewater structure; fill leaking cracks with crack repair epoxy as specified in Section 03 64 23, Epoxy Resin Injection Grouting.
 - b. Patch areas of damp spots previously recorded, and repeat water leakage test in its entirety until structure successfully passes acceptance criteria in the previous section.

3.10 MANUFACTURER'S SERVICES

- A. Provide representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection, and certification of proper installation for concrete ingredients, mix design, mixing, and placement.
 1. Concrete Producer Representative:
 - a. Observe how concrete mixes are performing.
 - b. Be present during first placement of each type of concrete mix.
 - c. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project, including instructions for redosing.
 - d. Establish control limits on concrete mix designs.
 - e. Provide equipment for control of concrete redosing for air entrainment or high-range, water-reducing admixture, superplasticizers, at Site to maintain proper slump and air content if needed.
 2. Admixture Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.
 3. Bonding Agent Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.

3.11 PROTECTION OF INSTALLED WORK

- A. After curing as specified in Section 03 39 00, Concrete Curing, and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage as a result of other construction work.
- B. Repair areas damaged by construction, using specified repair materials and approved repair methods.

3.12 SCHEDULE OF CONCRETE FINISHES

- A. Form Tolerances: As specified in Section 03 10 00, Concrete Forming and Accessories.
- B. Special Floor Finishes: As specified in Section 03 35 00, Concrete Finishing.
- C. Provide concrete finishes as scheduled:

Area	Type of Finish	Required Form Tolerances
Exterior Wall Surfaces		
Abovegrade/exposed (above point 6” below finish grade)	W-2	W-B
Abovegrade/covered with brick veneer or other finish material	W-1	W-A
Backfilled/waterproofed (below point 6” below finish grade)	W-1	W-A
Backfilled/not waterproofed (below point 6” below final grade)	W-1	W-A
Interior Wall Surfaces		
Open top water-holding tanks and basins/not painted or coated	W-2	W-A
Covered water-holding tanks and basins/not painted or coated	W-1	W-A
Water-holding tanks, channels, and basins/painted or coated	W-5	W-A
Buildings, pipe galleries, and other dry areas/not painted or coated	W-2	W-A
Buildings, pipe galleries, and other dry areas/painted or coated	W-5	W-A
Exterior Slabs		
Roof slab/exposed	S-5	S-B
Roof slab/covered with roofing material	S-1	S-A
Water-holding tanks and basins/top of wall	S-5	S-B

Area	Type of Finish	Required Form Tolerances
Top of footing	S-2	S-A
Clarifier slabs	S-2, S-7	S-A
Other water-holding tanks and basins	S-1	S-A
Stairs and landings	S-5	S-B
Sidewalks	S-6	S-B
Other exterior slabs	S-5	S-A
Interior Slabs		
Buildings, pipe galleries, and other dry areas	S-1	S-B
Slabs to receive mortar setting bed for tile	S-2	S-A
Slabs to receive resilient flooring or carpet	S-1	S-A
Hydraulic channels	S-1	S-A
Underside of elevated slabs	S-3	S-A
Beams and Columns		
Beams/coated	B-3	B-A
Beams/not coated	B-2	B-A
Columns/coated	C-3	C-A
Columns/not coated	C-2	C-A

3.13 SUPPLEMENTS

A. Requirements of concrete mix designs following “End of Section,” are a part of this Specification and supplement requirements of Part 1 through Part 3 of this section:

1. Concrete Mix Design, Class 5000F2S1P2C2.
2. Concrete Mix Design, Class 4500F2S1P1C1.
3. Concrete Mix Design, Class 4500F1S1P0C1.
4. Concrete Mix Design, Class 4000F0S1P0C0.

END OF SECTION

CONCRETE MIX DESIGN, CLASS 5000F2S1P2C2

- A. Mix Locations:
 - 1. Flow Equalization Tank Walls.
 - 2. Typical, unless otherwise specified.

- B. Exposure Categories and Classifications: F3S1P2C2.

- C. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.40.
 - 2. Minimum concrete compressive strength (f'c) shall be 5,000 psi at 28 days.
 - 3. Designed to conform to shrinkage limits.
 - 4. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - a. Slabs to receive hard-troweled finish.
 - b. Slabs to receive dry shake floor hardener.
 - c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
 - 5. Reservoir core walls shall have air content not greater than 2 percent.
 - 6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
3/8	4.0
1/2	4.0
3/4	4.0
1	4.0
1-1/2	4.0

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
<p>‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.</p> <p>*Tolerance of air content is +1-1/2 percent.</p> <p>§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.</p>	

7. Maximum Aggregate Size:
 - a. Flow Equalization Tank Walls: 1-inch.
8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II and Type V; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II or Type V, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - c. ASTM C595/C595M Type IP or Type IS (slag content less than 70 percent), tested to comply with moderate sulfate resistance option (MS).
 - 1) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 680 pounds per cubic yard for 1-inch nominal maximum size aggregate.

10. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.

- D. Refer to Part 1 through Part 3 of this section for additional requirements.

CONCRETE MIX DESIGN, CLASS 4500F2S1P1C1

- A. Mix Locations: Foot Bridge, Equipment Pads as shown on structural drawings, Tank Roof slab, Tank Foundation slab, and columns.
- B. Exposure Categories and Classifications: F2S1P1C1.
- C. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.45.
 - 2. Minimum concrete compressive strength (f'c) shall be 4,000 psi at 28 days and 4,500 psi at 56 days.
 - a. Designed to conform to shrinkage limits.
 - b. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - 1) Slabs to receive a hard-troweled finish.
 - 2) Slabs to receive a dry shake floor hardener.
 - 3) Slabs to receive a topping placed monolithically as a two-course floor on top of plastic concrete.
 - c. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
3/8	4.0
1/2	4.0
3/4	4.0
1	4.0
1-1/2	4.0

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
<p>‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.</p> <p>*Tolerance of air content is +1-1/2 percent.</p> <p>§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on sieved fraction passing 1-1/2-inch sieve in accordance with ASTM C231/C231M.</p>	

3. Maximum Aggregate Size:
 - a. Flow Equalization Tank Slab on Grade: 3/4-inch.
 - b. Other Locations Unless Noted Otherwise on Drawings: 1-inch.
4. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II or Type V; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - 3) ASTM C595/C595M Type IP or Type IS (slag content less than 70 percent), tested to comply with moderate sulfate resistance option (MS).
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent, unless otherwise specified.
 - a. Regardless of Assigned C Exposure Class, for Prestressed and Post-Tensioned Concrete: 0.06 percent.
 - b. Limits are stated in terms of chloride ions in percent by weight of cement.
 - c. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.

D. Refer to Part 1 through Part 3 of this section for additional requirements.

CONCRETE MIX DESIGN, CLASS 4500F1S1P0C1

A. Mix Locations:

1. Electrical duct banks.
2. Pipe encasements that are not cast monolithically with concrete base mats or slabs.
3. Where specified in Contract Documents.

B. Exposure Categories and Classifications: F1S1P0C1.

C. Mix Properties:

1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.45.
2. Minimum concrete compressive strength (f'c) shall be 3,500 psi at 28 days and 4,500 psi at 56 days.
3. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - a. Slabs to receive hard-troweled finish.
 - b. Slabs to receive dry shake floor hardener.
 - c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
4. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
3/8	6.0
1/2	5.5
3/4	5.0
1	4.5
1-1/2	4.5
2§	4.0

Nominal Maximum Aggregate Size in. ‡	Air Content (%)*
3§	3.5
<p>‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.</p> <p>*Tolerance of air content is +1-1/2 percent.</p> <p>§Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on the sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on the sieved fraction passing the 1-1/2-inch sieve in accordance with ASTM C231/C231M.</p>	

5. Maximum Aggregate Size:
 - a. Pipe Encasements: 1-inch.
 - b. Other locations as noted on Drawings.
6. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II; inclusion of supplementary cementitious materials in design mix is optional.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - 3) ASTM C595/C595M Type IP or Type IS (slag content less than 70 percent), tested to comply with moderate sulfate resistance option (MS).
 - a) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent, unless otherwise specified.
 - a. Regardless of Assigned C Exposure Class, for Prestressed and Post-Tensioned Concrete: 0.06 percent.

- b. Limits are stated in terms of chloride ions in percent by weight of cement.
 - c. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
- D. Refer to Part 1 through Part 3 of this section for additional requirements.

CONCRETE MIX DESIGN, CLASS 4000F0S1P0C0

- A. Mix Locations: Concrete curbs and sidewalks.
- B. Exposure Categories and Classifications: F0S1P0C0.
- C. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.50.
 - 2. Minimum concrete compressive strength ($f'c$) shall be 3,000 psi at 28 days and 4,000 psi at 56 days.
 - 3. There are no restrictions on air content except that air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
 - a. Slabs to receive hard-troweled finish.
 - b. Slabs to receive dry shake floor hardener.
 - c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
 - 4. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II.
 - b. ASTM C150/C150M types other than Type II, plus supplementary cementitious materials in accordance with one of the following:
 - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
 - 2) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - c. ASTM C595/C595M Type IP or Type IS (slag content less than 70 percent), tested to comply with moderate sulfate resistance option (MS).
 - 1) Provide documentation of test results in accordance with ASTM C1012/C1012M, for combinations of cementitious materials providing sulfate resistance with expansion less than 0.10 percent at 6 months.
 - 5. Limit water-soluble, chloride-ion content in hardened concrete to 1 percent, unless otherwise specified.
 - a. Limits are stated in terms of chloride ions in percent by weight of cement.
 - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.

- D. Refer to Part 1 through Part 3 of this section for additional requirements.

SECTION 03 31 40
PRESTRESSED CONCRETE TANK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section covers the complete furnishing and installation of seven-wire strand for circumferential and thread bars for vertical prestressing, of concrete walls, special forming requirements and the complete shotcrete application. This section also covers the qualifications for the Tank Subcontractor. In addition, this section covers general requirements for the tank and construction materials used in the tank. In the event of a discrepancy between this section of the Specifications and any other section of the Specifications, this section shall govern. The words “stressing machine” may refer to either circumferential wrapping machinery or vertical tendon stressing equipment.
- B. Furnish and construct the prestressed concrete reservoir of the capacity shown on Drawings, consisting of a flat concrete roof with circular concrete support columns, concrete floor and a poured-in-place concrete core wall, post-tensioned vertically with steel tendon rods and circumferentially with galvanized wrapped strand protected with several coats of shotcrete.
- C. The tanks shall conform to the dimensions and be equipped with the appurtenances shown on Drawings, and as specified herein.
- D. Concrete work shall conform to the provisions of Section 03 30 00, Cast-in-Place Concrete, as supplemented and modified by this section.

1.02 RELATED SECTIONS

- A. Related sections include the following:
 - 1. Section 01 33 00, Submittal Procedures.
 - 2. Section 03 10 00, Concrete Forming and Accessories.
 - 3. Section 03 21 00, Steel Reinforcement.
 - 4. Section 03 23 00, Seismic Cabling.
 - 5. Section 03 25 50, Tank Wall Base and Top Joint.
 - 6. Section 03 30 00, Cast-in-Place Concrete.
 - 7. Section 03 64 23, Epoxy Resin Injection Grouting.
 - 8. Section 07 14 00, Fluid-Applied Waterproofing.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. A416, Specification for Uncoated Seven-Wire Stress-Relieved Steel Strand for Prestressed Concrete.
 - b. A722, Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete.

1.04 TANK SUPPLY AND INSTALLATION WORK

A. It is the intent of these Specifications to obtain a tank installation with a focus on overall safety, quality and quality control, both during and after the construction process. Only Tank Subcontractors experienced in the supply and construction of strand wrapped prestressed concrete tanks are qualified to bid on and construct this tank project. The Tank Subcontractor shall have successfully completed at least three circular prestressed concrete tanks of at least one-half of the diameter, height and capacity.

1. All tanks listed for the Subcontractor's experience requirements must have been built in the Subcontractor's own name. Experience of personnel associated with the Subcontractor or hired by the Subcontractor are not acceptable. Subcontractor shall submit the name and location of the City and the completion dates of three tanks meeting the requirements listed above and on which the proposed qualifying "stressing machine" and automated shotcrete equipment has been used.

B. The Owner is desirous of obtaining a concrete tank that will not develop structural and aesthetic problems. Therefore, as evidenced by these Specifications and Drawings, a strong emphasis has been made on performance to assure desired details and proven construction methods are utilized to provide the highest quality structure available. For example, the stringent forming and pouring methods, the close-tolerance continuously recorded circumferential prestressing and the automated shotcrete specified are only three of many ways that will help prevent structurally deficient problems from occurring during the service life of the tank. It is imperative that the specified features of these Documents be strictly adhered to.

1.05 TANK CONSTRUCTION

- A. Tank construction shall comply with the basis of the methods, material, and equipment shown on Drawings, and specified in these Specifications. The Specifications and Drawings are based on proven construction techniques that result in successful low-maintenance tank storage performance. The following specific design criteria and salient characteristics are considered essential to the successful construction of the specified prestressed concrete tank:
1. Adaptability of liners, as specified herein, to be used under floor and subgrade to prevent water migration.
 2. Capability of subgrade to be compacted with heavy equipment.
 3. Capability of floor and footing to expand and contract.
 4. Satisfactory response of tank under seismic conditions.
 5. A "freed" condition between wall and wall-footing by use of neoprene bearing pads.
 6. A PVC waterstop between each core wall and floor-footing.
 7. Properly formed, poured, and reinforced core walls.
 8. Concrete floor, walls and roof of the thickness, strength, and cement content specified herein.
 9. A reduced number of wall joints.
 10. A PVC waterstop between each vertical wall joint.
 11. Quantity of vertical prestressing and the type of positive anchoring system as specified herein.
 12. Vertical prestressing tendons consisting of individual galvanized thread bars encased in PVC tubing.
 13. Epoxy pumping of all vertical prestressing tendons around thread bars.
 14. External, continuously strand wrapped circumferential prestressing providing the desired bond with the shotcrete in addition to the final force specified (No stressing system based on single strand wrapping, pulling strand through a die or jack-operated, circumferential tendon or cable systems, based on circumferential movement of the prestressing steel after it is placed in/around the wall, will be allowed).
 15. Positive anchoring system of circumferential prestressing to the core wall and spaced as shown on Drawings.
 16. Maximum allowable spacing of circumferential prestressing as specified.
 17. Galvanized circumferential prestressing for long-life prestressing forces.
 18. Continuous and instantaneous recording and correction of all applied prestressing forces.
 19. A maximum acceptable stress tolerance plus or minus 1.5 percent at any point along the prestressing steel.
 20. No variation in prestressing forces due to friction losses.
 21. Automated, wet-mix 10-sack shotcrete applied over a fully sandblasted concrete core wall.

22. External moisture protection as specified herein.
23. Conventional two-way, flat slab reinforced concrete roof and slope as shown on Drawings (No post-tensioned, precast, waffle, dome or other types of roof systems will be allowed).
24. Wall-roof connection as shown on Drawings.
25. An acceptable tank leakage rate as specified herein.

1.06 SUBMITTALS

- A. Section 01 33 00, Submittal Procedures: Procedures for Submittals.
- B. Submit five copies of the circumferential prestressing wrapping schedule and the intermediate lock-off elevations for the Design Engineer's review and approval before the wall pour is made.
- C. Submit mill certifications for the seven-wire strand, high-strength threaded bars, and all prestressing related material to verify conformance to these Specifications.
- D. Submit shotcrete mix design including results of 7-day, 14-day, and 28-day compression tests.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Prestressing steel shall be adequately packaged against intrusion of chemical contaminants (from the atmosphere or otherwise) for the protection of the steel against physical damage and corrosion during (and subsequently as the result of) shipping and storage.
- B. Prestressing steel that has sustained physical damage through rust or otherwise will be rejected.
- C. All materials and prestressing material delivered to the Job Site shall be stored off the ground on planks, supported by 4-inch by 4-inch timber, which must be covered with polyethylene or sizalkraft paper to prevent any moisture from coming up from the bottom.
- D. Reels of strand, prestressing tendons, anchorages, etc., shall be stacked neatly and as compact as possible.
- E. All materials for tendons and all fabricated thread bars shall be covered with tarpaulins in such a manner that water, rain, moisture, and dust are kept away.

PART 2 PRODUCTS

2.01 SEVEN-WIRE STRAND

- A. Hot-dipped galvanized seven-wire strand used for circumferential strand wrapping prestressing and seismic cables shall meet the following minimum requirements:

	Item	Specifications	
1.	Nominal strand diameter	3/8"	1/2"
2.	Nominal area after galv. (in ²)	0.089	0.153
3.	Nominal weight (lbs/1,000 LF)	303	541
4.	Pitch (strand dia.)	12-16	12-16
5.	Tensile strength (lbs) min.	21,400	38,200
6.	Yield strength @ 1% extension (lbs) min.	16,000	28,500
7.	Elongation in 24-inch at fracture min.	4.5%	4.5%
8.	Weight of zinc coating (oz/sq ft) min.	0.85	0.85

- B. Hot-dipped galvanized seven-wire strand shall be manufactured in accordance with ASTM A416 prior to galvanizing.
- C. Single wire prestressing material shall not be utilized in lieu of seven-wire strand prestressing material.

2.02 HIGH-STRENGTH THREADBARS – GALVANIZED

- A. Deformations of the thread bars shall form a screw-thread suitable for mechanically coupling lengths of thread bar and for positive attachment of anchor assemblies.
- B. Deformations shall conform to ASTM A722, Type II requirements and shall be uniform such that any length of bar may be cut at any point and the internal threads of a coupling designated for that size of bar can be freely screwed on the bar. The bars and their deformations shall be hot rolled.

- C. Tensile and Physical Properties shall meet the following requirements with bars being manufactured in accordance with ASTM A722, Type II:

Item		Unit	Specifications	
1.	Nominal diameter	inches	1.25	1.375
2.	Min. tensile force	kips (min.)	187	237
3.	Yield force at 0.2% offset	kips (min.)	150	190
4.	Elong. in 20 bar diameters	% (min.)	4	4
5.	Nom. cross-sectional area	sq. in.	1.245	1.577
6.	Nominal bar weight	lbs/ft.	4.39	5.56
7.	Min. wt. of zinc coating	oz/sq. ft.	0.85	0.85

- D. Thread bars with quenched or tempered steels will not be permitted and shall have a maximum carbon content of 0.55 percent. Only manufacturers that can provide projects of where the manufacturing of post-tensioning material has been accepted and approved along with certifications for post tensioning will be accepted.

2.03 ANCHORAGES FOR VERTICAL POST-TENSIONED THREAD BARS

- A. All post-tensioned prestressing shall be secured at the ends by means of approved permanent anchoring devices, which shall hold the prestressing steel at a force not less than 95 percent of the guaranteed minimum tensile strength of the prestressing steel.
- B. The load from the vertical prestressing anchoring device shall be distributed to the concrete through steel bearing plates of dimensions and details shown on Drawings.
- C. All vertical prestressing anchor plate dimensions, all dimensions relating to the conical hole in the top and bottom of the bearing plate (35-degree cone angle with the vertical), all steel tubing attached to the top bearing plate, and all tendon spacings shall strictly conform to the details shown on Drawings.
- D. Fully-threaded anchor connections shall be used at both ends of the vertical prestressing bar, which shall incorporate a spherical-shaped bearing surface to match the conical surface in the bearing plate.
- E. The contact point of the spherical-shaped vertical prestressing bearing surface to conical hole shall be approximately 1/4 inch to 1/2 inch below the bearing plate surface.

- F. Wedge anchors shall not be used for permanent anchor hardware.

2.04 TESTING OF PRESTRESSING MATERIAL

- A. Tank Subcontractor shall furnish, at their own expense, mill test certificates showing the dimensional and physical characteristics of each size, heat or reel of the prestressing steel they have furnished. Additional tests by a local testing laboratory and at Contractor's expense will be required for incomplete certificates and prestressing steel of foreign origin.
- B. Tank Subcontractor shall furnish evidence, to the satisfaction of the Design Engineer, prior to the preparation of Shop Drawings and installation of vertical tendons, that the proposed thread bar anchorage system meets the requirements of these Specifications. The Design Engineer may order additional tests to be taken. Should such additional tests not meet the Specifications, such expenses shall be paid for by the Contractor.
- C. Before any stressing operation may be started, Tank Subcontractor shall calibrate all recording equipment at an approved testing laboratory to the satisfaction of the Construction Manager.
- D. All continuous force readings for either the vertical or the circumferential prestressing operations shall be developed with electronic (or the substantial equivalent) force (strain gauge method) sensing transducers, all having a maximum nonlinearity error of plus or minus 0.5 percent and a maximum hysteresis error of plus or minus 0.25 percent.

2.05 ANCHOR POCKETS FOR VERTICAL TENDONS

- A. Anchor pockets for vertical prestressing tendons shall consist of steel cans, hot-dipped galvanized after cutting (unless shown otherwise on Drawings), and subsequently welded to the top bearing plate.
- B. Anchor pockets shall be adequately sealed from moisture and concrete intrusion by wooden lids and 2-inch wide plastic adhesive tape. Remove the lid after roof pour and grout void solid after prestressing.
- C. Anchor pockets for vertical prestressing thread bars must have adequate provisions for flushing of ducts with water during concrete placement.

2.06 DUCTS FOR VERTICAL THREAD BARS

- A. Duct enclosures for vertical prestressing steel shall be standard PVC pipe of size and class specified on Drawings.

- B. All ducts shall be provided with expandable valves to facilitate the injection of epoxy after prestressing.
- C. All connection details shall be as shown on Drawings.

2.07 EPOXY GROUT FOR VERTICAL THREAD BAR TENDONS

- A. The vertical tendon system shall provide complete 2-part epoxy protection of the prestressing steel inside ducting and anchors.
- B. Acceptable epoxy grout product is Select Injection Epoxy NC, distributed by SPG, Upland, CA (909) 985-5771. Or approved equal material may be used.
- C. Portland cement grout will not be accepted.

2.08 PORTLAND CEMENT

- A. Portland cement for the tank construction and shotcrete shall meet the requirements set out in Section 03 30 00, Cast-in-Place Concrete.

2.09 SHOTCRETE

- A. Fine aggregates shall meet the requirements set out in Section 03 30 00, Cast-in-Place Concrete.
- B. Well-graded coarse sand shall be used for all shotcrete applications.
- C. Coarse sand shall generally consist of the following gradation:

Sieve Size	% Passing by Weight
3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	10 - 30
No. 100	2 - 10
The fineness modulus shall fall between 2.70 and 3.00.	

- D. Plaster sand shall be used for the final shotcrete surfaces where a smooth finish is required and shall meet the following gradation:

Sieve Size	% Passing by Weight
3/8 inch	100
No. 4	97 - 100
No. 8	90 - 98
No. 16	70 - 85
No. 30	35 - 55
No. 50	15 - 25
No. 100	2 - 8
The fineness modulus shall fall between 2.40 and 2.75.	

- E. Rebound materials shall not be reused in any form for shotcrete. Rebound is defined as aggregate mixed with cement, which ricochets off the surface during the application of shotcrete because of collision with a harder surface, reinforcement, or other aggregate particles.
- F. Water shall meet the requirements set out in Section 03 30 00, Cast-in-Place Concrete.
- G. Air-entrainment and admixtures shall meet the requirements specified in Section 03 30 00, Cast-in-Place Concrete.
- H. All shotcrete, unless otherwise specified herein, shall be fibrous reinforced. Such material shall consist of 100 percent virgin polypropylene fibrillated fibers specifically manufactured for use as concrete/shotcrete secondary reinforcement. The required volume of fibers to be added per cubic yard of shotcrete shall be as specified in these Specifications.
1. The fibers shall be manufactured in accordance with applicable building codes and ASTM C1116 Type III 4.1.3. and ASTM C1116 (Ref. ASTM C1018) Performance Level I_s as outlined in Section 21, Note 17. Fibrous concrete reinforcement shall be as manufactured by the Fibermesh Company, Chattanooga, TN, telephone (615) 892-7243, or approved equal.
 2. Acceptable polypropylene fibers shall have the following physical characteristics:
 - a. Specific Gravity: 0.91.
 - b. Tensile Strength: 80 ksi to 110 ksi.
 - c. Fiber Length: Graded per manufacturer.

- I. See Drawings for shotcrete color.

2.10 SHOTCRETE PROPORTIONING

- A. Each cubic yard of mortar in the ready mix truck or mixer shall consist of 0.1 percent (1.5 pounds per cubic yard) polypropylene fibers as specified herein and a mix ratio of 3 pounds of moist sand to 1 pound of portland cement. Up to 50 ounces of Pro-Krete-R or Pozzolith 300R may be added at the option of Tank Subcontractor during warm weather conditions.
- B. Whenever night temperatures are expected to drop below 35 degrees F, shotcrete proportioning shall follow the provisions of ACI 306R, Cold Weather Concreting.
- C. If the batching procedure requires that smaller volumes of cement and sand be used, the required cement-to-sand ratio shall still be strictly followed.
- D. Additives other than Pro-Krete-R or Pozzolith 300R shall not be used unless specifically approved by the Design Engineer.
- E. If used by the shotcreter, the total volumetric air content of the shotcrete before placement shall not exceed 7 percent (plus or minus 1 percent) as determined by ASTM C173 or ASTM C231.
- F. Unless otherwise specified on Drawings, shotcrete cylinder strengths at 28 days shall be no less than 5,000 psi. Higher shotcrete cylinder strengths shall not permit a reduction in the above specified cement contents. The cement content in the above mix designs may be increased should the specified 28-day strength requirement not be met.
- G. The polypropylene fibers and admixtures shall be added to the shotcrete at the time it is batched and in the amounts specified herein. These additives shall be mixed in strict conformance to the manufacturer's instructions and recommendations for uniform and complete distribution. Each certificate of delivery supplied by the shotcrete supplier shall indicate the additive trade name, manufacturer's name and amount per cubic yard added to each batch of shotcrete.

2.11 WALL FORMS

- A. The wall form design shall be such that wall sections can be poured full height without creating horizontal cold joints and without causing snapping of form ties which shall be of sufficient strength and number to prevent spreading of the forms during the placement of concrete and which shall permit ready removal of the forms without spalling or damaging the concrete. Formwork

shall conform to the requirements of Section 03 10 00, Concrete Forming and Accessories.

2.12 ROOF FORMS

- A. Forms and falsework supports for the roof slab shall be sufficiently rigid and have the strength to support the wet concrete, the workers, and equipment necessary for its placement within acceptable deflection limits. Formwork shall conform to the requirements of Section 03 10 00, Concrete Forming and Accessories.

PART 3 EXECUTION

3.01 CIRCUMFERENTIAL PRESTRESSING EQUIPMENT

- A. The circumferential stressing system shall produce a continuously, electronically (or substantial equivalent) monitored permanent stress or force recording along the full length of the strand as it is being applied. The stress variation in any strand at any point around the circumference should not be greater than plus or minus 1.5 percent of the ultimate strength of the steel. In addition to this recording, any system which deflects the tensioned strand between the tensioning device and the wall, shall provide a similar continuously monitored stress or force record along the full length of the strand as it is being applied to the wall. These recordings shall show that either before or after deflection, that the stress variation in any strand at any point around the circumference shall not be greater than plus or minus 1.5 percent of the ultimate strength of the steel. No manual recorded force readings will be accepted.
- B. Any wrapping that does not meet the stress tolerances specified and/or cannot meet the requirements of above will not be accepted and will be removed at Contractor's expense. Contractor is responsible for all costs associated with meeting the specified tolerances.
- C. The prestressing system shall be capable of applying a continuous wrapped force at any point around the circumference within the specified tolerances. Circumferential stressing systems based on jack-operated cable or rod-type tendons (such as those placed inside of ducts incorporated in the corewall or placed manually around the exterior of the corewall) will not be allowed.
- D. Only machine wrapping systems which utilize seven-wire prestressing strandwrapping will be allowed.

3.02 CIRCUMFERENTIAL PRESTRESSING APPLICATION

- A. All cracks, 0.02 inch and larger in the corewall and floor slab, shall be repaired per Section 03 64 23, Epoxy Resin Injection Grouting, following the circumferential prestressing of the tank walls.
- B. Wrapped strand shall be anchored to the wall at least at the ends of every coil or reel. Submit anchoring method Shop Drawings to the Design Engineer for review.
- C. Permanently anchoring one strand to a previously wrapped strand will not be permitted.
- D. Wrapping strand ends shall be joined by suitable splicing methods that will develop 90 percent of the full strength of the strand. Submit splicing method Shop Drawings to the Design Engineer for review.
- E. Use of different alloys in the splicing material shall not be permitted.
- F. The temperature of the prestressed material during application shall not be allowed to increase by more than 50 degrees during such application. No system that relies on pulling the prestressing material through a die to create a force, will be allowed.
- G. Wrapping shall not start until the concrete has reached a compressive strength noted on Drawings; however, under no circumstance shall the compressive stress, exceed 55 percent of the compressive strength of the concrete attained at that time. The strength of the concrete shall be confirmed by the testing of concrete test cylinders taken from the concrete used for the wall sections.
- H. An initial shotcrete layer of 3/8-inch thickness shall be applied to the core wall prior to wrapping.
- I. The clear spacing between any two wrapped strands in the vertical direction shall be at least 1.5 strand diameters or 3/8 inch, whichever is larger. Any wrapped strands not meeting the spacing requirements shall be spread by approved methods or must otherwise be removed.
- J. In the event that gaps between the core wall and the wrapped strand develop that exceed 3/8 inch, wrapping shall be discontinued and the wall shall be built up with shotcrete to provide the proper curvature.
- K. Wrapping over intermediate shotcrete coats or built-up shotcrete areas may commence 12 hours after the shotcrete has been applied or when the shotcrete has reached a compressive strength of 400 psi, whichever is later.

3.03 VERTICAL PRESTRESSING EQUIPMENT

- A. The Tank Subcontractor shall provide a continuously, electronically (or substantial equivalent), monitored permanent force elongation record from zero to full force at the final lock-off for all vertical prestressing work.
- B. The ordinate of the permanent recording shall show the elongation in inches and the abscissa shall show the force in pounds or kips.
- C. Manually recorded force and elongation readings will not be accepted.
- D. The vertical high-strength thread bar stressing machinery shall have automatic electronic tensioning cut-off devices or equivalent means to ensure that the specified force and elongation is not exceeded at any time during the stressing operation.
- E. The force readings at the stressed bar ends, immediately after lock-off, for any stressing operation, on any thread bar, shall not fluctuate more than plus or minus 1.5 percent of the minimum ultimate strength of the steel from the desired average force setting.
- F. The applied force, immediately after lock-off of the stressing operation on any thread bar, shall be no less than 72 percent of the minimum ultimate strength of the steel and the applied force before lock-off shall be no greater than 75 percent.

3.04 VERTICAL PRESTRESSING APPLICATION

- A. All permanent anchor hardware shall have a ball-shaped threaded nut that can be screwed down on to a matching cone-shaped bearing surface in the bearing plate after the desired tension on the anchor hardware and/or prestressing steel has been applied.
- B. The number and spacing of the thread bars shown on Drawings shall not be altered under any condition.
- C. High-strength thread bars must be used for vertical prestressing.
- D. Vertical thread bar components shall be assembled off the ground and as detailed on Drawings. All vertical thread bars must be fully assembled before they are installed in the forms.
- E. Particular attention shall be paid to sufficiently taping damaged joint connections and holes in the PVC thread bar ducts.

- F. Anchor plates must be installed at right angles to the thread bar alignment near the anchor. Anchor plates must be installed with long sides, aligned parallel with the wall forms and secured to prevent their rotation while concrete is placed.
- G. The maximum permissible misalignment of anchor plate to tendon alignment is plus or minus 2.5 degrees.
- H. Vertical prestressing thread bars shall be accurately placed at the locations shown on Drawings, or as approved by the Design Engineer, and shall be securely fastened in place to reinforcing steel and form ties to prevent movement during placement of concrete. Placing of vertical tendons shall be done to proper locations, elevations and alignments, with a maximum tolerance of plus or minus 1/4 inch.
- I. Unless indicated otherwise on Drawings, the minimum concrete cover around steel anchor pockets and bearing plates shall be 1.5 inches.
- J. The vertical clearance between bottom anchor plate assembly and the waterstop at the base of the tank walls shall be no less than 2 inches nor more than 4 inches.
- K. All vertical thread bars must be flushed with water from the top immediately upon completion of the concrete vibrating operation. Water shall be introduced through a taped-off hole in the wooden lids on the anchor pockets and be permitted to drain through the bottom grout tube. Flushing shall not be accomplished by introducing water through the bottom connection.
- L. Flushing of ducts shall proceed after the pouring and vibrating of concrete around the thread bars ducts has been completed.
- M. Upon completion of the water flushing operation of vertical thread bar ducts, the ducts shall be given a short burst of compressed air from the top only to remove any accumulations of water at the bottom of the ducts.
- N. Cleaning of ducts with air only (not water), or removal of water with air from the bottom connection, will not be permitted.
- O. After the concrete corewall has reached the required compressive strength for prestressing listed on Drawings, the vertical thread bars shall be stressed to the level indicated on Drawings. Every other thread bar shall be stressed until all thread bars have been stressed to the prescribed level. This will require the prestressor to travel around the tank twice.
- P. After the stressed tendon has been locked-off the tendons shall be grouted as described below.

- Q. All ducts shall be clean and free of water and deleterious materials that would impair bonding of the grout or interfere with grouting procedures.
- R. Grout injection pipes shall be fitted with positive mechanical shutoff valves, which shall not be removed within the first 24 hours after grouting.
- S. Grouting of thread bar duct shall be started at the lowest grout connection.
- T. Grout shall be pumped into each vertical thread bar duct until the duct is filled completely and the entire nut at the top anchor has been covered. Pea gravel and/or silica sand may be placed (at Prestressor's option) around the top anchor nut prior to epoxy pumping.
- U. In cold weather, and especially during frosts, special precautions must be taken to avoid the freezing of grout. In the event that the grouting procedure cannot be postponed, the wall temperature must be kept above the freezing point with hot blankets or by other approved means.
- V. Upon completion of the vertical stressing and grouting operation, the inside surface of all the shear cans shall be coated with a two-part epoxy adhesive. Immediately after the epoxy coating has become tacky, all anchor pocket areas above the anchor nuts shall be drypacked with a one cement to two sand mortar mix, or alternately, the metal can may be filled with concrete aggregates and epoxy.
- W. The drypack surface shall be finished flush with the adjoining concrete surface.

3.05 CIRCUMFERENTIAL AND VERTICAL PRESTRESSING OPERATIONS

- A. The initial electronically (or substantial equivalent) recorded steel stress shall not exceed 75 percent of the guaranteed minimum ultimate strength (M.U.S.) of the steel at any time during or after stressing.
- B. An automatic, continuously electronically (or substantial equivalent) monitored permanent recording of the applied force, at any point on the strand, at any point on and around the tank wall, must be made during the entire circumferential prestressing application. All such recordings must be based on a continuous sensing of the applied force on the strand between the tensioning drum and the wall when, and as, the strand is being wrapped and laid on the wall.

- C. The force setting on wrapping and vertical thread bar stressing machinery shall be such that the applied forces fall within the specified minimum or maximum stress or force limitations; the force setting shall be corrected immediately when the applied force falls outside the required force tolerance limitations.
- D. In the event that the stressing machinery is incapable of holding the applied forces within the specified stress or force limitations, the Design Engineer will order, at Contractor's expense, the removal and replacement of such machinery in favor of a different unit capable of maintaining such tolerance requirements.
- E. The loss in stress in post-tensioned prestressing steel due to creep and shrinkage of concrete and sequence stressing has been assumed as 25,000 psi. The final stress is the average initial stress reduced by the stress loss of 25,000 psi.
- F. The final force is the steel section multiplied by the final stress.
- G. The final force for the vertical thread bars shall be no less than the required final force shown on Drawings.
- H. The initial force for the circumferential wrapped strand shall be no less than the required initial force shown on Drawings.
- I. The continuous, electronically-produced force application chart during the wrapping application becomes the property of the Owner.
- J. An automatic, continuously electronically (or substantial equivalent) monitored and simultaneously recorded force-elongation reading must be made for each vertical stressing application.
- K. The force-elongation reading must represent the true relationship between the elongation at any given point of the vertical stressing operation and the applied force on the prestressing steel at that same point.
- L. The force-elongation relationship must be constantly maintained from the beginning, starting with the removal of the slack to the point of lock-off and complete release of the force on the vertical prestressing steel after retraction of the stressing piston or equivalent stressing device.
- M. All electronically produced force-elongation readings during the vertical thread bar stressing operations become the property of the Owner.

3.06 SAFETY PRECAUTIONS

- A. Every precaution shall be taken to keep personnel and visitors outside the danger area of breaking strands or bars.
- B. At no time shall anyone stand in the line of the stressed vertical thread bars or stressed strand.
- C. No work shall be performed by anyone, other than the prestressing crew, within 100 feet of the wrapping operation or the application of the vertical tendon stressing operation.
- D. Where access to the site by unauthorized persons is outside the Contractor's control, while prestressing work is in progress, Contractor shall erect protective fencing to prevent breaking strand from endangering such persons.
- E. No welding to anchor plates is permitted after the tendons have been assembled. The prestressing steel shall not be used as a "ground" for welding operations.

3.07 ABRASIVE BLASTING

- A. Exterior surfaces of concrete walls shall be prepared prior to any shotcreting or strand wrapping may be started, to remove all deteriorated concrete and bond-inhibiting contaminants. The surface preparation shall achieve a minimum profile of ICRI CSP5 over a minimum of 90 percent of the surface area required to be prepared.
- B. The concrete surface shall have no traces of laitance, form-oil, original surface smoothness or surface color.
- C. In order to mitigate environmental concerns, conform to environmental constraints, and achieve the desired profile, the Tank Subcontractor shall utilize either a self-contained mechanical etching or shot blast system, combined with a vacuum recovery system, or a high pressure water jetting system with dust suppression equipment. Abrasive blasting systems which rely on sandblasting or steel shot without a vacuum recovery system or systems that have not been used successfully in the past to prepare surfaces for shotcreting and standwrapping will not be permitted.

3.08 SHOTCRETE EQUIPMENT

- A. Shotcrete mixing shall be in conformance with the requirements of Section 03 30 00, Cast-in-Place Concrete.

- B. The delivery equipment shall be of an approved design and size which has given satisfactory results in similar previous work.
- C. The equipment must be capable of discharging mixed materials into the hose under close control and it must be able to deliver a continuous smooth stream of uniformly mixed material at the proper velocity to the discharge nozzle, free from slugs of any kind.
- D. The nozzle shall be of a design and size that will ensure a smooth and uninterrupted flow of materials.
- E. Delivery equipment shall be thoroughly cleaned at the end of each shift.
- F. Equipment parts shall be regularly inspected and replaced as required.
- G. The air capacity of the compressor shall be large enough that the minimum amount of air to be available at the nozzle shall be no less than 400 cfm, irrespective of whether or not air from the same air supply is used for other purposes.

3.09 SHOTCRETE APPLICATION PROCESS

- A. Prior to application, testing lab shall verify all components, proportions of acceleration, nozzle certificate, equipment, and test panel fabrications.
- B. Shotcrete shall be applied under the wet mix process only.
- C. Nozzles shall be mounted on power driven machinery enabling the nozzle to travel parallel to the surface to be sprayed at a uniform linear or bi-directional speed.
- D. The nozzle shall be kept at a uniform constant distance from the surface, always insuring a right angle spray of the material to the surface.
- E. Hand operated nozzles and shotcreting operations dependent on the performance of the nozzleman will not be accepted except where additional shotcrete is needed to correct flat areas or for architectural surface treatments.
- F. Grout materials shall be delivered to the jobsite in ready-mix trucks from approved batching plants. However, job mixing will be accepted provided automatic weigh batch plants are used.
- G. The sand, cement, and water shall be premixed before being pumped through a 2-inch minimum hose by specially designed mortar pumps.
- H. The high velocity impact shall be developed pneumatically by injecting compressed air at the nozzle.

- I. The minimum air capacity to be furnished to the nozzle shall be 400 cfm.

3.10 SHOTCRETE PLACING AND FINISHING

- A. Shotcrete shall be applied in a steady, uninterrupted flow. Should the flow become intermittent for any cause, the machine operator shall direct the nozzle away from the work until it again becomes constant, or shut off the flow of materials.
- B. The nozzle shall be held at approximately right angles to the surface and shall be kept at the proper and the same distance from the surface dictated by good practice standards for the type of application, type of nozzle and air pressure employed.
- C. Sufficient time shall be allowed for each layer of shotcrete to set up so it may take the next layer without sagging.
- D. The shotcrete shall be started at the bottom of the wall until all wrapped strand has been covered. Subsequent shotcrete layers may be applied from the top down or from the bottom up at the discretion of the Tank Subcontractor.
- E. While the nozzle travels around the wall, the nozzle shall be raised or lowered at a uniform rate in such a manner that an adequate overlapping of coatings and a uniform finish will develop.
- F. The nozzle shall be spiraled up or down around the tank to either the top or the bottom of the wall or to the termination of the intermediate strand layer.
- G. To ensure proper penetration around the strand and proper conveyance of the material through the hose, a 5-inch to 7-inch slump of the mortar at the pump is recommended.
- H. Prewetting of the wall prior to the shotcrete application shall be done, even in arid areas. The moisture absorption by earlier applied layers is relied upon to improve the bond and strength of the material and to reduce drying shrinkage of the applied shotcrete.
- I. The application of the shotcrete in the number and thickness of layers specified herein is mandatory for proper penetration of shotcrete behind prestressing material and to reduce shrinkage due to more uniform in-depth drying of the shotcrete.
- J. Each layer of wrapped prestressing steel shall be covered with shotcrete until a minimum cover of 3/8 inch over the steel has been obtained.

- K. The final covercoat, to make up for the full thickness of shotcrete over the final strand layer, shall be applied in at least three layers of equal thickness.
- L. Each layer of shotcrete shall be completed for the full circumference of the tank and substantially the full height of that layer before the next layer of shotcrete may be applied.
- M. All shotcrete coatings shall be built up in layers of approximately 3/8 inch in thickness until the final required thickness has been obtained. The Tank Subcontractor shall demonstrate by a reliable means that the proper thickness of shotcrete has been obtained with each layer applied.
- N. Unless otherwise specified on Drawings, the minimum shotcrete cover over all wrapped steel shall be 2 inches.
- O. Install gauges to verify the 2-inch minimum shotcrete cover. The gauges shall be placed at a minimum of 4 feet on-center vertically with four equally spaced gauges placed circumferentially around the tank at each level.
- P. The shotcrete over areas where there is no wrapped steel shall be flush with the shotcrete over adjacent wrapped steel.
- Q. After the minimum shotcrete cover specified over the wrapped prestressing strand has been completed by the automated shotcrete procedure, and only if such finish requirements are shown on Drawings, the exterior surface shall be given an acceptable float finish true to line and curvature and to details shown on Drawings.
- R. If a float finish is required on Drawings, plaster or hand-applied shotcrete may be used to build up and level the surface and to obtain the desired surface finish and projections.
- S. The finish coat mix (if a smooth float finish is required on Drawings), shall consist of a minimum of one sack of cement for each 3-1/2 cubic feet of moist plaster sand.
- T. If no finish requirements are shown on Drawings, it is intended to have a natural original gun finish of the shotcrete cover coat.
- U. Contractor shall take every possible precaution to protect adjacent buildings, concrete surfaces, vehicles, equipment, etc., from being damaged by overshooting shotcrete and by materials carried away by the wind.
- V. Overshot shotcrete and rebound materials deposited on the roof shall be removed before it adheres to the concrete surface.

- W. Contractor shall pay for all damages caused by their operations under this Contract.

3.11 ARCHITECTURAL FINISH COAT

- A. After the minimum shotcrete cover indicated over the wrapped prestressing wire has been completed by the automated shotcrete procedure, the exterior surface shall be built-up using the details shown using plaster sand, and shall be given a troweled finish true to line and curvature and to details.
- B. Hand-applied shotcrete may be used to build up and level the surface and to obtain the vertical ribbed projections.
- C. The finish coat mix shall consist of a minimum of one sack of cement for each 3-1/2 cubic feet of moist plaster sand.

3.12 SHOTCRETE TESTS

- A. All shotcrete operations, testing, and prequalifying, shall conform to the entire Section 1910A of the 2016 CBC.

3.13 HAND PLACED SHOTCRETE FOR REPAIRS ONLY

- A. To ensure a high quality shotcrete, the Tank Subcontractor shall satisfy the Design Engineer that the nozzleman has had sufficient and acceptable experience in the application of structural shotcrete.
- B. Experience gained on shotcrete pool and ditch construction will not be considered as experience for qualifying the nozzleman, unless approved by the Design Engineer.
- C. The nozzleman shall be capable of applying thin coats of even and uniform thickness.
- D. The nozzleman's skill shall be tested and approved by the Design Engineer before they may start any work.

3.14 RESTRICTIONS ON SHOTCRETE OPERATION

- A. Shotcrete shall not be applied under such strong wind conditions that a considerable amount of cement and moisture will be removed by the wind from the mortar spray between the nozzle and the surface on which the shotcrete is applied.
- B. Shotcrete may be applied in cold weather provided the surfaces are not frozen.

- C. The temperature during the day must be expected to rise to at least 40 degrees F and the night temperature of the first night after the shotcrete application must not be expected to drop below 27 degrees F.
- D. The use of Type 3 portland cement is required in the event shotcrete is applied at temperatures below 40 degrees F.
- E. The Tank Subcontractor may apply shotcrete under those conditions solely at their own risk.
- F. Whenever rain or frost has damaged shotcrete which has not had a chance to set up, such shotcrete must be removed and replaced.
- G. Tank Subcontractor shall consult with the Design Engineer to determine whether or not they will accept the shotcrete damaged by rain or frost before applying any new layers of shotcrete.

3.15 SHOTCRETE WATER CURING

- A. Intermediate layers of shotcrete shall be kept damp by water curing or other means no sooner than 12 hours after the shotcrete has been applied.
- B. This water curing is not required should additional shotcrete be applied on the entire wall surface within the following 12 hours.
- C. An indiscriminate use of continuous water cure for intermediate layers should be avoided.
- D. Complete shotcrete surfaces, which do not receive any additional coatings, shall be membrane cured with plastic for a period of at least 7 days. Plastic membrane used shall contain and prevent loss of moisture from shotcrete as much as possible. Membrane curing methods utilizing curing compounds or wax-based residuals will not be permitted.
- E. Below grade exterior waterproofing specified in Section 07 14 00, Fluid-Applied Waterproofing, shall be applied no later than 5 days after completion of the curing. If conditions make it impossible to apply coatings within the 5-day period, or if no coatings are required, shotcrete shall be membrane cured for a period of 10 days instead of the 7 days specified herein.

3.16 CLEANING, DISINFECTING, AND WATERPROOFING

- A. After construction is completed, the interior of the tank shall be completely hosed out and cleaned of all dirt and loose material.

- B. Filling: Water for testing is described in Section 01 50 00, Temporary Facilities and Controls. Following the leakage tests, as described in this section, drain the reservoirs through the outlet pipeline.
- C. Roof, floor, and wall-footing cracks, which may have developed from drying shrinkage, shall not be taped or chipped out and caulked. All cracks shall be repaired in accordance with Section 03 64 23, Epoxy Resin Injection Grouting, prior to applying the interior coating (if specified) and exterior waterproofing.

3.17 TESTING AND REPAIRING LEAKS

- A. After filling the tank, the water level shall be held at the high water level for a period of 24 hours.
- B. The tank and the drain lines from the ring drain shall then be examined for evidence of leaks.
- C. All leaks shall be repaired to the satisfaction of the Construction Manager and Design Engineer.
- D. Leaks in floor construction joints may be detected with the aid of a diver.
- E. Mud or cement deposits on the floor, when stirred up, would flow to the leak and may so indicate where the leaks are.
- F. Honeycomb and cracks around waterstops may be detected through tapping with a hammer along the joint.
- G. The Design Engineer may insist upon any of these procedures when cement seeding has not stopped the leaks.
- H. Leakage through joints, which is suspected to be a result of bent over waterstops or honeycomb under or around waterstops will require removal of concrete around the waterstops in suspected areas, if directed by the Design Engineer.
- I. Chipped out concrete areas shall be properly drypacked with a mix of one cement to two coarse sand, after coating the existing concrete surface with an approved epoxy.
- J. The maximum allowable leakage rate of the completed tank shall not exceed 0.05 percent of the tank capacity in any 24-hour period when tested in accordance with ACI 350.1. If, at the end of 5 days the average daily leakage does not exceed the maximum allowable, the test shall be considered satisfactory. All visible running leaks shall be repaired to the satisfaction of

the Design Engineer. Small damp spots (where visible in the case of above ground tanks) may be accepted during the first 6 months of operation; should they not have healed by then, the Owner or Construction Manager may order the immediate repair of such areas. Any cracks, voids, honeycomb or cold joints showing or causing running leaks of water, shall be epoxy pumped by qualified operators until such cracks and voids have been completely sealed. If leakage continues and if allowed by the Design Engineer, the floor shall be covered with a minimum of 2 inches of water and pure cement shall then be spread evenly over the entire floor area at the rate of one sack of cement to every 1,000 square feet of floor area. The floor shall not be allowed to dry after the application of cement. Should repeated cement seeding fail to seal the cracks, each crack shall be pumped and sealed with a two-part water insensitive epoxy. If the Contractor elects to seal the tank floor, the Contractor shall be required to remove all cement residue from the tank and clean to the Construction Manager's satisfaction.

- K. The tank shall not be backfilled until and unless the Design Engineer and Construction Manager have accepted the tests. Once authorized to backfill, the tank shall be at least half full when the tank is backfilled. The backfill shall be placed equally around the tank as it is compacted, it shall not be piled against one portion of the perimeter unevenly. No track driven equipment shall be within 5 feet of the tank wall during backfilling operations without the approval of the Design Engineer.

END OF SECTION

**SECTION 03 35 00
CONCRETE FINISHING**

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM): C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-In. or 50-Mm Cube Specimens).

1.02 SUBMITTALS

A. Action Submittals: Manufacturer's product data sheet(s).

B. Informational Submittals:

1. Agenda: Conference prior to slab placement.
2. Manufacturer's written procedures for slab preparation, product application, protection of finished surface, and post-application cleanup.
3. Product manufacturers representatives' names and phone numbers.
4. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for products to be furnished.
5. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
6. Statement of Qualifications:
 - a. Manufacturer's Product Service Record.
 - b. Application personnel.
 - c. Manufacturer's representative.
7. Manufacturer's installation instructions.
8. Manufacturer's written instructions for maintenance and repair of floor finishes installed.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer's Product Service Record: Experienced providing concrete finishing products as specified.
2. Floor Product Manufacturer: Manufacture components of floor material, except the epoxy, in own plant and under control of trained quality control manager.

3. Application Personnel: Four previous projects of successful installation of specified materials or manufacturer's training.
- B. Preinstallation Training: Manufacturer-approved training of application personnel and quality control inspectors for these floor finishes.
- C. Conference Prior to Slab Placement:
1. Conducted by Contractor.
 2. Agenda:
 - a. Concrete mix design.
 - b. Placing techniques.
 - c. Finishing techniques.
 - d. Floor hardener application procedures.
 - e. Equipment required for these procedures.
 3. Attendees:
 - a. Contractor's superintendent.
 - b. Subcontractor's representative involved in slab installation and finishing.
 - c. Design Engineer.
 - d. Construction Manager.
- D. Mockups: Install one 10-foot by 20-foot area for each type of finish floor to demonstrate that the material and methods produce a finished product acceptable to the Design Engineer.
1. Mockup will establish the standard of quality for floor finishes.
 2. Use specified materials at a location designated by Design Engineer or Owner.
 3. Notify Construction Manager 5 days in advance of commencement of mockup floor slab application and training.
 4. Do not purchase floor materials until mockup slab installation has been accepted by the Design Engineer or Owner.
- E. Color Samples: Minimum 2-inch by 2-inch Sample applications of floor finishes available.

PART 2 PRODUCTS

2.01 CLEAR LIQUID SEALER DUST PROOFER

- A. Colorless, aqueous solution of zinc and magnesium fluorosilicate.
- B. Each gallon of solution shall contain a minimum of 2 pounds of fluorosilicate compound.

C. Manufacturers:

1. Master Builders Co., Cleveland, OH.
2. Sonneborn, Minneapolis, MN.
3. Euclid Chemical Co., Cleveland, OH.
4. Or approved equal.

2.02 DRY SHAKE HARDENERS

- A. Mix: Surface hardener with metallic or natural aggregate, premixed and packaged at factory, delivered to Site ready to apply.
- B. Natural Aggregate: Mixture of specially processed graded iron aggregate, selected portland cement, and necessary plasticizing agents formulated, processed, and packaged under stringent quality control at the manufacturer's factory.

1. Manufacturers and Products:

- a. Natural concrete gray, "Surflex" by Euclid Chemical Co. or "Mastercron" by Master Builders, Cleveland, OH.
- b. Colored and high reflective (white) "Surflex" by Euclid Chemical Co. or "Colorcron" by Master Builders, Cleveland, OH.
- c. Light reflective, (off-white) 50 percent light reflective "Surflex" by Euclid Chemical Co. or "Light Reflective Mastercron" by Master Builders, Cleveland, OH.
- d. Or approved equal.

- C. Metallic Aggregate: Metallic aggregate, cementitious binder, plasticizer, water-reducing admixtures, and other ingredients free from nonferrous particles, rust, and material intended to disguise rust.

1. Manufacturers and Products:

- a. Natural, concrete gray, and colored "Euco-Plate HD" by Euclid Chemical Co. or "Masterplate 200" by Master Builders, Cleveland, OH.
- b. Light reflective, (off-white) 50 percent to 57 percent reflectivity "Light Reflective Euco-Plate HD" or "Light Reflective Masterplate 200" by Master Builders, Cleveland, OH.
- c. "Light Reflective Nonoxidizing" (off-white) 50 percent to 57 percent reflectivity. Composed of specially processed nonoxidizing metallic aggregate and other proprietary ingredients with light reflective properties; "Lumiplate" by Master Builders, Cleveland, OH, or "Light Reflective Diamond Plate" by Euclid Chemical Co., Cleveland, OH.
- d. Or approved equal.

PART 3 EXECUTION**3.01 CLEAR LIQUID SEALER DUST PROOFER APPLICATION**

- A. Before application, thoroughly cure floors to receive treatment for minimum 28 days, keep clean, unpainted, free from membrane curing compounds, and perfectly dry with all Work above them completed.
- B. Apply hardener evenly to surface, using three coats, allowing 24 hours between coats.
 - 1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
 - 2. Apply each coat so as to remain wet on surfaces for 15 minutes.
 - 3. Apply approved treatment in accordance with manufacturer's instructions.
 - 4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.02 INSTALLATION OF DRY SHAKE HARDENERS

- A. Application:
 - 1. Application Rate: 2 pounds per square foot or as recommended by manufacturer.
 - 2. Penetration: Top 1/8-inch to 3/16-inch depth of floor slab.
 - 3. Commence application immediately upon completion of floating surface area; bleed water shall not be present during and after application.
 - 4. Distribute 2/3 of specified total quantity evenly on concrete surface to receive treatment by mechanical spreader; do not throw shake product.
 - 5. Apply first to areas adjacent to forms, entry ways, columns, and walls where rapid moisture loss may occur.
- B. Finishing:
 - 1. Commence first mechanical float with finishing machines using float blades as soon as shake has absorbed moisture, as indicated by darkening of the surface area.
 - 2. Float until moisture from base slab penetrates through first shake application.
 - 3. Immediately distribute remaining 1/3 of total required shake by spreader and commence second mechanical float, as specified above.
 - 4. Compact surface further by third mechanical float as time and setting characteristics of concrete allow.
 - 5. Do not add water to surface area. In drying conditions, an evaporation retarder may be used to prevent plastic shrinkage cracking and rapid

surface drying, subject to manufacturer's recommendations and approval of Design Engineer.

6. Hand or mechanically trowel surface while stiffening progresses, as indicated by loss of sheen with blades relatively flat.
7. Run trowel blades as soon as possible to achieve representative finish obtained on mockup panel.
8. Avoid excessive trowel blade speed which may "burn" or darken floor surface resulting in loss of wear.
9. Remove marks and pinholes in final raised trowel operation.

C. Curing:

1. Cure treated floor surface to meet the recommendations of the dry shake hardener manufacturer. Apply curing compounds as soon as possible without marring the slab surface.
2. Commence slab protection when curing compound is dry.
 - a. Cover slab with nonstaining kraft building paper to protect area from droppings.
 - b. Maintain floor free of traffic and loads for at least 10 days after completion.

D. Mixing: Mix in concrete mixer or ready-mix truck.

1. First add 3/4 of specified water quantity as recommended on product data sheet to mixer.
2. Proceed to add topping mix to water in a slow steady stream, followed by addition of remaining 1/4 of water.
3. Mix for 3 minutes or as recommended by manufacturer to provide 5-inch to 7-inch slump.
4. Mix shall be screedable and workable similar to concrete and shall not require compaction to attain specified strengths and density.
5. Perform slump test on each placement to ensure compliance with specified slump.
6. Place topping within 1 hour of water addition to mix and prior to loss of required slump.

E. Placement of Aggregate:

1. Application Rate: 1 inch thick with a minimum of 18 pounds of material per square foot per inch of thickness.
2. Place topping mixture by pump, bucket, or flow and screed level.
3. Finish with wooden bull float, one power floating, and one power troweling, or to meet the manufacturer's recommendations. Do not over finish.

F. Curing:

1. Commence curing immediately after completion of finish operation.
2. Wet cure by continuous water sprinkling or use wet burlap covered with polyethylene for minimum 2-day wet cure.
 - a. Apply membrane curing compound specified as recommended by topping manufacturer.

3.03 TESTS AND INSPECTION

A. Vapor Transmission Test:

1. Conduct test on new and existing concrete to show that no surface moisture exists prior to application of specified special floor treatment, as follows:
 - a. Place polyethylene plastic sheet, minimum 4 feet by 4 feet and sealed along four sides with duct tape to prevent moisture transmission by evaporation, over concrete floor area for 24 hours.
 - b. Indication of moisture transmission will be apparent by accumulation of moisture on enclosed surface of polyethylene plastic sheet.
 - c. Do not apply concrete bonding agent until test results indicate moisture is not being transmitted from concrete surface.

B. Strength Tests: Test metallic aggregate topping for compressive strength by making 2-inch by 2-inch cubes in accordance with ASTM C109.

C. Epoxy Joint Filler:

1. Allow 90 days after slab placement before filling joints.
2. Mix and install in accordance with manufacturer's instructions.
3. Fill contraction or construction joints in areas receiving armored joint treatment.

3.04 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection and certification of proper installation, and training of application personnel.
 1. Technical assistance with design and adjustment of concrete mixes to receive floor finishes and toppings.
 2. Technical assistance to assure and certify application and installation of system being used.

3. Consultation, direction, and certification of mockup, for full-scale application of floor finishes, and at other times as needed.
4. Attendance at the conference prior to slab placement to finalize proper methods and procedures.

END OF SECTION

**SECTION 03 39 00
CONCRETE CURING**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI): 308.1, Specification for Curing Concrete.
 2. ASTM International (ASTM):
 - a. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - b. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 3. NSF International: 61, Drinking Water System Components – Health Effects.

1.02 SUBMITTALS

- A. Action Submittals:
1. Manufacturers' data indicating compliance with the requirements specified herein for the following products:
 - a. Exposed aggregate finish retardant on formed surface.
 - b. Evaporation retardant.
 - c. Curing compound.
 - d. Penetrating water repellent sealer.
 - e. Clear liquid densifier.
 2. Curing methods proposed for each type of element such as slab, walls, beams, and columns in each facility.
- B. Informational Submittals:
1. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for the following:
 - a. Curing compound showing moisture retention requirements.
 - b. Retardants for exposed aggregate finish.

PART 2 PRODUCTS

2.01 MATERIALS

A. Curing Compound:

1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C1315 Type I and Type II, Class A.
2. Manufacturers and Products:
 - a. Euclid Chemical Co., Cleveland, OH; Super Diamond Clear VOX.
 - b. WR Meadows, Inc., Hampshire, IL; VOCOMP-30.
 - c. Vexcon Chemical, Inc., Philadelphia, PA; Starseal 1315.
 - d. Dayton Superior; Safe Cure and Seal 1315 EF.
 - e. BASF Construction Chemicals., Shakopee, MN; MasterKure CC 200WB.
 - f. Euclid Chemical Co., Cleveland, OH; EucoCure VOX.
 - g. Euclid Chemical Co., Cleveland, OH; Kurez VOX White Pigmented.
 - h. Or approved equal.

B. Evaporation Retardant:

1. Optional: Fluorescent fugitive dye color tint that disappears completely upon drying.
2. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee, MN; MasterKure ER 50.
 - b. Euclid Chemical Co., Cleveland, OH; Eucobar.
 - c. Or approved equal.

C. Penetrating Water Repellent Sealer: Water based, ready to use, single component, silane/siloxane, penetrating, clear water repellent sealer.

1. Viscosity: 50 cps.
2. Flash Point: 200 degrees F.
3. NCHRP No. 244 Reduction in Chloride Content:
 - a. Average: 82 percent.
 - b. Minimum Required: 75 percent.
4. NCHRP No. 244 Reduction in Weight Gain:
 - a. 21 Days: 85 percent.
 - b. VOCs: 50 g/l.
 - c. Depth of Penetration: 1/4 inch.

5. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee MN; MasterProtect H 400.
 - b. Euclid Chemical Co.; Baracade WB 244.
 - c. Or approved equal.
- D. Clear Liquid Densifier:
 1. Colorless, aqueous solution of magnesium fluorosilicate.
 2. Each gallon of solution shall contain a minimum of 2 pounds of fluorosilicate compound.
 3. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee, MN; MasterKure HD 300WB.
 - b. Euclid Chemical Co., Cleveland, OH; Surfhard.
 - c. Or approved equal.
- E. Retardant for Exposed Aggregate Finish on Slabs:
 1. Manufacturers and Products:
 - a. Sika Chemical Corp., Lyndhurst, NJ; Rugasol.
 - b. Conrad Sovig Co., San Francisco, CA; Conreveal Top Surface.
 - c. Burke Co., San Mateo, CA; Burke True Etch Surface Retarder.
 - d. Euclid Chemical Co., Cleveland, OH; Surface Retarder S.
 - e. Or approved equal.
- F. Retardant for Exposed Aggregate Finish on Formed Surface:
 1. Manufacturers and Products:
 - a. L. M. Scofield Co., Los Angeles, CA; Lithotex Top Surface Retarder.
 - b. Conrad Sovig Co., San Francisco, CA; Control Set.
 - c. Burke Co., San Mateo, CA; Burke True Etch Surface Retarder.
 - d. Euclid Chemical Co., Cleveland, OH; Surface Retarder F.
 - e. Or approved equal.
- G. Water: Clean and potable, containing less than 500 ppm of chlorides.

PART 3 EXECUTION

3.01 CONCRETE CURING

- A. General:
 1. Cure all concrete in accordance with Project Specifications and ACI 308.1.

2. Where surfaces are to receive coatings, painting, cementitious material, or other similar finishes, use only water curing procedures. Refer to Interior Finish Schedule for surfaces to receive coatings.
 3. Water curing as described below or special methods using moisture shall be agreed upon by Design Engineer prior to placing concrete.
 4. As required in Section 03 30 00, Cast-in-Place Concrete, if result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of water curing specified below, by 7 additional days.
- B. Use one of the following methods as approved by Design Engineer:
1. Vertical Surfaces:
 - a. Method 1: Leave concrete forms in place and keep surfaces of forms and concrete wet for 7 days.
 - b. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
 - c. Method 3: Apply curing compound, where allowed, immediately after removal of forms.
 2. Horizontal Surfaces:
 - a. Method 1: Protect surface by water ponding, completely cover the surface, for 7 days.
 - b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
 - c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
 - d. Method 4: Continuously sprinkle exposed surface for 7 days.
 - e. Method 5: Apply curing compound, where allowed, immediately after final finishing on surfaces that will not receive traffic during curing.
 - f. Only horizontal curing method 1 and method 2 may be used for the tank floor slab.

3.02 EVAPORATION RETARDANT APPLICATION

- A. Use on flatwork when environmental conditions are anticipated to cause rapid drying of the concrete surface.
- B. Spray onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture.
- C. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.03 PENETRATING WATER REPELLENT SEALER APPLICATION

- A. Apply where indicated on Interior Finish Schedule as shown on Drawings.
 - 1. Before application and with Work above completed, water cure concrete walls and floors for a minimum of 28 days prior to applying sealer. Install sealer on clean, unpainted concrete that has been water cured for 28 days and is free from membrane curing compounds.
- B. Apply per manufacturer's recommendations utilizing low pressure airless spray equipment.
 - 1. Actual coverage and number of coats to be determined by field test sample application and water absorption testing. Final approval by Owner is required.
- C. Apply at a coverage rate of 125 square feet per gallon to 200 square feet per gallon. Cure penetrating sealer on slabs for the minimum time recommended by manufacturer prior to allowing foot or vehicular traffic.

3.04 CLEAR LIQUID DENSIFIER APPLICATION

- A. Apply where indicated in Interior Finish Schedule on Drawings. Before application and with Work above completed, water cure concrete walls and floors for a minimum of 28 days prior to applying sealer. Install sealer on clean, unpainted concrete that has been water cured for 28 days and is free from membrane curing compounds.
- B. Apply liquid densifier evenly, using three coats, allowing 24 hours between coats.
 - 1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
 - 2. Apply each coat so as to remain wet on surface for 15 minutes.
 - 3. Apply approved liquid densifier in accordance with manufacturer's instructions.
 - 4. After final coat is completed and dry, remove surplus liquid densifier from surface by scrubbing and mopping with water.

3.05 RETARDANT FOR EXPOSED AGGREGATE SURFACES

- A. Apply where indicated in Finish Schedule on Drawings.
- B. Apply in accordance with manufacturer's product instructions.

3.06 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.
- B. Provide penetrating water repellent sealer manufacturer's representative to demonstrate proper application of product.
- C. Provide clear liquid densifier manufacturer's representative to demonstrate proper mixing and application of product.
- D. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound and to show coverage in one coat.
- E. Provide retardant for exposed aggregate surfaces manufacturer's representative to demonstrate proper application and surface mortar removal procedures.

END OF SECTION

SECTION 03 64 23
EPOXY RESIN INJECTION GROUTING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C882, Standard Specification for Test Method for Bond Strength of Epoxy Resin System Used with Concrete by Slant Shear.
 - b. D570, Standard Test Method for Water Absorption of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.02 DEFINITIONS

- A. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. Hydraulic Structure: Liquid containment structure and/or structure designed to mitigate liquid infiltration.
- D. Injection: Method of bonding together, addressing or eliminating leakage through cracks or joints by installing resin under pressure to fill the void in crack or joint.
- E. Joint: A planned and formed discontinuity in concrete structure at junction of adjacent and sequential concrete placements and may contain embedded waterstops.
- F. Leak or Leakage: Crack or joint exhibiting presence of moisture, sign of efflorescence, intermittently wet to touch, or continuous flow of liquid.
- G. Narrow Cracks: Width equal to or less than 0.015 inch.
- H. Wide Cracks: Wider than 0.015 inch.

1.03 SUBMITTALS

A. Action Submittals:

1. Physical and chemical properties for epoxy resin.
2. Technical data for metering, mixing, and injection equipment.
3. Depth of penetration, length, material used, and procedures where epoxy is approved for use.
4. Marked up drawings of proposed epoxy injection repair crack locations, widths, and lengths and direction on structure.
5. Sample bottle.
6. Pot Life Test.
7. Slant Shear Test (Bond Strength).
8. Core Test Results.

B. Informational Submittals:

1. Manufacturer's recommended surface preparation procedures and application instructions for epoxy resins.
2. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements. Certified test results for each batch of epoxy resin.
3. Statements of Qualification for Epoxy Resin:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
4. Sample of epoxy resin two component ratio and injection pressure test records for concrete crack repair work.
5. Installation instructions for repairing core holes with repair mortar.
6. Health and Safety Plans for confined space entry. Test results of epoxy resin bond tests.
7. Epoxy resin two component ratio and injection pressure test records for concrete crack repair work.

1.04 QUALITY ASSURANCE

A. Qualifications for Injection Staffs:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods of epoxy injection process for concrete structure.
 - b. Understands and is capable of explaining technical aspects of correct material selection and use.
 - c. Experienced in operation, maintenance, and troubleshooting of application equipment.

2. Injection Crew and Job Foreman:
 - a. Provide written and verifiable evidence showing compliance with the following requirements:
 - 1) Licensed or certified by epoxy resin material manufacturer.
 - 2) Provide projects showing successful application of successful epoxy inspection for at least 10,000 linear feet of successful crack injection, including 2,000 linear feet of wet crack injection to stop water leakage.

B. Injected Epoxy Resin:

1. Fill cracks and joints with minimum resin depth penetration no less than 90 percent of:
 - a. Full thickness of concrete section for cracks or joints.
 - b. Depth between waterstop and inside face of structure for joints with an embedded waterstop.

C. Injected cracks and joints which leak shall be considered deficient work irrespective of depth of penetration. Reinjection of deficient work or, with approval of Design Engineer, provide other repairs to eliminate leakage.

D. Bond Strength Test for Epoxy Resin:

1. Concrete failure before resin failure.
2. 1,500 psi minimum bond strength per ASTM C882 test requirements with no failure of either concrete or epoxy resin.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Package resin material in new sealed containers and label with following information:
 - a. Manufacturer's name.
 - b. Product name and lot number.
 - c. ANSI Hazard Classification.
 - d. ANSI recommended precautions for handling.
 - e. Mix ratio by volume for components.

B. Storage and Protection: Store epoxy resin material containers in accordance with manufacturer's printed instructions and at ambient temperatures below 110 degrees F and above 45 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials and accessories specified in this section shall be products of:
 - 1. BASF Construction Chemicals, LLC-Building Systems, Shakopee, MN; SCB Concessive Series products that meet properties indicated in Article Epoxy Injection Resin.
 - 2. Sika Corp., Lyndhurst, NJ; Sikadur Series products that meet properties below.
 - 3. Euclid Chemical Co., Cleveland, OH; Euco Series (#452) products that meet properties below.

2.02 EPOXY INJECTION RESIN

- A. Two-component A and B structural epoxy resin for injection into cracks or joints or other voids in concrete structures for bonding or grouting.
- B. Uncured Resin Properties:
 - 1. When mixed in ratio specified on resin container label:

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Pot Life (60-gram mass) @ 77, plus or minus 4 degrees F	As specified in Article Source Quality Control	13 to 25 minutes	15 to 30 minutes
Pot Life (60-gram mass) @ 100, plus or minus 4 degree F	As specified in Article Source Quality Control	3 to 10 minutes	10 to 20 minutes
Viscosity @ 40, plus or minus 3 degrees F	Brookfield RVT Spindle No. 4 @ 20 rpm	4,400 cps	600 cps
Viscosity @ 75 to 77 degrees F	Brookfield RVT Spindle No. 2 @ 20 rpm	375 to 350 cps	175 to 140 cps

- C. Epoxy Resin Properties: When cured for 7 days at 77 degrees F, plus or minus 3 degrees F and conditioned at test temperature 12 hours prior to test, unless otherwise specified.

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Ultimate Tensile Strength, psi	ASTM D368	8,000 min.	5,000 min.
Tensile Elongation @ Break, percent	ASTM D638	4.2 max.	3.0 max.
Flexural Strength, psi	ASTM D790	10,000 min.	10,000 min.
Flexural Modulus, psi	ASTM D790	5.5 x 10 ⁵ min.	4.5x10 ⁵ min.
Compressive Yield Strength, psi	ASTM D695*	15,000 min.	12,000 min.
Compressive Modulus, psi	ASTM D695*	4.0x10 ⁵ min.	4.0x10 ⁵ min.
Heat Deflection Temperature	ASTM D648*	130 degrees F min.	140 degrees F min.
Cured 3 days @ 40 deg F – Wet Concrete		3,500 psi min.	3,500 psi min.
Cured 1 day @ 77 deg F – Dry Concrete		5,000 psi min.	5,000 psi min.
Cured 3 days @ 77 deg F plus or minus 3 deg F		5,000 psi min.	5,000 psi min.
*Cure test specimens so that peak exothermic temperature of resin does not exceed 100 degrees F.			
Note: See referenced specifications for preparation method of test specimens.			

2.03 SURFACE SEAL

- A. Sufficient strength and adhesion for holding injection fittings firmly in place and to resist pressures preventing leakage during injection.
- B. Capable of removal after injection resin has cured.

2.04 ACID FLUSHING SOLUTION

- A. Premixed solution of food grade phosphoric acid diluted to a 5 percent plus or minus 0.5 percent of the volume of the bottle.

2.05 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.06 SAMPLE BOTTLE

- A. Five-inch natural wide mouth HDPE bottle or 4-ounce clear PVC cylinder bottle; supplied with caps.

2.07 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of epoxy resin.
- B. Pot Life Test:
 - 1. Condition Component A and Component B to required temperature.
 - 2. Measure components in ratio of Component B as stated on manufacturer's label into an 8-fluid ounce paper cup.
 - 3. Mix components for 60 seconds using nonmetallic stirring instrument. Scrape sides and bottom of cup periodically.
 - 4. Probe mixture once with nonmetallic stirring instrument every 30 seconds, starting 2 minutes prior to minimum specified pot life.
 - 5. Pot Life Definition: Time at which a soft stringy mass forms in center of cup.
- C. Slant Shear Test: Prepare specimens and perform tests in accordance with ASTM C882.

PART 3 EXECUTION

3.01 GENERAL

- A. Unless permitted otherwise, structurally repair cracks or joints listed below:
 - 1. Cracks considered to be defective as defined in Section 03 30 00, Cast-in-Place Concrete.
 - 2. All vertical cracks or joints near corners or intersections.
 - 3. All horizontal cracks or joints at wall bases.
 - 4. All cracks or joints in walls of circular tanks.
 - 5. All cracks or joints caused by voids or honeycombs.
 - 6. All horizontal joints with leaks and dampness.
 - 7. All cracks or joints caused by construction overloading.

8. All vertical or diagonal cracks or joints caused by drying shrinkage within a distance equal to the height of wall from the face of corners or intersecting walls. Inject 90 days after placement, unless approved otherwise by the project Structural Design Engineer.
 9. All horizontal cracks or joints caused by drying shrinkage within a distance equal to one-quarter on the wall height above or below elevated slabs. Inject 90 days after placement, unless approved otherwise by the project Structural Design Engineer.
 10. All cracks or joints as a result of thermal shrinkage where the concrete member being injected has been allowed to dry after placement for a minimum of 90 days.
 11. All other cracks or joints as a result of drying shrinkage to be repaired 90 days or more after placement.
- B. Do not proceed with injection work until submittals have been reviewed and approved by Design Engineer.
- C. Perform cracks or joints injection work after removing defective surface materials and after performing surface preparation, but prior to applying surface repair material unless otherwise noted. See Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces, and Section 03 01 33, Repair of Horizontal Concrete Surfaces, for concrete surface repair system.
- D. Width of cracks may vary along length and through thickness of concrete section.
- E. Remove all excess, unused epoxy resin materials on concrete surfaces exposed to view prior to end of Work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter and mix two epoxy resin components and inject mixture into cracks or joints.
- B. Pumps:
1. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.
 2. Primary injection pumps for each material of different mix ratio, including a standby backup pump of similar ratio.
 3. Capable of immediate compensation for changes in resins.
 4. Do not use batch mix pumps.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed epoxy resin at pressures in accordance with epoxy resin manufacturer's printed instruction and able to maintain pressure.

- D. Automatic Shutoff Control: Provide sensors on both Component A and Component B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance: Maintain epoxy resin manufacturer's prescribed mix ratio within a tolerance of plus or minus 5 percent by volume at discharge pressure up to 160 psi.
- F. Ratio/Pressure Check Device:
 - 1. Two independent valve nozzles capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.
 - 2. Pressure gauge capable of sensing pressure behind each valve.

3.03 PREPARATION

- A. Free cracks or joints from loose matter, dirt, laitance, oil, grease, efflorescence, salt, and other contaminants.
- B. Clean cracks or joints in accordance with epoxy resin manufacturer's instructions.
- C. Clean surfaces adjacent to cracks or joints from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instruction by low pressure water cleaning using a pressure of 1,000 psi to 3,000 psi.
- D. Do not use acids and corrosives for cleaning, other than those specified herein unless neutralized prior to injecting epoxy resin.
- E. During installation and curing of materials, if ambient temperature is expected to drop below manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.
- G. Dry out cracks or joints if required by manufacturer's instructions.

3.04 APPLICATION

- A. All liquid is to be removed from hydraulic structure prior to commencing with epoxy injection, unless approved otherwise.

B. Entry Ports:

1. Establish openings for epoxy resin entry in surface seal along crack.
2. Determine space between entry ports equal to thickness of concrete member to allow epoxy resin to penetrate to the full thickness of the member.
3. Drill injection holes at an angle between 45 degrees and 60 degrees from surface of concrete and perpendicular to alignment of cracks or joints, to intersect crack or joint at midpoint of concrete section, and intersect joints at midpoint between waterstop and interior concrete surface, except as noted otherwise.
4. Locate drill holes on alternate sides of crack or joint where possible, unless orientation of crack or joint is known or has been verified by non-destructive testing techniques or core drilling.
5. Drill Hole Spacing: Do not to exceed concrete thicknesses or 12 inches maximum, except as noted otherwise.
6. Adjust location and angle of drill holes to suit orientation of crack or joint and at commencement of drilling holes for injection and at beginning of each subsequent shift.
7. Take measures to prevent drilling holes for injection too shallow or too deep or damaging existing waterstop in joints.
8. Remove dust and debris in drill holes and on surface of structure resulting from drilling operation, by flushing with water prior to installing the injection packers or ports.
9. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:
 - a. Cracks or joints extend entirely through concrete element.
 - b. Backfill of walls on one side.
 - c. Slab-on-grade.
 - d. Difficult to excavate behind wall to seal both surfaces of crack.
10. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling or other one-way ball or check valve, to permit testing for watertightness and acid flushing of cracks and joints.

C. Acid Flushing of Cracks and Joints:

1. Flush cracks and joints with acid flushing solution in accordance with manufacturer's printed instructions. at high pressure or resin injection pressure. Apply acid flushing solution for a sufficient duration to permit solution to penetrate full depth and length of cracks and joints or to waterstop in joints.
2. Following acid flushing, flush cracks and joints with copious quantities of potable water in accordance with manufacturer's printed instructions. at a pressure of 1,000 psi, or resin injection pressure, whichever is

greater, until no evidence of acid flushing solution is visible in flush water.

3. Submit in-field health and safety plan for acid flushing operation. As a minimum, identify worker conducting acid flushing by wearing a reflective safety vest and signs indicating "Acid Flushing". Also, clearly identify Work area where acid flushing is underway by signs and isolate by placing orange pylons or other temporary barrier, and signs indicating "Acid Flushing". As work progresses, move pylons or barriers and signs to maintain a safe zone.

D. Application of Surface Seal along Cracks and Joints:

1. Apply surface seal in accordance with manufacturer's instructions to designated cracks and joints face prior to injection. Seal surface of cracks or joints to contain and prevent escape of injection epoxy.
2. Cure surface seal in accordance with manufacturer's printed instructions before commencing inject work.

E. Epoxy Injection:

1. Ensure zerk coupling is not installed in ports or packers next to the one being injected.
2. Start injection into each crack or joint at lowest elevation entry port or packer along vertical or diagonal crack or joint, and at one end of horizontal crack or joint.
3. Where injection entry ports or packers are used, continue injection at first port or packer until resin begins to flow out of port or packer at next highest elevation. Plug first port or packer and start injection at second port or packer until resin flows from next port or packer.
4. Inject entire crack or joint with same sequence.
5. At no time inject more than 6 feet length of first vertical crack or joint before verifying resin in sample bottle has start to set and cure.
6. Prior to commencing injection work along a horizontal crack or joint in structure when processed using ports or packers with zerk couplings are used, remove zerk couplings from injection ports or packers except for two ports or packers located where injection work will commence. Commence injection work in first two ports or packers. Once clean resin is vented from third injection port or packer, cease injection at first port or packer, and install zerk coupling and commence injection at third port or packer. Repeat process for fourth and subsequent ports or packers until full length of crack or joint has been injected.

F. Finishing:

1. Allow epoxy resin to cure in accordance with manufacturer's instruction after cracks or joints have been completely injected to allow surface seal removal without draining or runback of uncured epoxy resin material from cracks or joints.
2. Remove surface seal and injection packers or ports from cured injection resin along crack.
3. Finish crack or joint faces flush with adjacent concrete.
4. Indentations or protrusions caused by placement of entry ports, packers, drill holes, or damage from removal of surface seal is not acceptable.
5. Grind off protrusions and patch indentations and holes from injection packers and entry ports with a suitable patch material to satisfaction of Design Engineer.
6. Remove surplus surface seal material splatters and injection resin material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Epoxy Resin Two Component Ratio Tests:

1. Disconnect mixing head and pump two resin components simultaneously through ratio check device.
2. Adjust discharge pressure to 160 psi for both resin components.
3. Simultaneously discharge both resin components into separate calibrated containers.
4. Compare amounts simultaneously discharged into calibrated containers during same time period to determine mix ratio.
5. Complete test at 160 psi discharge pressure and repeat procedure for 0 psi discharge pressure.
6. Run ratio test for each injection unit at beginning and end of each injection work day, and when injection work has stopped for more than 1 hour.
7. Document and maintain complete accurate records of ratios and pressure checks.

B. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect two resin component delivery lines to pressure check device.
2. Pressure Check Device:
 - a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.
 - b. Pressure gauge capable of sensing pressure buildup behind each valve.

3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 psi.
4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 psi within 3 minutes.
5. Run pressure test for each injection equipment unit:
 - a. Beginning and end of each injection work day.
 - b. When injection work stop for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

C. Bottled Sample Tests:

1. During injection operation, provide at least one sample of mixed epoxy resin for each injection pump per shift per injection work day in a sample bottle.
2. Provide sufficient sample to demonstrate sample material epoxy resin will set and cure correctly.
3. Label each bottled sample with Contractor's name, date, and time sample was taken, and location in structure where sample was taken. Record details of bottle sample tests.
4. Place filled sample bottle upright in a container and allow sample to cure.
5. After sample has been allowed to cure, cut bottled sample open and visually inspect contents to verify that epoxy resin material has completely reacted and cured.
6. Evaluation and Assessment of Test:
 - a. Should bottled sample(s) indicate a problem; such as epoxy resin not cured or foreign liquid in sample bottle, take verifying core sample immediately from cracks or joints, where material was used.
 - b. Should above-referenced bottle sample(s) and core sample(s) indicate a problem with epoxy resin, arrange to have a Technical Representative of the epoxy resin manufacturer come to Site to review bottled sample(s) and core drilled sample(s) with Design Engineer and provide technical advice on corrective measures.
 - c. Carry out further investigation work or corrective measures recommended by Technical Representative of epoxy resin manufacturer.

END OF SECTION

SECTION 05 05 19
POST-INSTALLED ANCHORS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete.
 - b. 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
 - c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
 2. American Iron and Steel Institute (AISI): Stainless Steel Type 316.
 3. American National Standards Institute (ANSI).
 4. ASTM International (ASTM):
 - a. A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A143, Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - c. A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
 - e. A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
 - f. A380, Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - g. A385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - h. A563, Specification for Carbon and Alloy Steel Nuts.
 - i. A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - j. A967, Specification for Chemical Passivation Treatments for Stainless Steel Parts.
 - k. E488, Standard Test Methods for Strength of Anchors in Concrete Elements.
 - l. F436, Specification for Hardened Steel Washers.
 - m. F468, Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.

- n. F568M, Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
 - o. F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - p. F594, Specification for Stainless Steel Nuts.
 - q. F1554, Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
5. International Association of Plumbing and Mechanical Officials Uniform ES (IAPMO-UES): Evaluation Reports for Concrete and Masonry Anchors.
6. International Code Council Evaluation Service (ICC-ES):
- a. Evaluation Reports for Concrete and Masonry Anchors.
 - b. AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
 - c. AC70, Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements.
 - d. AC106, Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
 - e. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - f. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements. Evaluation Reports for Concrete and Masonry Anchors.
7. Specialty Steel Industry of North America (SSINA):
- a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.02 DEFINITIONS

- A. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- B. Exterior Area: Location not protected from weather by a building or other enclosed structure to include buried roof structures.
- C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or wash down, and where wall or roof slab is not common to a water-holding or earth-retaining structure.

- D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.
- E. Submerged: Location at or below top of wall of open water-holding structure, such as a basin or channel, or wall, ceiling, or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings: Specific instructions for concrete anchor installation, including drilled hole size and depth, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

B. Informational Submittals:

- 1. Concrete Anchors:
 - a. Manufacturer's product description and installation instructions.
 - b. Current ICC-ES or IAPMO-UES Report for each type of post-installed anchor to be used.
 - c. Adhesive Anchor Installer Certification.
- 2. Passivation method for stainless steel members.
- 3. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Installers of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Installer Certification Program or equivalent.
- 2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package stainless steel items in a manner to provide protection from carbon impregnation.
- B. Protect hot-dip galvanized finishes from damage as a result of metal banding and rough handling.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel:	
Threaded Rods	F593, AISI Type 316, Condition CW
Nuts*	F594, AISI Type 316, Condition CW
Carbon Steel:	
Threaded Rods	F1554, Grade 36 or F568M Class 5.8
Flat and Beveled Washers (Hardened)	F436
Nuts*	A194/A194M, Grade 2H
Galvanized Steel:	
All	A153/A153M
*Nuts of other grades and styles having specified proof load stresses greater than specified grade and style are also suitable. Nuts must have specified proof load stresses equal to or greater than minimum tensile strength of specified threaded rod.	

- B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, and zinc-plated steel material types as indicated in Fastener Schedule at end of this section.

2.02 POST-INSTALLED CONCRETE ANCHORS

- A. General:
 - 1. AISI Type 316 stainless or hot-dip galvanized as shown in Fastener Schedule at end of this section.

2. Post-installed anchor systems used in concrete shall be approved by ICC Evaluation Services Report or equivalent for use in cracked concrete and for short-term and long-term loads including wind and earthquake.
 3. Mechanical Anchors: Comply with the requirements of ICC-ES AC193 or ACI 355.2.
 4. Adhesive Anchors: Comply with the requirements of ICC-ES AC308 or ACI 355.4.
- B. Torque-Controlled Expansion Anchors (Wedge Anchors):
1. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; Kwik-Bolt –TZ (KB-TZ) Anchors (ESR-1917).
 - b. Powers Fasteners, Brewster, NY; Power-Stud +SD1, +SD2, +SD4, or +SD6 Anchors (ESR-2502 and ESR-2818).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 Anchors (ESR-1771 and ESR-3037).
 - d. Or approved equal.
- C. Undercut Anchors:
1. Manufacturers and Products:
 - a. USP Structural Connectors, Burnsville, MN; DUC Undercut Anchor (ESR-1970).
 - b. Hilti, Inc., Tulsa, OK; HDA Undercut Anchor (ESR-1546).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; TORQ-CUT Self-Undercutting Anchor (ESR-2705).
 - d. Powers Fasteners, Brewster, NY; Atomic+ Undercut Anchor (ESR-3067).
 - e. Or approved equal.
- D. Self-Tapping Concrete Screw Anchors:
1. Manufacturers and Products:
 - a. Powers Fasteners, Brewster, NY; Wedge-Bolt+ (ESR-2526).
 - b. Powers Fasteners, Brewster, NY; Vertigo+ Rod Hanger Screw Anchor (ESR-2989).
 - c. Powers Fasteners, Brewster, NY; Snake+ Flush Mount Screw Anchor (ESR-2272).
 - d. Hilti, Inc., Tulsa, OK; HUS-EZ Screw Anchor (ESR-3027).
 - e. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Titen HD Screw Anchor (ESR-2713).
 - f. Or approved equal.

E. Adhesive Anchors:

1. Threaded Rod:
 - a. Diameter as shown on Drawings.
 - b. Length as required to provide minimum depth of embedment indicated and thread projection required.
 - c. Clean and free of grease, oil, or other deleterious material.
2. Adhesive:
 - a. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
 - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
3. Packaging and Storage:
 - a. Disposable, self-contained system capable of dispensing both components in proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
 - b. Store adhesive on pallets or shelving in a covered storage area.
 - c. Package Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
 - d. Dispose of When:
 - 1) Shelf life has expired.
 - 2) Stored other than in accordance with manufacturer's instructions.
4. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500 SD (ESR-2322), or HIT-HY 200 (ESR-3187).
 - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-XP Epoxy Adhesive Anchors (ESR-2508), or AT-XP Adhesive Anchors (IAPMO UES-263).
 - c. Powers Fasteners, Brewster NY; Pure 110+ Epoxy adhesive anchor system (ESR-3298).
 - d. Or approved equal.

F. Adhesive Threaded Inserts:

1. Type 316 stainless steel, internally threaded inserts.
2. Manufacturer and Product:
 - a. Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500-SD or HIT-HY 200 adhesive.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 CONCRETE ANCHORS

- A. Begin installation only after concrete to receive anchors has attained design strength.
- B. Locate existing reinforcing with Ground Penetrating Radar or other method approved by Design Engineer prior to drilling. Coordinate with Design Engineer to adjust anchor locations where installation would result in hitting reinforcing.
- C. Install in accordance with written manufacturer's instructions.
- D. Provide minimum embedment, edge distance, and spacing as indicated on Drawings.
- E. Use only drill type and bit type and diameter recommended by anchor manufacturer.
- F. Clean hole of debris and dust per manufacturer's requirements.
- G. When unidentified embedded steel, rebar, or other obstruction is encountered in drill path, slant drill to clear obstruction. If drill must be slanted more than indicated in manufacturer's installation instructions to clear obstruction, notify Design Engineer for direction on how to proceed.
- H. Adhesive Anchors:
 - 1. Unless otherwise approved by Design Engineer and adhesive manufacturer:
 - a. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F.
 - b. Do not install prior to concrete attaining an age of 21 days.
 - c. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry.
 - d. Do not disturb anchor during recommended curing time.
 - e. Do not exceed maximum torque as specified in manufacturer's instructions.
- I. Prestressed Concrete: Do not use drilled-in anchors in prestressed or post-tensioned concrete members without Design Engineer's prior approval unless specifically shown on Drawings.

3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with CBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

3.03 MANUFACTURER’S SERVICES

- A. Adhesive and Mechanical Anchors: Conduct Site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify Construction Manager of time and place for sessions.

3.04 FASTENER SCHEDULE

- A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Post Installed Anchors for Metal Components to Cast-in-Place Concrete (such as, Ladders, Handrail Posts, Electrical Panels, Platforms, and Equipment)		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, galvanized anchors to anchor galvanized equipment)	Verify product acceptability and manufacturer’s requirements if anchor installation will occur in an overhead application
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Verify product acceptability and manufacturer’s requirements if anchor installation will occur in an overhead application
2. All Others		
All service uses and locations	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on all stainless steel threads.
- C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

SECTION 05 05 23
WELDING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Society of Mechanical Engineers (ASME):
 - a. BPVC SEC V, Nondestructive Examination.
 - b. BPVC SEC IX, Welding and Brazing Qualifications.
2. American Society of Nondestructive Testing (ASNT): SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing.
3. American Welding Society (AWS):
 - a. A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - b. A3.0, Standard Welding Terms and Definitions.
 - c. D1.1/D1.1M, Structural Welding Code - Steel.
 - d. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - e. D1.3/D1.3M, Structural Welding Code - Sheet Steel.
 - f. D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
 - g. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 - h. D1.8/D1.8M, Structural Welding Code - Seismic Supplement.
 - i. QC1, Standard for AWS Certification of Welding Inspectors.
4. ASTM International (ASTM): A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

1.02 DEFINITIONS

A. CJP: Complete Joint Penetration.

B. CWI: Certified Welding Inspector.

1. Contractor's Welding Inspector: Contractor's CWI acts for, and on behalf of, the Contractor for all inspection and quality matters within the scope of the Contract Documents. Contractor is required to provide a welding inspector to oversee welding operations and be responsible for visual inspection and necessary correction of all deficiencies in materials and workmanship required to meet referenced welding codes. This type of Quality Control Inspection is not classified as Special Inspection.

2. Verification Inspector: CWI who acts on behalf of the Owner. This type of independent inspection and testing is the prerogative of the Owner, who may perform this function, or waive independent verification inspection if it is not required by the building official and building code.
- C. MT: Magnetic Particle Testing.
 - D. NDE: Nondestructive Examination.
 - E. NDT: Nondestructive Testing.
 - F. PJP: Partial Joint Penetration.
 - G. PQR: Procedure Qualification Record.
 - H. PT: Liquid Penetrant Testing.
 - I. Special Inspection: Nondestructive examination exclusive of VT. Special inspection includes NDE, such as MT, PT, UT, RT, and Verification Inspection. Special Inspection personnel report to, and are retained by the Owner. See additional requirements in Section 01 45 33, Special Inspection, Observation, and Testing.
 - J. RT: Radiographic Testing.
 - K. UT: Ultrasonic Testing.
 - L. VT: Visual Inspection/Testing.
 - M. WPQ: Welder/Welding Operator Performance Qualification Record.
 - N. WPS: Welding Procedure Specification.

1.03 SUBMITTALS

- A. Action Submittals:
 1. Shop Drawings:
 - a. Shop and field WPSs and PQRs.
 - b. NDT procedure specifications prepared in accordance with ASME BPVC SEC V.
 - c. Welding Data (Shop and Field): Submit welding data together with Shop Drawings as a complete package.
 - 1) Show on Shop Drawings, or on a weld map, complete information regarding base metal specification designation, location, type, size, and extent of welds with reference

- called out for WPS and NDE numbers in tails of combined welding and NDE symbols as indicated in AWS A2.4.
- 2) Clearly distinguish between shop and field welds.
 - 3) Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for welds.
 - 4) Welding and NDE Symbols: In accordance with AWS A2.4.
 - 5) Welding Terms and Definitions: In accordance with AWS A3.0.

B. Informational Submittals:

1. WPQs.
2. CWI credentials.
3. Testing agency personnel credentials.
4. CWI visual inspection (VT) reports.
5. Welding Documentation: Submit on forms in referenced welding codes.

1.04 QUALIFICATIONS

- A. WPSs: In accordance with AWS D1.1/D1.1M (Annex M Forms) for shop or field welding; or ASME BPVC SEC IX (Forms QW-482 and QW-483) for shop welding only.
- B. WPQs: In accordance with AWS D1.1/D1.1M (Annex M Forms); or ASME BPVC SEC IX (Form QW-484).
- C. CWI: Certified in accordance with AWS QC1, and having prior experience with specified welding codes. Alternate welding inspector qualifications require prior approval by Design Engineer.
- D. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.

1.05 SEQUENCING AND SCHEDULING

- A. Unless otherwise specified, Submittals required in this section shall be submitted and approved prior to commencement of welding operations.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

- A. Fabricator's CWI shall be present whenever shop welding is performed. CWI shall perform inspection at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
1. Verifying conformance of specified job material and proper storage.
 2. Monitoring conformance with approved WPS.
 3. Monitoring conformance of WPQ.
 4. Inspecting weld joint fit-up and performing in-process inspection.
 5. Providing 100 percent visual inspection of welds.
 6. Coordinating with nondestructive testing personnel and reviewing NDE test results.
 7. Maintaining records and preparing reports documenting that results of CWI VT and subsequent NDE testing comply with the Work and referenced welding codes.

PART 3 EXECUTION

3.01 GENERAL

- A. Welding and Fabrication by Welding: Conform to governing welding codes referenced in attached Welding and Nondestructive Testing Table.
- B. Qualify welding procedure specifications for pressure piping for notch toughness by limiting heat input; conduct charpy testing of weld metal and heat-affected zone as part of the welding procedure qualification. Conduct charpy tests on full-size specimens in accordance with ASTM A370 at a test temperature of 30 degrees F. The minimum average energy of the test coupons including weld and heat-affected zone near the weld on the member shall not be less than 25-foot-pounds.

3.02 NONDESTRUCTIVE WELD TESTING REQUIREMENTS

- A. Quality Control Inspection:
1. All Welds: 100 percent VT by Contractor's CWI.
 2. Acceptance Criteria:
 - a. Structural Pipe and Tubing: AWS D1.1/D1.1M, Paragraph 9.25.
 - b. All Other Structural Steel: AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
 - c. Stud Connections: AWS D1.1/D1.1M, Paragraph 7.8.1.

B. Nondestructive Testing Requirements:

1. NDT frequency shall be as specified below, as required by referenced welding codes, or as specified in the attached table. In case there is a conflict, the higher frequency level of NDT shall apply.
 - a. Nontubular Connections:
 - 1) CJP Butt Joint Groove Welds: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.
 - 2) All Other CJP Groove Welds: 10 percent random UT.
 - 3) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
 - b. Tubular Connections:
 - 1) CJP butt joint groove welds made from one side without backing: 100 percent RT or UT in accordance with AWS D1.1/D1.1M, Paragraph 9.26.2 requirements.
 - 2) CJP Butt Joint Groove Welds made without backing or back-gouging: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.
 - 3) All Other CJP Groove Welds: 10 percent random UT.
 - 4) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
2. NDT Procedures and Acceptance Criteria:
 - a. Nontubular Connections:
 - 1) RT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part E. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.12.1.
 - 2) UT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part F. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.13.1.
 - 3) PT and MT:
 - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
 - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
 - b. Tubular Connections:
 - 1) RT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.28 and Paragraph 9.29.
 - 2) UT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.27.

- 3) PT and MT:
 - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
 - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 9.25.

3.03 FIELD QUALITY CONTROL

- A. Contractor's CWI shall be present whenever field welding is performed. CWI shall perform inspection, at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
 1. Verify conformance of specified job material and proper storage.
 2. Monitor conformance with approved WPS.
 3. Monitor conformance of WPQ.
 4. Inspect weld joint fit-up and perform in-process inspection.
 5. Provide 100 percent visual inspection of all welds in accordance with Subparagraph Quality Control Inspection.
 6. Supervise nondestructive testing personnel and evaluate test results.
 7. Maintain records and prepare report confirming results of inspection and testing comply with Project requirements.

3.04 WELD DEFECT REPAIR

- A. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.

3.05 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is a part of this Specification:
 1. Welding and Nondestructive Testing Table.

END OF SECTION

WELDING AND NONDESTRUCTIVE TESTING						
Specification Section	Governing Welding Codes or Standards	Submit WPS	Submit WPQ	Onsite CWI Req'd	Submit Written NDT Procedure Specifications	NDT Requirements
03 21 00, Steel Reinforcement	AWS D1.4/D1.4M, Structural Welding Code - Reinforcing Steel	Yes	Yes	Yes	Yes	100% VT and 100% MT of all rebar splices; also see Section 03 21 00
05 50 00, Metal Fabrications	AWS D1.1/D1.1M, Structural Welding Code-Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum or AWS D1.6/D1.6M, Structural Welding Code - Stainless Steel	Yes	Yes	Yes	No	100% VT; also see Section 05 50 00
05 52 16, Aluminum Railings	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum	Yes	Yes	Yes	No	100% VT; also see Section 05 52 16, Aluminum Railings
05 53 00, Metal Gratings	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum	Yes	Yes	Yes	No	100% VT; also see Section 05 53 00
33 05 01.01, Welded Steel Pipe and Fittings	ASME BPV Code, Section IX; and AWS D1.1/D1.1M, Structural Welding Code - Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 33 05 01.01

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. The Aluminum Association, Inc. (AA): The Aluminum Design Manual.
 2. American Galvanizers Association (AGA):
 - a. Inspection of Hot-Dip Galvanized Steel Products.
 - b. Quality Assurance Manual.
 3. American Iron and Steel Institute (AISI): Stainless Steel Types.
 4. American Ladder Institute (ALI): A14.3, Ladders - Fixed - Safety Requirements.
 5. American National Standards Institute (ANSI).
 6. American Society of Safety Engineers (ASSE): A10.11, Safety Requirements for Personnel and Debris Nets.
 7. American Welding Society (AWS):
 - a. D1.1/D1.1M, Structural Welding Code - Steel.
 - b. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - c. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 8. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A48/A48M, Specification for Gray Iron Castings.
 - c. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - d. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - e. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - f. A143/A143M, Standard for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - g. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - h. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - i. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

- j. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- k. A276, Standard Specification for Stainless Steel Bars and Shapes.
- l. A283/A283M, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- m. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- n. A325, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
- o. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- p. A384/A384M, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- q. A385/A385M, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- r. A489, Standard Specification for Carbon Steel Lifting Eyes.
- s. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- t. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- u. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- v. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- w. A780/A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786/A786M, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A793, Standard Specification for Rolled Floor Plate, Stainless Steel.
- z. A967, Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- aa. A992/A992M, Standard Specification for Structural Steel Shapes.
- bb. A1085, Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ee. B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

- ff. B632/B632M, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
 - gg. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - hh. D1056, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
 - ii. F436, Standard Specification for Hardened Steel Washers.
 - jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - ll. F594, Standard Specification for Stainless Steel Nuts.
 - mm. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
 - nn. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
9. Occupational Safety and Health Administration (OSHA):
- a. 29 CFR 1910.27, Fixed Ladders.
 - b. 29 CFR 1926.105, Safety Nets.
 - c. 29 CFR 1926.502, Fall Protection Systems Criteria and Practices.
10. Specialty Steel Industry of North America (SSINA):
- a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.02 DEFINITIONS

- A. Anchor Bolt: Cast-in-place anchor; concrete or masonry.
- B. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals. Corrosive area includes areas exposed to corrosive atmosphere such as hydrogen sulfide from wastewater.
- C. Exterior Area: Location not protected from weather by building or other enclosed structure.
- D. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, nor where wall or roof slab is common to a water-holding or earth-retaining structure.
- E. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.

- F. Submerged: Location at or below top of wall of open water-holding structure, such as basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings: Metal fabrications, including welding and fastener information.
- 2. Samples: Color samples of abrasive stair nosings.

B. Informational Submittals:

- 1. Pre-engineered Ladders: Letter of certification that ladder meets OSHA 29 CFR 1910.27 requirements.
- 2. Passivation method for stainless steel members.
- 3. Galvanized coating applicator qualifications.
- 4. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as practical, factory assemble specified items. Package assemblies, which have to be shipped unassembled to protect materials from damage and tag to facilitate identification and field assembly.
- B. Package stainless steel items to provide protection from carbon impregnation.
- C. Protect painted coatings and hot-dip galvanized finishes from damage as a result of metal banding and rough handling. Use padded slings and straps.
- D. Store fabricated items in dry area, not in direct contact with ground.

1.06 SPECIAL GUARANTEE

- A. Manufacturer’s extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of sidewalk doors and floor hatches found defective during a period of 5 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

1.07 EXTRA MATERIALS

- A. Furnish, tag, and box for shipment and storage the following extra materials:

Item	Quantity
Neoprene Gasket	Two for each location requiring neoprene gaskets.
4 inches wide by 50 feet long Neoprene Gasket Material	One roll for each location requiring neoprene gaskets.
Neoprene Gasket Adhesive	One (manufacturer’s recommended) for each location requiring neoprene gaskets.

- B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

PART 2 PRODUCTS

2.01 GENERAL

- A. For hot-dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for ASTM A36/A36M steel), limit maximum silicon content to 0.21 percent and phosphorous content to 0.03 percent.
- B. All aluminum products shall be anodized unless otherwise specified.

C. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Steel Wide Flange Shapes	A992/992M
Other Steel Shapes and Plates	A36/A36M or A572/A572M, Grade 50 or A992/A992M for other steel shapes
Steel Pipe	A500, Grade B
Hollow Structural Sections (HSS)	A500/A500M, Grade C
Aluminum:	
Aluminum Plates	B209, Alloy 6061-T6
Aluminum Structural Shapes	B308/B308M, Alloy 6061-T6
Stainless Steel:	
Bars and Angles	A276, AISI Type 316 (316L for welded connections)
Shapes	A276, AISI Type 304 (304L for welded connections)
Steel Plate, Sheet, and Strip	A240/A240M, AISI Type 316 (316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316, Group 2, Condition SH
Nuts	F594, AISI Type 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	F1554, Grade 36, unless otherwise noted on Drawings, with weldability Supplement S1
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436

Item	ASTM Reference
Thrust Ties for Steel Pipe:	
Threaded Rods	A193/A193M, Grade B7
Nuts	A194/A194M, Grade 2H
Plate	A283/A283M, Grade D
Welded Anchor Studs	A108, Grades C-1010 through C-1020
Aluminum Bolts and Nuts	F468, Alloy 2024-T4
Cast Iron	A48/A48M, Class 35

- D. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Fastener Schedule at end of this section.

2.02 ANCHOR BOLTS AND ANCHOR BOLT SLEEVES

A. Cast-In-Place Anchor Bolts:

- 1. Headed type, unless otherwise shown on Drawings.
- 2. Material type and protective coating as shown in Fastener Schedule at end of this section.

B. Anchor Bolt Sleeves:

- 1. Plastic:
 - a. Single unit construction with corrugated sleeve.
 - b. Top of sleeve shall be self-threading to provide adjustment of threaded anchor bolt projection.
 - c. Material: High-density polyethylene.
- 2. Fabricated Steel: ASTM A36/A36M.

2.03 POST-INSTALLED CONCRETE AND MASONRY ANCHORS

- A. See Section 05 05 19, Post-Installed Anchors.

2.04 PIPE SLEEVES

- A. As specified in Section 40 27 01, Process Piping Specialties.
- B. ASTM A53/A53M, Schedule 40 steel pipe sleeves with continuously welded 3/16-inch-thick seep ring with outside diameter 3 inches greater than sleeve outside diameter. Hot-dip galvanize in accordance with ASTM A123/A123M.

2.05 EMBEDDED STEEL SUPPORT FRAMES FOR FLOOR PLATE AND GRATING

- A. Steel angle support frames to be embedded in concrete shall be stainless steel, ASTM A276, AISI Type 316, unless indicated otherwise.
- B. Welded anchors for stainless steel support frames shall also be stainless steel.

2.06 ABRASIVE NOSING FOR STAIRS

- A. Unless otherwise shown on Drawings, furnish flush type abrasive nosings on stairs.
- B. Nosing Components:
 - 1. Homogeneous epoxy abrasive, with minimum 50 percent aluminum oxide content, formed and cured upon an extruded aluminum base.
 - 2. Epoxy abrasive shall extend over and form curved front edge of nosing.
 - 3. Base of Nosing: Extruded aluminum alloy 6063-T5, heat-treated.
- C. Anchoring System: Double-set anchors consisting of two rows of integrally extruded anchors.
- D. Size: 3 inches wide by 1/4-inch to 3/8-inch-thick by length as shown.
- E. Color: Selected by Design Engineer from manufacturer's standard color range.
- F. Manufacturers and Products:
 - 1. Wooster Products, Inc., Wooster, OH; Spectra Type WP3J and Spectra Type WP3C.
 - 2. American Safety Tread Co., Inc., Helena, AL; Type BF-311D and Type FA-311D.
 - 3. Or approved equal.

2.07 SIDEWALK DOORS

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span. Provide H-20 wheel loading capacity where indicated on Drawings.
- B. Component Fabrication:
 - 1. Access Door Leaf(s): 1/4-inch aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.

2. Channel Frame: 1/4-inch-thick extruded aluminum trough frame with continuous anchor flange around perimeter. Weld 1-1/2-inch diameter drain coupling, and drain pipe, to frame trough at front right corner, unless indicated otherwise on Drawings.
 3. Safety Grate: Aluminum grating with 300 psf live load capacity, 5-inch by 5-inch grate openings, permanent hinging system that locks grate in 90-degree position, and opening arm with vinyl grip handle and locking device.
- C. Door Hardware:
1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
 2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
 3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
 4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed.
- D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.
- E. Manufacturers and Products:
1. Bilco Co., New Haven, CT; J Series.
 2. Nystrom Products Co., Minneapolis, MN; FG Series.
 3. U.S.F. Fabrication, Hialeah, FL; T Series.
 4. ITT Flygt Corporation, Trumbull, CT; FDRN Series.
 5. Thompson Fabricating Co., Birmingham, AL; TE Series.
 6. Halliday Products, Orlando, FL; WS Series.
 7. Or approved equal.

2.08 FABRICATED UNITS

- A. Shell Manhole:
1. Flanged and bolted type with confined rubber gasket.
 2. Manhole Unit: Capable of withstanding pressure of full tank of water with no leakage.
 3. Minimum clear opening of 24 inches.
 4. Cover: Hinged to tank.
 5. Material: AISI Type 316L stainless steel.
 6. Grind welds and sheared edges smooth.
- B. Overflow Pipe and Accessories:
1. Fabricate supporting brackets of structural shapes and flat bar stock, as shown. Material shall be AISI Type 316 stainless steel.
 2. Bolts: AISI Type 316 stainless steel machine bolts with hexagon nuts.
- C. Weir and Baffle Plates: Fabricate plates and associated framing of stainless steel, AISI Type 316 unless indicated otherwise on Drawings.
- D. Stop Gates and Guide Frames: Aluminum plate with aluminum channel or angle sections as stiffeners.
1. Guides, Rests, and Fasteners: AISI Type 316 stainless steel.
 2. Identification Plate:
 - a. 16-gauge aluminum or stainless steel securely mounted on each gate.
 - b. Text: 1-inch die-stamped word "WATERSIDE" and corresponding gate number as shown in Gate Schedule on Drawings.
 - c. Mount plate on side opposite gate stiffeners.
 3. Extruded Aluminum Guide Manufacturer:
 - a. Washington Aluminum Co., Baltimore, MD.
 - b. Or approved equal.

2.09 ACCESSORIES

- A. Antiseizing Lubricant for Stainless Steel Threaded Connections:
1. Suitable for potable water supply.
 2. Resists washout.
 3. Manufacturers and Products:
 - a. Bostik, Middleton, MA; Neverseez.
 - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.
 - c. Or approved equal.

B. Neoprene Gasket:

1. ASTM D1056, 2C1, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on Drawings.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.
4. Manufacturer and Product:
 - a. Monmouth Rubber and Plastics Corporation, Long Branch, NJ; Durafoam DK1111LD.
 - b. Or approved equal.

2.10 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Fit and assemble in largest practical sections for delivery to Site.

B. Materials:

1. Use steel shapes, unless otherwise noted.
2. Steel to Be Hot-dip Galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 percent and 0.25 percent.
3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures—Allowable Stress Design.

C. Welding:

1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
2. Welded fabrications shall be free from twisting or distortion caused by improper welding techniques.
3. Steel: Meet fabrication requirements of AWS D1.1/D1.1M, Section 5.
4. Aluminum: Meet requirements of AWS D1.2/D1.2M.
5. Stainless Steel: Meet requirements of AWS D1.6/D1.6M.
6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D1.1/D1.1M, Section 7, and manufacturer's instructions.

7. Complete welding before applying finish.
- D. Painting:
1. Shop prime with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.
 2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
 3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
- E. Galvanizing:
1. Fabricate steel to be galvanized in accordance with ASTM A143/A143M, ASTM A384/A384M, and ASTM A385/A385M. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.
 2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385/A385M.
 3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
 4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
 5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A123/A123M.
 6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM A153/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
 7. Galvanized steel sheets in accordance with ASTM A653/A653M.
 8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.
- F. Electrolytic Protection: Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
- G. Watertight Seal: Where required or shown, furnish neoprene gasket of a type that is satisfactory for use in contact with sewage. Cover full bearing surfaces.
- H. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.

- I. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.11 SOURCE QUALITY CONTROL

- A. Visually inspect all fabrication welds and correct deficiencies.
 - 1. Steel: AWS D1.1/D1.1M, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
 - 2. Aluminum: AWS D1.2/D1.2M.
 - 3. Stainless Steel: AWS D1.6/D1.6M.
- B. Hot-Dip Galvanizing:
 - 1. An independent testing agency will be retained by Owner in accordance with ASTM A123/A123M and ASTM A153/A153M.
 - 2. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123/A123M and ASTM A153/A153M.
 - 3. Reject and retest nonconforming articles in accordance with ASTM A123/A123M and ASTM A153/A153M.

PART 3 EXECUTION

3.01 INSTALLATION OF METAL FABRICATIONS

- A. General:
 - 1. Install metal fabrications plumb and level, accurately fitted, free from distortion or defects.
 - 2. Install rigid, substantial, and neat in appearance.
 - 3. Install manufactured products in accordance with manufacturer's recommendations.
 - 4. Obtain Design Engineer approval prior to field cutting steel members or making adjustments not scheduled.
- B. Aluminum:
 - 1. Do not remove mill markings from concealed surfaces.
 - 2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
 - 3. Fabrication, mechanical connections, and welded construction shall be in accordance with the AA Aluminum Design Manual.

C. Pipe Sleeves:

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide center flange for water stoppage on sleeves in exterior or water-bearing walls.
4. Provide rubber caulking sealant or a modular mechanical unit to form watertight seal in annular space between pipes and sleeves.

3.02 CAST-IN-PLACE ANCHOR BOLTS

- A. Locate and hold anchor bolts in place with templates at time concrete is placed.
- B. Use anchor bolt sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.
- C. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.03 ACCESS COVERS

- A. Install access covers, including sidewalk doors, floor hatches, and hinged manhole covers in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor or roadway surface.
- C. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.
- D. Route drain pipe to exterior face of concrete or as shown on Drawings.
- E. Position cover so that hinge is on side opposite ladder.

3.04 SAFETY CLIMB DEVICE SYSTEM

- A. Provide for each ladder where unbroken height between levels exceeds 20 feet, or at lesser height where indicated on Drawings.
- B. Install in accordance with manufacturer's instructions.
- C. Furnish additional accessories required to complete system for each ladder.
- D. Furnish one harness for each ladder equipped with safety climb device.

- E. Furnish pivot section at platforms, landings, and roofs.
- F. When installed to required height, fall prevention system shall be rigid and an integral part of the structure.

3.05 ELECTROLYTIC PROTECTION

A. Aluminum and Galvanized Steel:

1. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
2. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
3. Allow coating to dry before installation of the material.
4. Protect coated surfaces during installation.
5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions and per approved submittal.

B. Titanium: Where titanium equipment is in contact with concrete or dissimilar metal, provide full-face neoprene insulation gasket, 3/32-inch minimum thickness and 70-durometer hardness.

C. Stainless Steel:

1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
3. Remove contamination using cleaning and passivation methods in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

3.06 PAINTING

A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.

B. Repair of Damaged Hot-Dip Galvanized Coating:

1. Conform to ASTM A780/A780M.

2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780/A780M.
3. For flame cut or welded areas, use zinc-based solder, or zinc sticks, conforming to ASTM A780/A780M.
4. Use magnetic gauge to determine thickness is equal to or greater than base galvanized coating.

C. Field Painting of Shop Primed Surfaces: Prepare surfaces and field finish in accordance with Section 09 90 00, Painting and Coating.

3.07 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

A. Owner-Furnished Quality Assurance:

1. In accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings.
2. Contractor responsibilities and related information on special inspection, observation, and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.

B. Contractor-Furnished Quality Control:

1. Inspection and testing required in Section 01 45 16.13, Contractor Quality Control.
2. Manufacturer's Certificate of Compliance per Section 01 61 00, Common Product Requirements, for test results, or calculations, or drawings that ensure material and equipment design and design criteria meet requirements of Section 01 61 00, Common Product Requirements, and Section 01 88 15, Anchorage and Bracing.
3. Special inspection shall be provided by Owner where indicated in Statement of Special Inspections Plan on Drawings.

3.08 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Anchor Bolts Cast Into Concrete for Structural Steel, Metal Fabrications and Castings		
Interior Dry Areas	Hot-dip galvanized steel headed anchor bolts, unless indicated otherwise	

Service Use and Location	Product	Remarks
Exterior and Interior Wet Areas	Stainless steel headed anchor bolts	
Submerged and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating	See Section 09 90 00, Painting and Coating
2. Anchor Bolts Cast Into Concrete for Equipment Bases		
Interior Dry Areas	Hot-dip galvanized steel headed anchor bolts, unless otherwise specified with equipment	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating, unless otherwise specified with equipment	See Section 09 90 00, Painting and Coating
3. Post-Installed Anchors: See Section 05 05 19, Post-Installed Anchors		
4. Connections for Structural Steel Framing		
Exterior and Interior Wet and Dry Areas	High-strength steel bolted connections	Use hot-dipped galvanized high-strength bolted connections for galvanized steel framing members
5. Connections for Steel Fabrications and Wood Components		
Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections	
6. Connections of Aluminum Components		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	

Service Use and Location	Product	Remarks
7. All Others		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on stainless steel threads.

END OF SECTION

SECTION 05 52 16
ALUMINUM RAILINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Aluminum Association: Aluminum Design Manual.
2. Aluminum Association, Incorporated (AA): DAF45, Designation System for Aluminum Finishes.
3. American Concrete Institute (ACI) 318, Building Code Requirements for Structural Concrete.
4. American Iron and Steel Institute (AISI).
5. ASTM International (ASTM):
 - a. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - b. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - c. E894, Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 - d. E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 - e. E985, Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
6. California Buildings Commission: California Building Code (IBC).
7. Occupational Safety and Health Act (OSHA): 29 CFR 1910, Code of Federal Regulations.

1.02 DEFINITIONS

- A. ICC Evaluation Services Report: ICC report on evaluation of manufactured concrete anchor systems.
- B. Railings: This term includes guardrail systems, handrail systems, platform railing systems, ramp-rail systems, and stair-rail systems. Railings may be comprised of a framework of vertical, horizontal, or inclined members, grillwork or panels, accessories, or combination thereof.
- C. Special Inspection: As defined by the ICC IBC.

- D. Toeboards: Vertical barrier at floor level usually erected on railings along exposed edges of floor or wall openings, platforms, or ramps to prevent miscellaneous items from falling through.

1.03 DESIGN REQUIREMENTS

- A. Structural Performance of Railing Systems: Design, test, fabricate, and install railings to withstand the following structural loads without exceeding allowable design working stress or allowable deflection. Apply each load to produce maximum stress and deflection in railing system components.
 - 1. Railing System:
 - a. Capable of withstanding the following load cases applied:
 - 1) Concentrated load of 200 pounds applied at any point and in any direction in accordance with CBC and OSHA.
 - 2) Uniform load of 50 pounds per linear foot applied in any direction in accordance with CBC.
 - 3) Concentrated load need not be assumed to act concurrently with uniform loads in accordance with CBC.
 - 2. In-Fill Area of Railing Systems:
 - a. Capable of withstanding a horizontally applied normal load of 50 pounds applied to 1 square foot at any point in system including panels, intermediate rails, balusters, and openings and space between railings.
 - b. Horizontal concentrated load need not be assumed to act concurrently with loads on top rails of railings.
 - 3. Calculated lateral deflection at top of posts shall not exceed 1 inch.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Project-specific scaled plans and elevations of railings and detail drawings. Include railing profiles, sizes, connections, anchorage, size and type of fasteners, and accessories.
 - b. Manufacturer's literature and catalog data of railing and components.
 - c. Design Data:
 - 1) Calculations or test data using specified design performance loads and including the following:
 - a) Railing calculations including the connection design shall be performed based on Aluminum Design Manual.

- b) Bending stress in, and deflection of, posts in accordance with ASTM E985 as modified herein.
 - c) Design of post base connection.
 - d) Documentation that concrete anchors have been designed in accordance with one of the following:
 - (1) ACI 318, Appendix D.
 - (2) ICC Evaluation Services Report for selected anchor.
2. Samples:
- a. Rail sections, 6 inches long showing each type of proposed connection, proposed finish, and workmanship.
 - b. Each fitting including wall brackets, castings, toeboard, and rail expansion joints.
- B. Informational Submittals:
- 1. Manufacturer's assembly and installation instructions.
 - 2. Special Inspection: Manufacturer's instructions for Special Inspection of post-installed anchors.
 - 3. Test Reports:
 - a. Test data may supplement load calculations providing data covers complete railing system, including anchorage:
 - 1) Test data for railing and components showing load and deflection as a result of load, in enough detail to prove railing is strong enough and satisfies national, state, local standards, regulations, code requirements, and OSHA 29 CFR 1910, using design loads specified. Include test data for the following:
 - a) Railing and post connections.
 - b) Railing wall connections.
 - c) Railing expansion joint connections.
 - d) Railing system gate assembly, including latch, gate stop, and hinges. Both gate latch and stop to support required loads applied independent of each other.
 - e) Railing picket panel clamps and connections.
 - 2) Testing of anchorages shall be in accordance with ASTM E894 and ASTM E935 using applied loads in accordance with ICC IBC.
 - 3) Deflection Criteria:
 - a) In accordance with ASTM E985 and design loads specified, except as follows:
 - (1) Maximum calculated lateral deflection at top of posts shall not exceed 1 inch.
 - 4) Aluminum Rail Piping: Test data showing yield strength of pipe as delivered equals or exceeds specified values.

4. Manufacturer's written recommendations describing procedures for maintaining railings including cleaning materials, application methods, and precautions to be taken in use of cleaning materials.

1.05 QUALITY ASSURANCE

- A. Qualifications: Calculations required for design data shall be stamped by a registered civil or structural engineer licensed in state where Project will be constructed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package and wrap railings to prevent scratching and denting during shipment, storage, and installation. Maintain protective wrapping to the extent possible until railing is completely installed.
- B. Delivery:
 1. Shop assemble into practical modules of lengths not exceeding 24 feet for shipment.
 2. Deliver toeboards loose for field assembly.
 3. Deliver clear anodized railing pipe and posts with protective plastic wrap.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Thermal Movements: Allow for thermal movement resulting from the following maximum range in ambient temperature in design, fabrication, and installation of railings to prevent buckling, opening up of joints, over stressing of components, connections and other detrimental effects. Base design calculation on actual surface temperature of material as a result of both solar heat gain and night time sky heat loss. Temperature change is difference between high or low temperature and installation temperature.
 1. Temperature Change Range: 70 degrees F, ambient; 100 degrees F, material surfaces.

PART 2 PRODUCTS

2.01 ALUMINUM RAILINGS

- A. General:
 1. Furnish pre-engineered and prefabricated railing systems as shown on Drawings.

2. Railing systems using pop rivets or glued railing construction are not permitted.
3. Sand cast accessories and components are not permitted.
4. Fasteners shall be AISI Type 304 or Type 316 stainless steel, unless otherwise noted.

B. Rails, Posts, and Formed Elbows:

1. Extruded Alloy 6105-T5, 6061-T6, or equivalent.
2. Tensile Strength: 38,000 psi, minimum.
3. Yield Strength: 35,000 psi, minimum.
4. Wall Thickness: 0.145 inch, minimum.
5. Posts and railings shall be nominal 1-1/2-inch diameter (1.90-inch outside diameter).

C. Accessories:

1. Fittings and Accessories:
 - a. Extruded, machined bar stock, permanent mold castings, or die castings of sufficient strength to meet load requirements.
 - b. Gauge metal components are not acceptable for load-resisting components.
 - c. Fittings shall match color of pipe in railings.
2. Miscellaneous Extruded Aluminum Parts: Alloys 6063-T6, 6061-T6, or 6105 T5 aluminum, or equivalent, and of adequate strength for all loads.
3. Castings for Railings:
 - a. Cast Al-mag with sufficient strength to meet load and test requirements.
 - b. Anodizable grade finish with excellent resistance to corrosion when subjected to exposure of sodium chloride solution intermittent spray and immersion.
4. Post Anchorages:
 - a. Refer to standard details for types of post anchorages and minimum requirements.
 - b. Bolts at anchorages shall be minimum 1/2-inch diameter.
5. Wall Brackets: Adjustable wall fitting, with provision for minimum three 3/8-inch diameter AISI Type 304 or Type 316 stainless steel bolts or concrete anchors.
6. Rail Terminals (including wall returns): Aluminum wall fitting with provision for three 3/8-inch Type 304 fasteners.
7. Railing System Gate:
 - a. Extruded aluminum rail components.
 - b. Hardware Manufacturers and Products:
 - 1) Julius Blum & Co., Inc., Carlstadt, NJ; No. 782/3 gate hinges with springs, and No. 784 gate latch and stop.

- 2) CraneVeyor Corp., South El Monte, CA; No. C4370b gate hinges with spring, No. C4369 gate latch, and No. C4368 gate stop.
 - 3) Moultrie Manufacturing Co., Moultrie, GA; Part No. W60006.
 - 4) Or approved equal.
8. Railing Picket Panels and Clamps:
 - a. 1/2-inch Schedule 40 aluminum pipe (picket).
 - b. Extruded aluminum 1-1/2-inch by 7/8-inch by 1/8-inch channel.
 - c. Furnish neoprene plug for each end of picket.
 - d. Fasteners: Stainless steel.
 9. Toeboards:
 - a. Molded or extruded Alloy 6063-T6 or 6061-T6 aluminum.
 - b. Provide slotted holes for expansion and contraction where required.
 10. Fasteners: Stainless steel.
- D. Metal Supports Embedded in Concrete: In accordance with Section 05 50 00, Metal Fabrications.
- E. Finishes:
1. Pipe and Post: In accordance with AA DAF45, designation AA-M32-C22-A41.
 2. Cast Fittings and Toeboards: In accordance with AA DAF45, designation AA-M10-C22-A41.

2.02 ANCHOR BOLTS, FASTENERS, AND CONCRETE ANCHORS

- A. Locknuts, Washers, and Screws:
1. Elastic Locknuts, Steel Flat Washers, Round Head Machine Screws (RHMS): AISI Type 304 or Type 316 stainless steel.
 2. Flat Washers: Molded nylon.
- B. Bolts and Nuts for Bolting Railing to Metal Beams: ASTM A193/A193M and ASTM A194/A194M, Type 304 or Type 316 stainless steel.
- C. Concrete Anchors:
1. Stainless steel, AISI Type 304 or Type 316.
 2. Post-installed anchors in accordance with Section 05 50 00, Metal Fabrications, unless otherwise specified herein.
 3. Bolt Diameter: 1/2-inch, minimum.

2.03 FABRICATION

- A. Shop Assembly:
 - 1. Post Spacing: Maximum 6-foot horizontal spacing.
 - 2. Railing Posts Bolted to Metal or Concrete:
 - a. In lieu of field cutting, provide approved fitting with sufficient post overlap, containing provisions for vertical adjustment.
 - b. Field fit-up is required.
 - 3. Free of burrs, nicks, and sharp edges when fabrication is complete.
 - 4. Welding is not permitted.
- B. Shop/Factory Finishing:
 - 1. Use same alloy for uniform appearance throughout fabrication for railings.
 - 2. Railing and Post Fittings: Match fittings with color of pipe in railing.
- C. Shop Assembly:
 - 1. Shop assemble rails, posts, and formed elbows with a close tolerance for tight fit.
 - 2. Fit dowels tightly inside posts.
- D. Repair of Defective Work: Remove stains and replace defective Work.

PART 3 EXECUTION

3.01 GENERAL

- A. Field fabrication of aluminum railing systems is not permitted.
- B. Where required, provide railing posts longer than needed and field cut to exact dimensions required in order to satisfy vertical variations on actual structure.
- C. Install railing with base that provides plus or minus 1/4-inch vertical adjustment inside base fitting. If adjustment is required in field and exceeds plus or minus 1/4-inch, reduce post length not to exceed beyond bottom of lowest set-screw or bolt in base fitting.
- D. Modification to supporting structure is not permitted where railing is to be attached.
- E. Mount railings only on completed walls. Do not support railings temporarily by means not satisfying structural performance requirements.

- F. Protection from Entrapped Water:
1. Make provisions in exterior and interior installations subject to high humidity to drain water from railing system.
 2. For posts mounted in concrete, bends, and elbows occurring at low points, drill weep holes of 1/4-inch diameter at lowest possible elevations, one hole per post or rail. Drill hole in plane of rail.

3.02 RAILING INSTALLATION

- A. Assembly and Installation: Perform in accordance with manufacturer's written recommendations for installation.
- B. Expansion Joints:
1. Maximum intervals of 54 feet on center and at structural joints.
 2. Slip joint with internal sleeve extending 2 inches beyond each side of joint. Provide 1/2-inch slip joint gap to allow for expansion.
 3. Fasten to one side using 3/8-inch diameter set-screw. Place set-screw at bottom of pipe.
 4. Locate joints within 12 inches of posts. Locate expansion joints in rails that span expansion joints in structural walls and floors supporting the posts.
- C. Posts and Rails:
1. Surface Mounted Posts:
 - a. Bolt post baseplate connectors firmly in place.
 - b. Shims, wedges, grout, and similar devices for railing post alignment not permitted.
 2. Grouted Posts:
 - a. Clean dust and foreign matter from sleeves or blockouts.
 - b. Moisten interior of hole and surrounding surface with clean water. Fill hole with nonshrink grout or epoxy grout prior to installing post.
 - c. Brace railing until grout sets.
 - d. Posts installed outside and exposed to freezing temperatures, drill weep hole through post approximately 1/2 inch above level of grout inside post and in plane of rail to prevent entrapment and freezing of water inside post.
 3. Set posts plumb and aligned to within 1/8 inch in 12 feet.
 4. Set rails horizontal or parallel to slope of steps to within 1/8 inch in 12 feet.
 5. Install posts and rails in same plane.

6. Remove projections or irregularities and provide a smooth surface for sliding hands continuously along top rail.
 7. Use offset rail for use on stairs and platforms if post is attached to web of stringers or structural platform supports.
 8. Support 1-1/2-inch rails directly above stairway stringers with offset fittings.
- D. Wall Brackets: Support wall rails on brackets spaced maximum 5 feet on centers as measured on the horizontal projection.
- E. Toeboard:
1. Provide at railings, except where 4-inch or higher concrete curbs are installed, at gates, or at stairways unless shown otherwise.
 2. Accurately measure in field for correct length; after railing post installation cut and secure to posts.
 3. Dimension between bottom of toeboard and walking surface not to exceed 1/4 inch.
 4. Install plumb and aligned to within 1/8 inch in 12 feet.
- F. Railing System Gate: Install in accordance with manufacturer's installation instructions.

3.03 FIELD FINISHING

- A. Corrosion Protection: Prevent galvanic action and other forms of corrosion caused from direct contact with concrete and dissimilar metals by coating metal surfaces as specified in Section 09 90 00, Painting and Coating.

3.04 FIELD QUALITY CONTROL

- A. Post-installed anchors supporting railing systems require special inspection.
- B. Owner-Furnished Quality Assurance, in accordance with ICC IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- C. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

3.05 CLEANING

- A. Wash railing system thoroughly using clean water and soap. Rinse with clean water.
- B. Do not use acid solution, steel wool, or other harsh abrasive.
- C. If stain remains after washing, restore in accordance with railing manufacturer's recommendations or replace stained railings.

END OF SECTION

SECTION 05 53 00
METAL GRATINGS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges.
 2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A510, Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
 - c. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - d. A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - e. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 3. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. MBG 531, Metal Bar Grating Manual.
 - b. MBG 532, Heavy-Duty Metal Bar Grating Manual.

1.02 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
 - b. Grating Anchorage: Show details of anchorage to supports to prevent displacement from traffic impact.
 - c. Product data for grating, grating clips, anchors, accessories, and other manufactured products specified herein.
 - d. Manufacturer's specifications, including coatings, surface treatment, and finishes.

B. Informational Submittals:

1. Special handling and storage requirements.
2. Installation instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as is practical, factory assemble items.
- B. Package and clearly tag parts and assemblies that are, due to necessity, shipped unassembled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
 1. Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
 2. IKG Industries, Houston, TX.
 3. Ohio Gratings, Inc., Canton, OH.
 4. Seidelhuber Metal Products, Inc., South San Francisco, CA.
 5. Or approved equal.

2.02 GRATING MATERIALS

- A. Aluminum: Provide alloy and temper as designated below.
 1. Bearing Bars and Banding: ASTM B221 Alloy 6061-T6 or 6063-T6.
 2. Swaged Crossbar Rods: ASTM B221 Alloy 6061 or 6063, or ASTM B210 Alloy 3003.
 3. Finish: Mill.
- B. Carbon Steel:
 1. Bearing Bars, Banding, and Rectangular Cross Bars: ASTM A1011/ A1011M commercial steel Type II for hot rolled carbon steel sheet and strip, or ASTM A36/A36M.
 2. Cross Bars made from Wire Rods: Not permitted.
 3. Finish: Galvanized after fabrication.
- C. Stainless Steel:
 1. Bearing Bars, Banding, and Cross Bars: ASTM A666, Type 304L.
 2. Finish: Mill.

2.03 METAL BAR GRATING

A. General Requirements:

1. Maximum Service Load:
 - a. Light Duty (Type A): 100 psf uniformly distributed load.
 - b. Medium Duty (Type B): 500 psf uniformly distributed load.
2. Maximum Deflection: Span/240 or 1/4 inch, whichever is less.
3. Bearing Bar Spacing:
 - a. Light Duty: 1-3/16 inch maximum, center-to-center.
 - b. Medium Duty: 15/16 inch maximum, center-to-center.
4. Cross Bar Spacing: 4 inches maximum, center-to-center. For aluminum I-bar grating with depths greater than 2 inches, provide cross bars at 2 inches maximum, center-to-center.
5. Bearing Bars, Cross Bars, and Banding: Minimum thickness as specified in NAAMM MBG 531 or as shown on Drawings.

B. Grating Materials:

1. Aluminum, pressure-locked rectangular bar grating fabricated by pressing crossbars between rectangular bearing bars.
2. Galvanized steel welded, rectangular bar grating fabricated by electro-forging cross bars to bearing bars.
3. Stainless steel pressure-locked rectangular bar grating fabricated by swaging crossbars between rectangular bearing bars.

C. Surface: Plain.

D. Stair Treads:

1. Material and Type: Same as grating material and grating type as furnished for connecting walkway or work surface.
2. Nosings: Integral ribbing and serrated edge on one long axis of tread, or nonslip abrasive on each tread along one long edge.
3. Carrier Plate or Angle: Furnish at each end for connection to stair stringers.

2.04 HEAVY-DUTY METAL BAR GRATING (TYPE C)

A. General Requirements:

1. Maximum Service Load: AASHTO H-20.
2. Maximum Deflection: Span/240.
3. Bearing Bar Spacing: 1-7/8 inch maximum center-to-center.
4. Cross Bar Spacing: 4 inches maximum center-to-center.

5. Bearing Bars, Cross Bars, and Banding: Minimum thickness as specified in NAAMM MBG 532 or as shown on Drawings.
6. Grating Type: Galvanized steel, heavy-duty, rectangular bar grating fabricated by welding crossbars between rectangular bearing bars.

2.05 ACCESSORIES

- A. Embedded Frames: As indicated on Drawings and as specified in Section 05 50 00, Metal Fabrications.
- B. Grating Clamps:
 1. Use at flanged beam and bolted angle frame supports.
 2. Removable from above grating walkway surface.
 3. Provide hat bracket, recessed bolt, and bottom clamp of same material as grating.
 4. Manufacturers and Products:
 - a. Direct Metals Company, LLC, Kennesaw, GA; Grating Clamp.
 - b. Grating Fasteners, Inc., Harvey, LA; G-Clip.
 - c. Or approved equal.
- C. Anchor Stud and Saddle Clip:
 1. Use at embedded angle frame supports with stud anchor and nut recessed below top of grating surface.
 2. Removable from above grating walkway surface.
 3. Provide Type 316 stainless steel welded threaded stud anchor, nut, washer, and saddle clip.
 4. Manufacturers and Products:
 - a. Welded Stud Anchor:
 - 1) Nelson Stud Welding, Inc., Elyria, OH.
 - 2) Stud Welding Associates, Inc., Elyria, OH.
 - 3) Or approved equal.
 - b. Saddle Clip:
 - 1) Direct Metals Company, LLC, Kennesaw, GA; Saddle Clip.
 - 2) Grating Fasteners, Inc., Harvey, LA; Saddle Clip.
 - 3) Struct-Fast, Inc., Baltimore, MD; Gratefast.
 - 4) Or approved equal.

2.06 FABRICATION

- A. General:
 1. In accordance with NAAMM MBG 531 or NAAMM MBG 532.
 2. Do not weld aluminum grating.

3. Conceal fastenings where practical.
 4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
 5. Cutouts:
 - a. Fabricate in grating sections for penetrations indicated.
 - b. Arrange to permit grating removal without disturbing items penetrating grating.
 - c. Edge band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
 6. Do not notch bearing bars at supports to maintain elevation.
 7. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
 8. Section Length: Sufficient to prevent section from falling through clear opening when oriented in the span direction and one end is touching either the concrete or the vertical leg of grating support.
 9. Minimum Bearing: 1 inch for grating depth up to 2-1/4 inches and 2 inches for grating depth greater than 2-1/4 inches.
 10. Banding and Toe Plates: Same material as grating and welded to bearing bars in accordance with requirements of NAAMM MBG 531 and NAAMM MBG 532.
- B. Metal Bar Grating: A single grating section shall be not less than 1.5 feet or greater than 3 feet in width, or weigh more than 150 pounds.
- C. Heavy Duty Metal Bar Grating: Minimum width of grating sections shall be 2 feet regardless of length and weight.
- D. Supports:
1. Same material as grating, except that supports which are to be embedded in concrete shall be Type 316 stainless steel, unless part of an extruded aluminum system.
 2. Coordinate dimensions and fabrication with grating to be supported.

PART 3 EXECUTION

3.01 PREPARATION

- A. Electrolytic Protection:
1. Protect aluminum surfaces in contact with dissimilar metals, or embedded or in contact with masonry, grout, or concrete as specified in Section 09 90 00, Painting and Coating.
 2. Allow paint to dry before installation of material.

3.02 INSTALLATION

- A. Until grating sections are securely fastened in place, area shall be appropriately barricaded or flagged to alert people working in the area of potential fall hazard.
- B. Install manufactured products in accordance with manufacturer's recommendations.
- C. Install supports such that grating sections have a solid bearing on both ends, and that grating sections will not rock or wobble under design loads.
- D. Install grating supports plumb and level as applicable.
- E. Install sections of welded frames with anchors to straight plane without offsets.
- F. Field locate and install fasteners to fit grating layout.
- G. Anchor grating securely to supports using minimum of four fastener clips and bolts per grating section.
- H. Each grating or plank section shall be easily removable and replaceable.
- I. Completed installation shall be rigid and neat in appearance.
- J. Protect painted and galvanized surfaces during installation.
- K. Repair damaged coatings as specified in Section 09 90 00, Painting and Coating.

END OF SECTION

SECTION 07 14 00
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Copies of manufacturer's literature for products proposed.
2. Samples:
 - a. Cured membrane and coating system applied to 12-inch square by 1/4-inch-thick plywood or similar rigid base.
 - b. Sample of each color and coating to be used on Project.

B. Informational Submittals:

1. Certification: Compliance with product requirements specified.
2. Sample copy of guarantee to be provided. Upon completion and acceptance of the Work required by this section, submit an executed copy of the guarantee.
3. Applicator approval letter from membrane manufacturer.

1.02 QUALITY ASSURANCE

- A. Applicator: Approved and licensed by fluid applied waterproofing manufacturer.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in sealed, undamaged containers. Identify each container with material name, date of manufacture, and lot number.
- B. Store material in dry area out of direct sunlight. Storage area temperature shall not exceed 90 degrees F.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Perform Work only when existing and forecasted weather conditions are within limits established by manufacturer of materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive waterproofing.

1.05 SPECIAL GUARANTEE

- A. Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Special Guarantee shall provide for correction or, at the option of Owner, removal and replacement of Work specified in this specification section found defective during a period of 3 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.

PART 2 PRODUCTS

2.01 MEMBRANE

- A. Polyurethane elastomer-based fluid applied waterproofing membrane.
- B. Manufacturers and Products:
1. The Neogard Corp., Dallas, TX; Perma-Gard III.
 2. Carlisle Coatings and Waterproofing, Sapulpa, OK; CCW-525.
 3. Sonneborn, a Division of BASF, Shakopee, MN; HLM 5000.
 4. W.R. Grace & Co., Cambridge, MA; Procor 20.
 5. Or approved equal.

2.02 RELATED MATERIALS

- A. As follows, compatible with components produced by membrane manufacturer:
1. Primers: As recommended by membrane manufacturer for type of substrate involved.
 2. Sealants: Low modulus, unmodified polyurethane or as recommended by membrane manufacturer.
 3. Backer Rod: Expanded polyethylene rod as manufactured by Dow Chemical, Ethafoam.
 4. Flashing Reinforcement: Woven, uncoated fiberglass mesh on 0.050-inch-thick precured neoprene.
 5. Protection Board: Approved by membrane manufacturer.

PART 3 EXECUTION

3.01 CONDITIONS OF SURFACES

- A. Verify curing methods used for concrete are compatible with membrane system.

3.02 PREPARATION

- A. Cleaning:
 - 1. Thoroughly clean surfaces to receive membrane following membrane manufacturer's recommendations.
 - 2. Treat as necessary to remove laitance, loose material on surface, grease, oil, and other contaminants that will affect bond of the membrane.
 - 3. Vacuum clean or clear water wash surfaces and allow to dry completely.
- B. Fill voids and control joints with sealant and overcoat with nonflow membrane material. Fill or coat visible shrinkage cracks to minimum 2 inches either side of crack.
- C. Use drop cloths or masking as required for protection of adjacent surfaces.

3.03 FLASHINGS-FLUID APPLIED

- A. Unless Drawings establish more restrictive requirements, the following minimum requirements apply:
 - 1. Fill construction joint voids at intersections of vertical and horizontal walls with backer rod and sealant in accordance with requirements of membrane manufacturer.
 - 2. Nonreinforced Flashing:
 - a. Install nonreinforced flashing at construction joints not subject to movement, at all intersecting surfaces that are structurally and rigidly connected, and at all piping or other penetrations through membraned surface that do not require reinforced flashing.
 - b. Apply 50-mil minimum dry film thickness of membrane for 4 inches minimum onto adjacent surfaces.
 - c. At intersections of membrane with vertical walls, piping penetrations, and at projections through horizontal membrane, extend flashing coat to a height not greater than finished horizontal surface, with due allowance for installation of sealant work. Trowel a 1-inch-high, 45-degree cant at meeting angle using nonflowing membrane material.
 - d. At projections through a vertical membrane, extend flashing coat 4 inches minimum onto penetrating element.

3. Reinforced Flashing:
 - a. Apply flashing reinforcement over cracks, expansion and control joints, and at changes of plane where adjacent surfaces are not structurally and rigidly connected and also at penetrations through a membrane surface.
 - b. Apply 50-mil dry film thickness embedment coat of membrane to surfaces to be flashed. Extend 6 inches minimum out onto adjacent deck surface.
 - c. Embed reinforcement in wet coating. Embedment coating should extend 2 inches beyond reinforcement.
 - d. At intersections of membrane with vertical walls, extend embedment coat and reinforcement to a height not greater than finished horizontal surface with due allowance for installation of sealant work. Trowel a 1-inch high, 45-degree cant at meeting angle using nonflowing coating material.

3.04 MEMBRANE

- A. Install, following safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of federal, state, and local authorities having jurisdiction.
- B. Following manufacturer's instructions, apply membrane material with a calibrated notched squeegee, trowel, or approved spray equipment to produce a 50-mil minimum dry thickness.
- C. Extend membrane over previously flashed areas.
- D. Use self-leveling membrane material up to a 5 percent slope.
- E. Use nonflow membrane material for vertical surfaces and surfaces over a 5 percent slope.
- F. Allow membrane to cure overnight. At temperatures less than 75 degrees F and relative humidity less than 50 percent, extend curing time.

3.05 PROTECTION

- A. Protect cured vertical membranes exposed to backfilling operations with protection board.
- B. Butt all boards; do not overlap.
- C. Adhere or bond protection boards to membrane as recommended by membrane manufacturer.

3.06 COATING

- A. Apply 20-mil (0.020-inch) thick base coat of self-leveling (up to 5 percent pitch) or nonflow (over 5 percent pitch) coating to surfaces as shown. Overcoat previously detailed areas. Allow to cure overnight.
- B. Apply a second 20-mil (0.020-inch) thick topcoat of self-leveling (up to 5 percent pitch) or nonflow (over 5 percent pitch) coating to surfaces previously base coated.

3.07 CLEANING

- A. Clean stains from adjacent surfaces with toluene, 1-1-1, trichloroethane, xylene, commercial tar remover, or as recommended by the membrane manufacturer.
- B. Remove foreign matter from finished membrane surface.

3.08 APPLICATION SCHEDULE

- A. Membrane:
 - 1. Apply waterproofing membrane and protection board to exterior surfaces of cast-in-place concrete structures below finish ground level that enclose spaces that may be occupied, such as stairways, galleries, pump rooms, mechanical and electrical equipment rooms, and other areas shown. Do not include water-holding basins.
 - 2. Apply membrane from top of footings to 6 inches below finished grade.

END OF SECTION

SECTION 07 19 00
WATER REPELLENTS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals: Manufacturer's product data for water repellent.
- B. Informational Submittals:
 - 1. Manufacturer's current application instructions for water repellent.
 - 2. Evidence of applicator certification by product manufacturer.
 - 3. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 4. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.

1.02 QUALITY ASSURANCE

- A. Qualifications: Applicator certified by product manufacturer.
- B. Mockup:
 - 1. Apply water repellent following manufacturer's application instructions to not less than 20 square feet of substrate material that matches actual job conditions. Determine the optimum coverage rate required for application.
 - 2. After sample treatment has cured (approximately 12 hours to 24 hours), water test to verify that substrate is coated with sufficient water repellent to effectively repel moisture from the surface.
 - 3. Verify that application of water repellent materials will produce no surface stains or discoloration, and obtain Design Engineer's acceptance.
 - 4. Maintenance: Maintain mockup during construction for workmanship comparison; remove and legally dispose of mockup when no longer required.
 - 5. Incorporation: Mockup may be incorporated into final construction upon Owner's approval.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original sealed containers.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Lids must be kept tightly sealed. Do not allow moisture to enter containers.
 - 2. Store containers in a dry place, upright and airtight at temperatures of 45 degrees F (7 degrees C) and not exceeding 100 degrees F (38 degrees C).

1.04 PROJECT CONDITIONS

- A. Surface, air, and material temperatures shall not be lower than 40 degrees F or higher than 95 degrees F during application unless otherwise permitted by manufacturer's instructions. Do not apply when temperature is expected to fall below 40 degrees F within 12 hours following application.
- B. Weather: Clear with no precipitation during application or expected for 4 hours following application.
- C. Provide positive ventilation throughout the application.

1.05 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the Owner, removal and replacement of Work specified in this Specification section found defective during a period of 10 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.
- B. Conditions: Applied product will retain its water repellent effects during the Special Guarantee period.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. BASF; MasterProtect Series.
- B. Degussa Corp.

- C. Euclid Chemical Company (The); an RPM Company.
- D. Pecora Corporation.
- E. PROSOCO, Inc.
- F. Sika Corporation; Sikagard 701w.
- G. TNEMEC Inc.; PRIME-A-PELL H₂O SERIES 633.
- H. Or approved equal.

2.02 WATER REPELLENT

- A. Active Alkylalkoxysilane Content: By weight, 40 percent.
- B. Not alter appearance of concrete or change the surface texture.
- C. No fillers, stearates, or paraffins.
- D. Clear color.
- E. VOC Content: Less than 350 grams per liter using EPA Method 24.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify that surfaces are solid, dry, and free of dirt, efflorescence, oil, wax, frozen matter, loose particles, cracks, pits, laitance, curing compounds, and other foreign matter that would block absorption of water repellent.
- B. Verify that curing of sealants is complete.
- C. Clean masonry surfaces to make them acceptable for application.
- D. Protect and mask adjacent surfaces during application.

3.02 APPLICATION

- A. Follow product manufacturer's instructions and recommendations, including application apparatus and techniques, and coverage rates.
- B. Provide uniform coverage over entire surface of face brick on exterior and interior of buildings.

3.03 FIELD QUALITY CONTROL

- A. Notify Construction Manager 48 hours prior to application.
- B. After water repellent has dried (24 hours, low humidity, medium temperature (70 degrees F to 90 degrees F) and 48 hours, high humidity, low temperature (50 degrees F to 69 degrees F), test surfaces with a water spray. Recoat areas that indicate water absorption.

3.04 CLEANING

- A. At completion, remove from the jobsite excess material, debris, and waste. Dispose of water repellent containers according to state and local environmental regulations.
- B. Upon completion of Work, clean window glass and other splattered surfaces.

3.05 PROTECTION

- A. Protect adjacent shrubs, metal, wood trim, glass, asphalt, and other building hardware from overspray. Do not permit spray mist or liquid to drift onto surrounding properties or parking lots. Avoid contact with automobile paint and windshields. Clean up immediately after application using cleaners approved by product manufacturer.
- B. Protect installed product's finish surfaces from damage during construction.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - d. A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - e. B32, Standard Specification for Solder Metal.
 - f. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - g. B370, Standard Specification for Copper Sheet and Strip for Building Construction.
 - h. C920, Standard Specification for Elastomeric Joint Sealants.
 - i. C1311, Standard Specification for Solvent Release Sealants.
 - j. D1187/D1187M, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - k. D4586/D4586M, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 2. Federal Specifications (FS): QQ-L-201F(2), Lead Sheet.
 3. FM Global (FM): Loss Prevention Data Sheet 1-49, Perimeter Flashing.
 4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): 1793, Architectural Sheet Metal Manual.

1.02 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

- B. Wind Zone 2: For velocity pressures of 31.9-foot-pounds per square foot, 60-foot-pounds per square foot perimeter uplift force, 90-foot-pounds per square foot corner uplift force, and 30-foot-pounds per square foot outward force.
- C. Thermal Movements:
 - 1. Provide sheet metal flashing and trim that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures for preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 - a. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.
 - 2. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
 - 3. Base engineering calculation on surface temperatures of materials as a result of both solar heat gain and nighttime-sky heat loss.
- D. Water Infiltration: Provide sheet metal flashing and trim that does not allow water infiltration to building interior.
- E. Complete System: All sheet metal flashings and counterflashings necessary to make buildings weathertight shall be provided, whether or not specifically indicated.

1.03 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA 1793. Conform to dimensions and profiles shown, unless more stringent requirements are indicated.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Show joints, types and location of fasteners, and special shapes.
 - b. Catalog data for stock manufactured items.
 - 2. Samples: Color Samples for items to be factory finished.

1.05 DELIVERY, HANDLING, AND STORAGE

- A. Inspect for damage, dampness, and wet storage stains upon delivery to Site.
- B. Remove and replace damaged or permanently stained materials that cannot be restored to like-new condition.
- C. Carefully handle to avoid damage to surfaces, edges, and ends.
- D. Do not open packages until ready for use.
- E. Store materials in dry, weathertight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.01 METAL

- A. Aluminum Sheet: ASTM B209, Alloy 5005-H34, alloy and temper as required for application and finish, 0.032 inch thick, unless otherwise shown, with Architectural Class I color anodic coating in 0.70-mil thickness; light bronze color.

2.02 DOWNSPOUTS

- A. Cast iron pipe as specified in Section 22 10 01, Plumbing Piping and Accessories.

2.03 ANCILLARY MATERIALS

- A. Solder: ASTM B32, alloy composition Sn 50.
- B. Soldering Flux: ASTM B32, Type RA.
- C. Isolation Paint: ASTM D1187/D1187M, asphalt. As specified in Section 09 90 00, Painting and Coating.
- D. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.
- E. Plastic Roof Cement: ASTM D4586/D4586M, Type II.
- F. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- G. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- H. Fasteners:
 - 1. Zinc or Aluminum Work: Stainless steel or aluminum; reglet fasteners may be galvanized or cadmium-plated steel.

2.04 FABRICATION OF FLASHING

- A. Field measure prior to fabrication.
- B. Fabricate in accordance with SMACNA 1793 SMACNA 1013 that applies to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Counter Flashing Systems: Figure 4-4.
 - 2. Roof Penetration Flashings: Figure 8-8, Figure 8-9, Figure 8-10, and Figure 8-11.
- C. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- D. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
- E. Seams:
 - 1. Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 2. Other than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- F. Reinforcements and Supports: Provide same material as flashing, unless other material is shown. Steel, where shown or required, shall be galvanized or stainless.
- G. Rigid Joints and Seams: Make mechanically strong. Seal aluminum joints with sealant. Solder galvanized and stainless steel metal joints. Do not use solder to transmit stress.

- H. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- I. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
- J. Fabricate sheet metal in 10-foot maximum lengths, unless otherwise indicated.
- K. Provide watertight closures at exposed ends of counterflashing.
- L. Fabricate corners in one-piece with legs extending 30 inches each way to field joint. Lap, rivet, or solder corner seams watertight. Apply sealant if necessary.
- M. Neutralize soldering flux.
- N. Solvent clean sheet metal. Surfaces to be in contact with roofing or otherwise concealed shall be coated with isolation paint.
- O. Pipe Penetrations through Roof: As shown on Drawings.
- P. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- Q. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA 1793 and FM Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set and cant strips and reglets in place.
- B. Verify nailing strips and blocking are properly located.
- C. Verify membrane termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

A. Flashing:

1. General:
 - a. Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA 1793.
 - b. Provide concealed fasteners where possible, set units true to line, and level as indicated.
 - c. Install work with laps, joints, and seams that will be permanently watertight.
2. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - a. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch centers.
3. Isolate metal from wood and concrete and from dissimilar metal with isolation tape or two coats of isolation paint.
4. Use only stainless steel fasteners to connect isolated dissimilar metals.
5. Joints: 10-foot maximum spacing and 2-1/2 feet from corners, butted with 3/16-inch space centered over matching 8-inch-long backing plate with sealing tape in laps.
6. Set flanges of flashings and roof accessories on continuous sealing tape or in plastic roof cement on top of envelope ply of roofing. Nail flanges through sealing tape and at 3-inch maximum spacing. Touch up isolation paint on flanges.
7. Joints, Fastenings, Reinforcements, and Supports: Sized and located as required to preclude distortion or displacement as a result of thermal expansion and contraction.
8. Provide continuous holddown clips at counterflashing and gravel stops.
9. Conceal fastenings wherever possible.
10. Set flashing and sheet metal to straight, true lines with exposed faces aligned in proper plane without bulges or waves.
11. At vents through roof, turn down lead flashing minimum 2 inches inside vent pipe.

B. Prefabricated Metal Systems:

1. Follow system manufacturer's printed instructions.
2. Place color variations in pieces so no extremes are next to each other.

3.03 FINISH

- A. Exposed Surfaces of Flashing and Sheet Metalwork: Free of dents, scratches, abrasions, or other visible defects, and clean and ready for painting where applicable.

3.04 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 70 01
ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Air Movement and Control Association International (AMCA).
2. American Architectural Manufacturers Association (AAMA).
3. ASTM International (ASTM):
 - a. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - b. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
4. FM (Factory Mutual) Global (FM).
5. UL.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings of each item specified showing materials, details, flashing, anchorage, and relation to adjacent structure.
2. Catalog cuts of each item specified item.

B. Informational Submittals: Manufacturer's Certificate of Compliance per Section 01 61 00, Common Product Requirements, (or alternately, test results or calculations) that assure item's and its anchorage's design criteria meets requirements of Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.

1.03 SEQUENCING AND SCHEDULING

A. Coordination: Schedule and coordinate work of this section with work of Section 22 40 00, Plumbing Fixtures, Section 23 31 16.16, Thermoset Fiberglass-Reinforced Plastic Ducts and Accessories, and Section 07 62 00, Sheet Metal Flashing and Trim.

PART 2 PRODUCTS

2.01 ROOF CURBS

- A. Concrete Curb: Cast-in-place, as indicated on Drawings.

2.02 ROOF DRAINS

- A. Refer to Section 22 40 00, Plumbing Fixtures.

2.03 LOUVERED PENTHOUSE (TYPE PH)

- A. Assembly: Extruded aluminum structural frame, 0.081-inch-thick, suitable for curb mounting, with removable roof with 1-inch-thick, 1.5-pound-density sound attenuation inside.
- B. Blades: Extruded aluminum, 0.081-inch-thick, drainable 4 inches deep, spaced 2 inches to 3 inches at 30-degree to 45-degree angle, concealed mullions, and square corner posts.
- C. Pressure Loss: AMCA certified rating of no greater than 0.10-inch WC.
- D. Sizes: Exterior dimensions of fabricated unit to match outside face of concrete support curb, per plan. Field verify concrete curb dimensions.
- E. Screen: Inside mounted, PVC-coated aluminum, 1/2-inch mesh.
- F. Finish: Duranodic (AAMA AA-C22A42).
- G. Manufacturers and Products:
 - 1. Construction Specialties; Model 6118 with 6-inch fixed blades.
 - 2. Ruskin; Type PHB.
 - 3. Or approved equal.

2.04 ANCILLARY MATERIALS

- A. Sealing Tape: Polyisobutylene sealing tape.
- B. Isolation Paint: ASTM D1187, asphalt. As specified in Section 09 90 00, Painting and Coating.
- C. Coat aluminum surfaces in contact with concrete or dissimilar metals as specified in Section 09 90 00, Painting and Coating.

- D. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil-thick minimum polyester.
- E. Plastic Roof Cement: ASTM D4586, Type II.
- F. Fasteners: Stainless steel of type required.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine surfaces and structures to receive the Work of this section.
- B. Take measurements at Site and fabricate Work to suit. No changes shall be made in supporting structure to accommodate this Work.

3.02 INSTALLATION

- A. General:
 - 1. Install roof specialties and accessories as detailed in approved Shop Drawings and in conformance with manufacturer's instructions, recommendations, and standards.
 - 2. Use appropriate pipe curb assembly, pipe seal, flexible base pipe seal, or vent pipe flashing where pipe, conduit, or cable, etc., penetrate roofing membrane.
 - 3. Factory Finished Units: Place color variations in pieces so no extremes are next to each other.
 - 4. Make Work weathertight and free of expansion and contraction noise.
 - 5. Maintain separation between aluminum surfaces and concrete or dissimilar metals as specified in Section 09 90 00, Painting and Coating.
- B. Louvered Penthouse: Install weathertight in accordance with manufacturer's instructions.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
 - a. C661, Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 - b. C834, Standard Specification for Latex Sealants.
 - c. C920, Standard Specification for Elastomeric Joint Sealants.
 - d. C1193, Standard Guide for Use of Joint Sealants.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Surface preparation instructions. Indicate where each product is proposed to be used.
2. Samples: Material proposed for use showing color range available.

1.03 QUALITY ASSURANCE

A. Applicator Qualifications: Provide a list of projects and references with successful experience in installing sealants in projects of similar scope.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Ambient Temperature: Between 40 degrees F and 80 degrees F (4 degrees C and 27 degrees C) when sealant is applied. Consult manufacturer when sealant cannot be applied within these temperature ranges.

PART 2 PRODUCTS

2.01 SEALANT MATERIALS

A. Characteristics:

1. Uniform, homogeneous.
2. Free from lumps, skins, and coarse particles when mixed.
3. Nonstaining, nonbleeding.

4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
 5. Immersible may be substituted for nonimmersible.
- B. Color: Unless specifically noted, match color of the principal wall material adjoining area of application, or as selected by Design Engineer.
- C. Type 1—Silicone, Nonsag, Nonimmersible:
1. Silicone base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 2. Capable of withstanding movement up to 50 percent of joint width.
 3. Manufacturers and Products:
 - a. Dow Corning Corp.; No. 790.
 - b. General Electric; Silpruf.
 - c. BASF; Sonneborn, Omniseal-50.
 - d. Or approved equal.
- D. Type 2—Multipart Polyurethane, Self-leveling, Immersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade P, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products:
 - a. BASF; Sonneborn, SL-2.
 - b. Pecora Corp.; Urexspan NR-200.
 - c. Tremco; THC-900/901.
 - d. Sika Chemical Corp.; Sikaflex 2c SL.
 - e. Or approved equal.
- E. Type 3—Multipart Polyurethane, Nonsag, Immersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products:
 - a. Pecora; DynaTrol II.
 - b. Tremco; Dymeric 240.
 - c. BASF; Sonneborn NP-2.
 - d. Sika Chemical Corp.; Sikaflex 2c NS.
 - e. Or approved equal.

- F. Type 4—Multipart Polyurethane, Nonsag, Nonimmersible:
1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
 2. Manufacturers and Products:
 - a. BASF; Sonneborn NP-2.
 - b. Pecora Corp.; Dynatrol II.
 - c. Tremco; Dymeric 240.
 - d. Sika Chemical Corp.; Sikaflex 2c NS.
 - e. Or approved equal.
- G. Type 5—One-part Polyurethane, Immersible:
1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS or P, Class 25.
 2. Capable of being continuously immersed in water.
 3. Manufacturers and Products for Nonsag:
 - a. Sika Chemical Corp.; Sikaflex-1a.
 - b. Tremco; Vulkem 116.
 - c. Or approved equal.
 4. Manufacturers and Products for Self-leveling:
 - a. BASF; Sonneborn, SL-1.
 - b. Tremco; Vulkem 45.
 - c. Sika Chemical Corp.; Sikaflex 1c SL.
 - d. Or approved equal.
- H. Type 6—One-Part Polyurethane, Nonimmersible:
1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 2. Manufacturers and Products:
 - a. Pecora Corp.; Dynatrol 1 XL.
 - b. Tremco; Dymonic.
 - c. BASF; Sonneborn, NP-I.
 - d. Or approved equal.
- I. Type 13—Tape Sealant:
1. Compressible polyurethane foam impregnated with polybutylene or polymer-modified asphalt.
 2. Color: Black.
 3. Size: 3/4 inch wide by length required by expanded thickness recommended by manufacturer for particular application.

4. Manufacturers and Products:
 - a. Emseal Joint Systems, Ltd.; AST—High Acrylic.
 - b. Dayton Superior; Polytite Standard.
 - c. PARR Technologies; PARR Sealant EP-7212-T.
 - d. Or approved equal.

2.02 BACKUP MATERIAL

- A. Nongassing, extruded, closed-cell round polyurethane foam or polyethylene foam rod, compatible with sealant used, and as recommended by sealant manufacturer.
- B. Size: As shown or as recommended by sealant material manufacturer. Provide for joints greater than 3/16-inch-wide.
- C. Manufacturers and Products:
 1. Sonneborn; Sonolastic Closed-cell Backing Rod.
 2. Tremco; Closed-cell Backing Rod.
 3. Pecora Corporation; Green Rod.
 4. Or approved equal.

2.03 ANCILLARY MATERIALS

- A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Primer: Nonstaining type recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 GENERAL

- A. Use of more than one material for the same joint is not allowed unless approved by sealant manufacturer.
- B. Install joint sealants in accordance with ASTM C1193.
- C. Horizontal and Sloping Joints up to 1 Percent Maximum Slope: Use self-leveling (Grade P) joint sealant.

- D. Steeper Sloped Joints, Vertical Joints, and Overhead Joints: Use nonsag (Grade NS) joint sealant.
- E. Use joint sealant as required for the applicable application and as follows:

<u>Joint Size</u>	<u>Sealant Type</u>
Less than 1”	1, 2, 3, 4, 5, or 6
Less than 2”	1, 2, 3, or 4
Over 2”	Follow manufacturer’s recommendation

3.02 PREPARATION

- A. Verify that joint dimensions, and physical and environmental conditions, are acceptable to receive sealant.
- B. Surfaces to be sealed shall be clean, dry, sound, and free of dust, loose mortar, oil, and other foreign materials.
 - 1. Mask adjacent surfaces where necessary to maintain neat edge.
 - 2. Starting of work will be construed as acceptance of subsurfaces.
 - 3. Apply primer to dry surfaces as recommended by sealant manufacturer.
- C. Verify joint shaping materials and release tapes are compatible with sealant.
- D. Examine joint dimensions and size materials to achieve required width/depth ratios.
- E. Follow manufacturer’s instructions for mixing multi-component products.

3.03 INSTALLATION

- A. Use joint filler to achieve required joint depths, to allow sealants to perform intended function.
 - 1. Install backup material as recommended by sealant manufacturer.
 - 2. Where possible, provide full length sections without splices; minimize number of splices.
 - 3. Tape sealant may be used as joint filler if approved by sealant manufacturer.
- B. Use bond breaker where recommended by sealant manufacturer.
- C. Seal joints around window, door and louver frames, expansion joints, control joints, and elsewhere as indicated.

- D. Joint Sealant Materials: Follow manufacturer’s recommendation and instructions, filling joint completely from back to top, without voids.
- E. Joints: Tool slightly concave after sealant is installed.
 - 1. When tooling white or light color sealant, use a water wet tool.
 - 2. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.
- F. Tape Sealant: Compress to 50 percent of expanded thickness and install in accordance with manufacturer’s instructions.

3.04 CLEANING

- A. Clean surfaces next to the sealed joints of smears or other soiling resultant of sealing application.
- B. Replace damaged surfaces resulting from joint sealing or cleaning activities.

3.05 JOINT SEALANT SCHEDULE

- A. This schedule lists the sealant types acceptable for each joint location. Use as few different sealant types as possible to meet the requirements of Project.

Joint Locations	Sealant Type(s)
Expansion/Contraction and Control Joints at:	
Concrete Walls (except water-holding and belowgrade portions of structures)	1, 3, 4, 5, 6
Concrete Floor Slabs (except for water-holding Structures)	2, 5
Slabs Subject to Vehicle and Pedestrian Traffic	2, 5
Material Joints at:	
Metal Door, Window, and Louver Frames (Exterior)	1, 5, 6
Wall Penetrations (Exterior)	1, 5, 6
Floor Penetrations	5, 6
Roof Penetrations	5
Sheet Metal Flashings	5, 13

Joint Locations	Sealant Type(s)
Other Joints:	
Threshold Sealant Bed	5
Concrete Form Snap-Tie Holes	1, 4, 5

END OF SECTION

**SECTION 07 95 00
EXPANSION CONTROL**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The work shall consist of furnishing and installing a hinged safety cover expansion joint that can accommodate vertical offsets in opposing concrete decks. The safety cover shall incorporate an integral hinge allowing for vertical and lateral shear movement. Watertightness is achieved through an integral flexible fabric reinforced rubber gutter and a waterstop in the cover that provides impact resistance and sound dampening.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings of each item specified showing materials, details, dimensions, flashing, anchorage, and relation to adjacent structure.
 - 2. Catalog cuts of each item specified item.
- B. Informational Submittals: Manufacturer's Certificate of Compliance per Section 01 61 00, Common Product Requirements, (or alternately, test results or calculations) that assure item's and its anchorage's design criteria meets requirements of Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.

1.03 QUALITY ASSURANCE

- A. Joint Opening Adjustment: The Design Engineer shall provide calculations to the concrete subcontractor to adjust the nominal joint opening the day of the concrete placement through the use of a "temperature adjustment table" with expansion joint openings calculated in 5-degree increments based on a temperature range of minus 20 degrees F to 120 degrees F.
- B. Expansion Joint Surface Areas: 2 feet on each side of joint gap shall be finished and graded perpendicular to joint gap creating flush slab-to-slab transition. Elevations on each side of the joint opening shall be identical.
- C. Bedding Compound: Manufacturer-approved elastomeric bedding compound shall be provided to compensate for slight elevation changes along the length of the expansion joint.

- D. Installer Qualifications: Factory-trained and “certified” contractor shall install the specified expansion joint system. The Contractor shall provide proof of certification from manufacturer and proof of participation in manufacturer’s continuing education program.

1.04 WARRANTY

- A. The Manufacturer and Certified Contractor jointly warrant to the Owner that the expansion joint system shall be free from manufacturing, material, and installation defects for a period of 2 years from the date of installation, subject to the terms and conditions of the manufacturer’s standard written limited warranty. The Certified Contractor and Manufacturer will jointly warrant and provide at no charge, all materials and labor needed to properly repair defective expansion joint within the term of the warranty. No liability or responsibility is accepted due to defects in the concrete.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide seismic expansion joint sealing system that meets the specified movement requirements and is capable of accommodating pedestrian traffic.
- B. System shall consist of surface mounted aluminum base frame with integral fabric reinforced flexible rubber gutter system. System shall be capable of accommodating vertical offsets in opposing concrete decks and lateral shear movement through its aluminum hinge design. Seismic safety cover plate shall incorporate a waterstop that provides impact resistance and sound dampening.
- C. Manufacturer and Product:
1. MM Systems Corporation; Hinged Safety Cover System “HSC Series.”
 2. Or approved equal.
- D. Select the system size at each joint location based on the movement and design requirements that meet the project specification or as defined by the structural Design Engineer of record.
- E. The Certified Contractor must provide written confirmation utilizing manufacturer’s product data that the model and size selected will comply with and accommodate expansion, contraction, vertical displacement and lateral shear throughout the full movement cycle.

2.02 COMPONENTS AND MATERIALS

- A. Aluminum Base Frames: Capable of HS-20 loading from aluminum Alloy 6005-T5.
- B. Aluminum Hinge Plate: 3/8-inch minimum plate thickness from aluminum Alloy 6005-T5 with ADA compliant beveled edges. Top surface shall provide a slip resistant raised V-pattern profile. Underside of plate shall have continuous end cavities to receive integral high-density rubber damper that provides impact damping and sound deadening.
- C. Rubber Gutter: Continuous fabric reinforced 60-mil EPDM rubber attached to concrete with Microsealant Waterproofing Tape.
- D. Accessories: Provide necessary assembly hardware required for complete installation.
- E. Waterproofing: Provide LokCrete® Elastomeric Bedding Compound material as manufactured by MM Systems Corporation, or approved equal. Elastomeric concrete shall be produced in an ISO2001 manufacturing facility consisting of polyurethane liquid components “A” and “B” and a specialty aggregate component “C”. Elastomeric bedding compound to cure exothermically and bond to the concrete and aluminum frame.
 - 1. Physical Properties of Elastomeric Bedding Compound after 7-day cure at room temperature:

Property	Requirement	ASTM Method
Tensile Strength	4,750 psi	D412
Ultimate Elongation	10%	D412
Hardness, Shore D	78 +/- 5	D2240
Tear Resistance	200 pli / 35 kN/m	D624
Water Absorption	3%	D570
Heat Shrinkage, max.	2%	D1299
Compression Set	48%	D395
Pot Life	5 minutes	(after mixing)
Adhesion	Concrete Failure	D421

2.03 FABRICATION

- A. Metal Frames and Plates: Shall be shipped in standard 10 feet lengths and shall be cut to length at jobsite where required. All profiles shall be miter cut in the field to conform to directional changes unless otherwise contracted with expansion joint manufacturer.
- B. Rubber Gutter: Shall be shipped in the longest practical continuous length in manufacturer's standard shipping carton.
- C. Elastomeric Bedding Compound: Ship in manufacturer's approved containers shrink wrapped on wooden pallets.

2.04 FINISHES

- A. Aluminum Plates: Top surface of aluminum base frame and hinge plate shall have nonslip raised V-pattern profile and standard mill finish.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Examine surfaces and structures to receive the Work of this section.
- B. The Contractor shall provide properly formed concrete expansion joint openings constructed to the exact dimensions and elevations shown on manufacturer's standard system drawings or as shown on Drawings. Any edge or area in need of repair shall utilize structural concrete repair materials that provide a solid and square expansion joint opening. Deviations from these dimensions will not be allowed without the written consent.
- C. The Contractor shall ensure that the joint opening sidewall interfaces run parallel to each other for the entire length of the joint. Sidewalls shall be plumb and interfaces must be continuously equidistant from each other across the joint width to accommodate the proper installation of the expansion joint system.
- D. Any concrete edge or area adjacent to the expansion joint opening in need of repair shall utilize structural concrete repair materials.
- E. Surface areas two feet on each side of the expansion joint opening shall be finish graded perpendicular to joint opening creating flush slab-to-slab transition. Elevations on each side shall be identical.

3.02 INSTALLATION

- A. General: Install expansion joint system in strict accordance with the manufacturer's typical details and instructions along with the advice of their qualified representative. Refer to Manufacturers Installation Guide for detailed step-by-step installation instructions.
- B. Elastomeric Bedding Compound Installation:
 - 1. The Contractor shall clean the concrete surface where the aluminum base frames are attached. Remove all contaminants by sandblasting immediately prior to installation of expansion joint system. Concrete form release agents, water repellents, laitance, surface dirt, rust, old sealants, and other surface treatments and protective coatings must be removed from the concrete surface in order to obtain the proper elastomeric bedding compound bond.
 - 2. Areas adjacent to the joint must be masked with tape to assure neat, clean joint lines. (Remove tape after installation of base frames).
 - 3. Do not install elastomeric bedding compound until the concrete has been air-dried at temperatures at or above 45 degrees F for at least 28 days minimum and the concrete must have a measured moisture content that is below 4 percent. The surface area must be completely dry prior to placement of the elastomeric bedding compound.
 - 4. Refer to Manufacturers Installation Guide for detailed step-by-step instructions on how to properly mix and install elastomeric concrete filler.

3.03 CLEANING AND PROTECTION

- A. Protect the system and its components during construction. Heavy construction equipment will not be permitted to cross the expansion joint. Subsequent damage to the expansion joint system will be repaired at the general contractor's expense. After work is complete, clean exposed surfaces with a suitable cleaner that will not harm or attack the finish.

END OF SECTION

SECTION 08 06 01
DOOR AND HARDWARE SCHEDULE

PART 1 GENERAL

1.01 SUBMITTALS

- A. Submittal requirements are specified in appropriate product sections.

PART 2 PRODUCTS

2.01 GENERAL

- A. Products and materials referred to in this section are specified in the appropriate product sections.

PART 3 EXECUTION

3.01 GENERAL

- A. Requirements for incorporation of scheduled products into the Work are specified in the appropriate product sections.

3.02 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification.
1. Door and Hardware Schedule: A tabulation of door, frame, and finish hardware characteristics for each opening numbered on Drawings. Provide items as scheduled.
 2. Door and Frame Types.

END OF SECTION

DOOR AND HARDWARE SCHEDULE

ABBREVIATIONS:

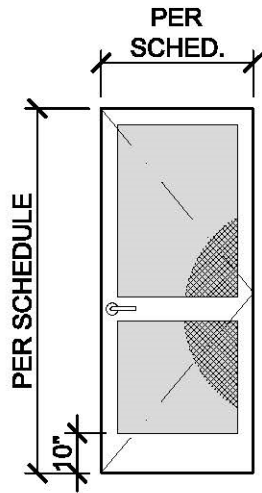
AL	Aluminum	MATL	Material
AS	As Selected	MET	Metal
CLSR	Closer	MS	Manufacturer's Standard
COL	Color	P-P	Push-Pull
CONSTR	Construction	RFS	Roll-Up Fire Shutter
FCTY	Factory	SC	Solid Core Wood
FNSH	Finish	SIM	Similar
FRP	Fiberglass Reinforced Plastic	SST	Stainless Steel
HC	Hollow Core	TSHD	Threshold
HM	Hollow Metal	VIN	Vinyl
KEY	Key Group	W-S	Weatherstripping
K-PL	Kick Plate	WW	Window Wall

NOTES:

- No. 1 See end of this Specification section for door and frame types.
- No. 2 For door details, see Drawing No. 12-A-502.
- No. 3 Letter-number codes in hardware columns refer to items of hardware in Section 08 71 00.
- No. 4 Numbers in "FnsH" column refer to paint systems in Section 09 90 00.
- No. 5 Codes in "COL" column refer to color list in Section 09 06 00.

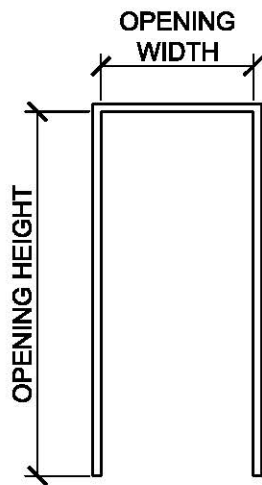
Opening														Hardware											Fire Protection Rating	Other Requirements		
No.	Size		Door					Frame				Details			Hinge	Lock	Exit	Clsr	P-P	Stop	Bolt	K-PL	Tshd	W-S			Misc	
	Width	Height	Constr	Type	Glass	FnsH	Col	Matl	Type	FnsH	Col	Head	Jamb	Sill														
12101A	3'2"	7'7"	AL	A	-	FCTY	AS	AL	F-1	FCTY	AS	9/A-502	10/A-502	11/A-502	H-1	L-1	-	C-1	-	-	-	-	T-1	W-1	-	-		

DOOR TYPE



TYPE 'A'
2-PANEL -
BIRD SCREEN INFILL

FRAME TYPE



TYPE 'F-1'
DOUBLE RABBET

SECTION 08 11 16
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
 2. American Architectural Manufacturers Association (AAMA): 605.2, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 3. ASTM International (ASTM): B209/B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.02 SUBMITTALS

- A. Action Submittals:
1. Applicable information for each type of door and frame, including:
 - a. Frame conditions and complete anchorage details, supplemented by suitable schedules covering doors and frames.
 - b. Glass and louver opening sizes and locations in doors.
 - c. Connections of door frames to structural steel framing concealed in frames.
 - d. Location and field splice joints for frames too large to ship in one piece; indicate complete instructions for making field splices.
 - e. Joints required to accommodate expansion joint movement.
 - f. Relate to door numbers used on Drawings.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Properly identify each item with number used on Drawings.
- B. Store doors upright, in protected dry area, at least 1 inch off ground or floor and at least 1/4 inch between individual pieces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cline Aluminum Doors, Inc., Bradenton, FL; Series 500SE.
- B. Cross Aluminum Products, Inc., Niles, MI; WS-500 Series.

- C. Special-Lite, Decatur, MI; SL-15 Series.
- D. Or approved equal.

2.02 MATERIALS

A. Aluminum Frames:

1. Extruded from 6063-T5 aluminum alloy meeting ASTM B209.
2. Minimum Wall Thickness: 0.125 inch.
3. Mechanically fastened corners.
4. Reinforcements: 6061-T6 aluminum of 1/4-inch minimum thickness.
5. Size and Profile: 5 inches by 1-3/4 inches, with open or closed back and applied stop with integral weatherstripping.
6. Concealed fasteners or welding are preferred to through-the-face fasteners.

B. Flush Aluminum Doors: 6063-T5 extrusions and 5005-H14, smooth face sheets.

1. Minimum component thicknesses as follows:
 - a. Base Sheets: 0.090 inch.
 - b. Beveled Lock Rail Edge: 0.125 inch.
 - c. Hinge Rail Edge: 0.190 inch.
 - d. Internal Grid Sections: 0.080 inch.
 - e. Snap-on Removeable Glazing Stops: 0.050 inch.

2.03 MISCELLANEOUS ITEMS

- A. Furnish manufacturer's standard core filler, anchors, fasteners, and other ancillary items.
- B. Bird Screen: Provide aluminum wire mesh, square weave, woven construction, stretched tight in four-sided aluminum U-Edging frame. Provide weld connection between mesh and U-Edging. Provide fabricated screen panel integral with door assembly, factory installed in lieu of 1/4 inch glazing lite with manufacturer's standard snap-on removeable glazing stops and vinyl inserts.
 1. Wire Diameter: 0.047 inch minimum.
 2. Mesh Size Vertical: 4 per inch.
 3. Mesh Size Horizontal: 4 per inch.
 4. Opening Size Vertical: 0.2030 inch.
 5. Opening Size Horizontal: 0.2030 inch.
 6. Weight: 0.2 pounds per square feet minimum.

7. Finish: Bright mill finish.
8. U-Edging: 1/4 inch by 1 inch.

2.04 FACTORY FINISHING REQUIREMENTS

- A. Aluminum Door and Frame Finish: AAMA 605.2 High Performance Organic Coating; color as scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Frames:

1. Installation: Maintain scheduled dimensions, hold head level, and maintain jambs plumb and square.
2. Secure anchorages and connections to adjacent construction.
3. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb, and anchors are securely attached.
4. Install following manufacturer's recommendations.

B. Doors:

1. Follow manufacturer's recommendations.
2. Hardware: In accordance with manufacturer's templates and instructions.
 - a. Adjust operable parts for correct function.
 - b. Remove hardware, with exception of prime coated items, tag, box, and reinstall after finish paint work is completed.

3.02 PROTECTION

- A. Protect installed doors and frames against damage from other construction work.

3.03 SCHEDULES

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements, see Section 08 06 01, Door and Hardware Schedule.

END OF SECTION

SECTION 08 45 00
TRANSLUCENT WALL AND ROOF ASSEMBLIES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Architectural Manufacturers Association (AAMA):
 - a. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 - b. 2604, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions & Panels.
 2. ASTM International (ASTM):
 - a. C297/C297M, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
 - b. D572, Standard Test Method for Rubber-Deterioration by Heat and Oxygen.
 - c. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - d. D1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
 - e. D1037, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - f. D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - g. D3163, Standard Test Method for Determining Strength of Adhesively Bonded Rigid Plastic Lap-Shear Joints in Shear by Tension Loading.
 - h. D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - i. E72, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - j. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - k. E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- l. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
- m. E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
3. International Code Council (ICC): AC 04, Acceptance Criteria for Sandwich Panels.
4. International Code Council – Evaluation Services (ICC-ES).
5. Military Specifications (MIL): DOD-P-15328D, Primer (Wash) Pretreatment (Formula #117 for Metals).
6. National Fenestration Rating Council (NFRC): 100, Procedure for Determining Fenestration Product U-Factors.
7. UL: 972, Standard for Burglary Resisting Glazing Material.

1.02 DESIGN REQUIREMENTS

- A. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, including perimeter and field components of aluminum tube frame as indicated on Drawings.
 1. Include structural analysis data signed and sealed by the qualified professional engineer, registered in the State of California, responsible for their preparation.
 2. Standard panel system shall have less than 0.01 cfm/ft² air leakage by ASTM E283 at 6.24 psf (50 miles per hour) and no water penetration by ASTM E331 at 15 psf; and structural testing by ASTM E330.
 3. Design translucent panel system to accommodate expansion and contraction within system components caused by a cycling temperature range of plus 100 degrees F to 0 degrees F without causing detrimental effects to system or components.
 4. Design and size members to withstand dead loads and live loads caused by snow, hail, and pressure and suction of wind acting perpendicular to panel system as calculated in accordance with applicable building codes and specified design criteria.
 5. System shall accommodate, without damage to system or components or deterioration of perimeter seal(s). Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Plans, elevations including gridlines in each panel, sections, details, and attachment to other work.
 - b. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
2. Samples:
 - a. Assembled panel at least 14 inches by 24 inches, with specified translucent facings and selected extrusion finishes. Include full size pieces showing joinery, anchorage, expansion provisions, and flashing.
 - b. Aluminum extrusions finished with scheduled or specified colors for finish selection.

B. Informational Submittals:

1. Structural analysis data, including loads transmitted to building structural frame as required by design, prepared and sealed by a qualified professional engineer.
2. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements. Submit with Action Submittal for the same item.
3. ICC-ES Evaluation Report for specific system proposed.
4. Manufacturer's written approval of installer.
5. Installer Certificate, signed by installer, certifying compliance with project qualification requirements.
6. Product Test Reports: Certified test reports performed by independent testing organizations qualified per ASTM E699 for each type and class of panel system. Reports shall verify material will meet performance requirements of this Specification. Previously completed test reports shall be acceptable if current and indicative of products used on this Project.
 - a. Required Test Reports:
 - 1) International Building Code Evaluation Report (AC 177).
 - 2) Flame Spread and Smoke Developed (UL 723): Submit UL card.
 - 3) Burn Extent (ASTM D635).
 - 4) Color Difference (ASTM D2244).
 - 5) Impact Strength (UL 972).

- 6) Bond Tensile Strength (ASTM C297 after aging by ASTM D1037).
 - 7) Bond Shear Strength (ASTM D1002).
 - 8) Beam Bending Strength (ASTM E72).
 - 9) Insulation U-Factor (NFRC 100).
 - 10) NFRC System U-Factor Certification (NFRC 700).
 - 11) NFRC Visible Light Transmittance (NFRC 202).
 - 12) Solar Heat Gain Coefficient (NFRC or Calculations).
 - 13) Condensation Resistance Factor (AAMA 1503) (Insulated Thermally Broken only).
 - 14) Air Leakage (ASTM E283).
 - 15) Structural Performance (ASTM E330).
 - 16) Water Penetration (ASTM E331).
 - 17) 1,200 degrees F Fire Resistance (SWRI).
7. Maintenance Data: Cleaning and refinishing instructions and recommended products.
 8. Qualifications: Translucent panel manufacturer and panel erector shall show, upon request, proof of their ability to perform the Work.
 9. Sample guarantee.
 10. Letter from manufacturer stating the assembled product meets requirements for use in High Fire Severity Zone, as defined in California Building Code, Chapter 7A.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope and location.
2. Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural, and water infiltration testing of sandwich panel systems by an accredited agency.
3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.

- B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified panel systems by listing projects and references and can show evidence of satisfactory completion of projects of similar size, scope, and type.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store translucent panels on long edge, several inches above ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.
- B. Ship units assembled and ready for erection.

1.06 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the Owner, removal and replacement of Work specified in this Specification section found defective during a period of 20 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.
- B. Conditions:
 - 1. Leakage of water to interior.
 - 2. Structural failures including system deflection exceeding $L/100$ at midpoint of clear span.
 - 3. Deterioration of metal finishes beyond normal weathering, including checking, crazing, peeling, chalking or fading.
 - 4. Deterioration of exterior skins from windblown abrasives.
 - 5. Delamination of coating from face sheet.
 - 6. Delamination of panel sheets from panel structural cores.
 - 7. Discoloration of exterior face of more than 3.0 Delta E Adams Units according to ASTM D2244.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials and products specified in this section shall be products of:
 - 1. Kalwall Corp., Manchester, NH.
 - 2. Major Industries, Wausau, WI.
 - 3. Or approved equal.

2.02 MATERIALS

A. Translucent Fiberglass Face Sheets:

1. Translucent Faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
2. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil, and repel an impact minimum of 70-foot-pounds without fracture or tear when impacted by a 3-1/4-inch diameter, 5-pound free-falling ball per UL 972.
3. Interior flame spread rating no greater than 15 and smoke developed no greater than 450, when tested in accordance with ASTM E84. Burn extent by ASTM D635 shall be no greater than 1 inch.
4. Exterior: Match existing color and texture, 0.070-inch-thick.
 - a. FRP Face Sheet must be manufacturer 'Type A' with:
 - 1) Plastic Combustibility Classification: CC1.
 - 2) Surface Burning Classification (UL 723): Class A.
 - 3) Roof Fire Classification (UL 790): Class A.
5. Interior: Provide sheet matching exterior face, 0.070-inch-thick.
 - a. FRP Face Sheet must be manufacturer 'Type A' with:
 - 1) Plastic Combustibility Classification: CC1.
 - 2) Surface Burning Classification (UL 723): Class A.
 - 3) Roof Fire Classification (UL 790): Class A.
6. Free of ridges and wrinkles, which prevent proper surface contact in bonding to aluminum grid core. Clusters of air bubbles/pinholes that collect moisture and dirt will not be acceptable.
7. Exterior Face:
 - a. Color Stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 - b. Shall have integral, embedded, permanent glass veil erosion barrier and high performance thermoset acrylic protective surface (minimum thickness 1.2 mils) for maximum resistance to erosion and weather, applied in factory under controlled temperature conditions. Plastic overlay films are not acceptable. This coating shall be fully field refinishable if damaged.
8. Uniform in color.

B. Grid Core: Noncombustible aluminum I-beams, 6063-T6, mechanical interlocking of muntin-mullion and perimeter, 7/16 inch width.

C. Adhesive:

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25 years field use.
2. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."
3. Minimum Strength:
 - a. Tensile:
 - 1) After two exposures to six cycles each of aging conditions in accordance with ASTM D1037: 750 psi by ASTM C297/C297M.
 - b. Shear:
 - 1) After four separate aging conditions in accordance with ASTM D1002:
 - a) 50 Percent Relative Humidity at 68 Degrees F: 540 psi.
 - b) 182 Degrees F: 100 psi.
 - c) Accelerated Aging by ASTM D1037 at Room Temperature: 800 psi.
 - d) Accelerated Aging by ASTM D1037 at 182 Degrees F: 250 psi.
 - e) 500-hour Oxygen Bomb by ASTM D572: 1,400 psi.

D. Battens and Perimeter Closure Systems:

1. Battens and Closures: Extruded 6063-T6 and 6063-T5 aluminum screw clamp-tite closure system using 2-inch battens.
2. Fasteners: Stainless steel screws.

E. Flexible Sealing Tape: Manufacturer's standard; preapplied to closure system at factory under controlled conditions.

F. Corrosion-Resistant Finish: Fluoropolymer fortified thermoset acrylic/urethane system that meets performance requirements of AAMA 2604.

1. Uniform in appearance.
2. Factory Applied Under Controlled Conditions:
 - a. Aluminum wash-primed in accordance with MIL DOD-P-15328D.
 - b. Even over entire exposed aluminum surface.
 - c. Minimum Dry Thickness: 2 mils (0.002 inch).
3. Remain adhered to aluminum substrate with no blistering or peeling.

4. Color change shall be no greater than 3 DELTA-E Adams Units after 10 years' outdoor exposure at 5 degrees from vertical, facing south in South Florida.
5. Resistant to most chemicals including acids, alkalies, gases, salt solutions, and water.
6. Custom color custom color-matched to original plant color. Allow for additional lead time for color match and delivery of custom color.

2.03 FABRICATION

- A. Translucent Wall Panels (TWP):
 1. True structural composite flat sandwich panels of flat face sheets bonded to grid core of mechanically interlocking aluminum I-beams. Laminate together under controlled process of heat and pressure. Tape bond systems are not allowed.
 2. Uniform Thickness: 2-3/4 inches.
 3. "U" Value: 0.29.
 4. Visible LT (NFRC 202 – Center of Glazing (Panel)) by NFRC Certified Laboratory: 20 percent.
 5. Shading Coefficient: 0.22.
- B. Preassemble and seal panels at factory. Field assembly of major components will not be allowed.
- C. Panel deflection for 10-foot clear span tested flat in accordance with ASTM E72 shall not exceed 1.9 inches at 30 pounds per square foot loading.
- D. Grid Pattern: 12 inches by 12 inches nominal, and symmetrical about vertical centerline of each panel.
- E. Adhesive Bonding Line: Straight, cover entire width of I-beam, and have a neat, sharp edge. In order to ensure bonding strength, white spots at intersections of muntins and mullions shall not exceed four for each 40 square feet of panel nor shall they be more than 3/64-inch wide.

2.04 BATTENS AND CLOSURE SYSTEM

- A. Closure System (Wall): Standard extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.
- B. Sealing Tape: Manufacturer's standard, preapplied to closure system at the factory under controlled conditions.

- C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
- D. Finish: Match existing adjacent assemblies.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare openings, including isolating aluminum system, from dissimilar materials that may cause damage by electrolysis.
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete, masonry or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

3.02 ERECTION

- A. Erect insulated translucent panel systems in strict accordance with manufacturer's instructions. Fasten and seal in strict accordance with manufacturer's shop drawings. Clean aluminum before applying sealants.
 - 1. Anchor component parts securely in place by permanent mechanical attachment system.
 - 2. Accommodate thermal and mechanical movements.
 - 3. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.
- B. After other trades have completed work on adjacent material, carefully inspect translucent panel unit installation, ensure no shifting or rattling, and make adjustments necessary to ensure proper installation and weathertight conditions.

3.03 CLEANING

- A. Leave translucent panels in undamaged condition and ready for final cleaning.
- B. Clean both faces of panels in accordance with manufacturer's instructions.

3.04 PROTECTION OF COMPLETED WORK

- A. Install marker tape across panels secured to frames or structure. No tape or marking allowed on panels after final cleaning.

END OF SECTION

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. Builders Hardware Manufacturer's Association (BHMA):
 - a. A156.1, Butts and Hinges.
 - b. A156.2, Bored and Preassembled Locks and Latches.
 - c. A156.3, Exit Devices.
 - d. A156.4, Door Controls - Closers.
 - e. A156.13, Mortise Locks & Latches.
 - f. A156.16, Auxiliary Hardware.
 - g. A156.18, Materials and Finishes.
 2. International Code Council (ICC): A117.1, Accessible and Usable Buildings and Facilities.
 3. UL: Fire Protection Equipment List.

1.02 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Product Data: Manufacturer's literature for each item of finish hardware required herein, clearly marked.
 - b. Finish Hardware Schedule: Furnish complete and detailed schedule, show product items, numbers, and finishes for hardware for each separate opening.
 - 1) List groups and suffixes in proper sequence.
 - 2) Describe door and architectural door number.
 - 3) Manufacturer, product name, and catalog number.
 - 4) Function, type, and style.
 - 5) Size and finish of each item.
 - 6) Indicate mounting heights.
 - 7) Explanation of abbreviations and symbols used within schedule.
 - c. Special Tools: Provide listing and description of usage.

B. Informational Submittals:

1. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
2. Manufacturer's Field Service Report.
3. Certification of Hardware Consultant.
4. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
5. Copy of final Hardware Schedule, edited to reflect, "As Installed."

1.03 QUALITY ASSURANCE

- A. Qualifications of Architectural Hardware Consultant (AHC): Certified by Door and Hardware Institute.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Before delivery, clearly identify and tag each item of hardware with respect to specified description and location of installation.
- B. Provide secure storage for finish hardware until installation is made.

1.05 EXTRA MATERIALS

- A. Special Tools: Two sets for installation and maintenance of hardware.

1.06 WARRANTY

- A. Refer to conditions of Contract.
- B. Manufacturer's Warranty:
1. Closers: 10 years.
 2. Exit Devices: 5 years.
 3. Locksets and Cylinders: Lifetime.
 4. All other Hardware: 2 years.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Provide end products of one manufacturer for each product in order to achieve standardization for appearance, maintenance, and replacement.
1. City-Approved Manufacturers:
 - a. Best Access Systems.
 - b. Folger Adams with Best Lock.

c. Or approved equal.

B. Finishes: BHMA A156.18.

C. Some products listed below may not be used on this Project. Refer to Hardware Sets at end of this section for specified for use on this Project.

2.02 FASTENERS

A. Stainless steel.

2.03 GEARED CONTINUOUS HINGES

A. BHMA A156.1.

B. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1.

C. Anti-spinning through fastener.

D. Nonhanded.

E. Lifetime warranty.

F. Width: Minimum for clearance of trim and 180-degree swing.

G. Exterior Hinges: Nonremovable pin.

H. Qualifications of Supplier: Recognized supplier of architectural finish hardware, with warehousing facilities, who has been furnishing hardware in vicinity of Project, and who is, or who employs, architectural hardware consultant.

I. Joint Tolerance: 0.012 inch maximum, gauged in CLOSED position.

J. Finish: Clear aluminum anodized, Class 1.

K. Types and Manufacturers:

No.	Type Description	Manufacturer	Model	Finish
H1	Geared Continuous Hinge	Stanley	661HD UL	Clear Anodized Aluminum, Class 1

2.04 LOCKS AND LATCH SETS

- A. Mortise Locks: BHMA A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2, UL 10C. Locks will meet UL 437 requirements.
 - 1. Trim: Wrought or forged lever handles and roses.
 - 2. Lever Backset: 2-3/4 inches.
 - 3. Manufacturer and Product:
 - a. Best; 3H Fairbanks.
 - b. Or approved equal.
- B. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
- C. Provide 9001-Quality Management and 14001-Environmental Management.
- D. Fit ANSI A115.1 door preparation.
- E. Functions and design as indicated in the hardware groups.
- F. Solid, one-piece, 3/4-inch (19 mm) throw, anti-friction latchbolt made of self-lubricating stainless steel.
- G. Deadbolt functions shall have 1 inch (25 mm) throw bolt made of hardened stainless steel.
- H. Latchbolt and deadbolt are to extend into the case a minimum of 3/8 inch (9.5 mm) when fully extended.
- I. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated.
- J. Provide sufficient curved strike lip to protect door trim.
- K. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable.
- L. Lock shall have self-aligning, through-bolted trim.
- M. Levers to operate a roller bearing spindle hub mechanism.
- N. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.

- O. Spindle to be designed to prevent forced entry from attacking of lever.
- P. Provide locksets with 7-pin removable and interchangeable core cylinders.
- Q. Each lever to have independent spring mechanism controlling it.
- R. Core face must be the same finish as the lockset.
- S. Finish: Satin chromium-plated No. 626.
- T. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
L-1	Best	45H-0N15J	626/US26D
Lock Function		Room Type	
N		Passage	
No additional alternatives will be considered.			

2.05 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 City’s permanent keying system or furnished in the same keyway (or key section) as the City’s permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the City.
- B. Cylinders, Removable and Interchangeable Core System: Best CORMAX™ Patented 7-pin.
 - 1. All seven pins shall be operational pins.
- C. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock.
 - 1. Existing Factory-Registered Grand Master Key System: Grand master key locks to City’s existing system.
- D. 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 per Paragraph Stamping below.

- E. Stamping:
1. Permanently inscribe each key with a visual key control number and include the following notations:
 - a. "CITY OF SAN DIEGO".
 - b. "DO NOT DUPLICATE".
 - c. All keys will have visual key control.
- F. Transmit Grand Masterkeys, Masterkeys, and other Security keys to City by Registered Mail, return receipt requested.
- G. 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.
- H. The City will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- I. Locks and cylinders shall be of the same manufacturer unless otherwise indicated.
- J. All keys and cores shall have visual key control.
- K. 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 three typed copies of keying and programming schedule to Architect.
- L. Any Questions, Contact:
1. Carpenter Supervisor Martin Sorrell at telephone (619) 525-8550; or
 2. Lock Shop at telephone (619) 525-8552.

2.06 CONSTRUCTION KEY SYSTEM

- A. Temporary cores (construction cores) shall be installed by the Contractor for security purposes.
- B. Removable construction core system for locks, and shall be interchangeable with Best cores.

- C. Temporary cores shall be keyed alike.
- D. The Contractor shall provide the City of San Diego lockshop with copies of the control key and operating key upon completion of the Work.
- E. The Contractor shall furnish permanent cores to the City of San Diego lockshop for final installation.
- F. See Article Manufacturer's Services under Part 3, Execution.
- G. Assemble permanent cylinders with construction inserts and ship with all lock sets.
- H. Change Keys: Pack in separately identified envelopes and ship.
- I. Construction Keys: Pack in cartons marked "packing list" and ship.
- J. Construction Insert Extractor Keys, Master Keys, and Grand Master Keys: Ship by registered mail to City of San Diego lockshop.
- K. On completion of job, deliver construction keys to Owner.

2.07 CLOSERS

- A. Tested and approved by BHMA for ANSI 156.4, Grade 1.
- B. UL 10C certified.
- C. Provide 9001-Quality Management and 14001-Environmental Management.
- D. Closer shall have extra-duty arms and knuckles.
- E. Conform to ANSI 117.1.
- F. Maximum two 7/16 inch case projection with nonferrous cover. Separate adjusting valves for closing and latching speed, and backcheck.
- G. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
- H. Full rack and pinion type closer with 1-1/2-inch minimum bore.
- I. Mount closers on nonpublic side of door, unless otherwise noted in Specification.
- J. Closers shall be nonhanded, nonsized, and multi-sized.

- K. Mount regular arm closers on pull side of doors. Mount parallel arm closers on push side of doors. On pair of doors provide closer on active leaf only, unless noted otherwise.
- L. Finish: Satin chromium-plated No. 626.
- M. Types and Manufacturers:

Description	Manufacturer	Model/Series	Finish
C-1	LCN	4040XP SHCNS TBSRT	689
Alternate	Sargent		
No Additional Alternatives will be considered.			

2.08 THRESHOLDS

- A. Thresholds: Thresholds shall be aluminum beveled type with maximum height of 1/2-inch for conformance with ADA requirements. Furnish as specified and per details.
- B. Thresholds: One-piece full width of opening; extend beyond jamb where indicated.
- C. Provide with stainless steel machine screws in threaded expansion anchors at concrete.
- D. Finish: Mill finish aluminum, unless indicated otherwise.
- E. Types and Manufacturers:

No.	Type Description	Pemko	Reese
T-1	Saddle (serrated, 5-inch by 1/4-inch)	271A	S405A

2.09 WEATHERSTRIP

- A. 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. Finish: Clear anodized aluminum, unless indicated otherwise.

- B. 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).
- C. Seal Types and Manufacturers:

No.	Type Description	Pemko
W1	Rubber or vinyl bulb at jams and head	303AV
	Door shoe	222AV 36"

2.10 SILENCERS

- A. Ives, Glynn-Johnson.
- B. At metal frame of each hinged door that does not have seals scheduled.
- C. Three at single leaves and two at pairs.

2.11 TEMPLATES

- A. Fabricate to template hardware applied to metal doors and frames.
- B. Ensure that required templates are furnished to various manufacturers for fabrication purposes.
- C. Templates: Make available not more than 10 days after receipt of approved Hardware Schedule.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Door and Frame Prep (City Requirement): Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8 inches high), hinge preps will be mortised and reinforced with a minimum of 10-gauge reinforcement material; minimum of 14-gauge reinforcement material for closer. Hollow metal doors shall be properly

prepared and reinforced with a minimum of 16-gauge material for either mortised or cylindrical locks as specified.

1. Closer Reinforcement: All hollow metal doors receiving door closers shall have 14-gauge reinforcement. In the event this is not possible, the use of sex bolts is mandatory.
- C. Hardware Installation (City requirement): The manufacturer's representative for the locking devices and closing devices must inspect the prepared doors and frames, and approve in writing, prior to the installation of their product.

3.02 INSTALLATION

- A. In accordance with manufacturer's written instructions.
- B. Make Work neat and secure, develop full strength of components, and provide proper function.
- C. Prevent marring, scratching, or otherwise damaging adjacent finishes during hardware installation.
- D. Latchbolts:
 1. Install to engage in strikes automatically, whether activated by closers or manually.
 2. In no case shall additional manual pressure be required to engage latchbolt in strike.
- E. Stops and Holders: Set to allow doors to open as far as possible.
- F. Wall Mounted Hardware: Install over solid structural backing or solid blocking in hollow walls.
- G. Thresholds:
 1. Cope ends neatly to profile of jamb.
 2. Set in sealant and seal ends to jambs.
- H. Key Control System Cabinet: Install where shown.
- I. Hardware: Adjust for easy, noise-free operation.
- J. Replace damaged hardware items.

3.03 MOUNTING DIMENSIONS

- A. Standard Door Hardware Locations: As recommended and published by Door and Hardware Institute, except as noted or detailed otherwise.
- B. Door Silencers: Install 3 inches from top and bottom of jamb and 1 inch above strike at single doors, and 3 inches from edges of doors in head for pairs of doors.
- C. Nameplates: Attach to doors or walls adjacent to doors 5 feet 6 inches above floor using stainless steel Phillips head screws.

3.04 PROTECTION

- A. Cover and protect exposed surfaces of hardware during installation and until Substantial Completion.
- B. Fit, dismantle, and reinstall finish hardware as required for finish painting work.
- C. Protect and prevent staining of hardware during construction in accordance with manufacturer's recommendations.
- D. Remove protective measures and permanent lock cylinders installed prior to final cleaning.

3.05 DOOR AND HARDWARE SCHEDULE

- A. Door and Hardware Schedule in Section 08 06 01, Door and Hardware Schedule, is guide to functional requirements of each opening.
- B. Provide finish hardware as scheduled. Sizes omitted shall be as recommended by manufacturer.

3.06 HARDWARE SETS

HDW-1:	Item	Type
	Continuous Geared Hinge	H-1
	Passage Set	L-1
	1 Closer	C-1
	1 Threshold	T-1
	1 Set weatherstrip	W-1

END OF SECTION

SECTION 09 06 00
SCHEDULES FOR FINISHES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Submittal requirements are specified in appropriate product sections.

PART 2 PRODUCTS

2.01 GENERAL

- A. Products and materials referred to in this section are specified in appropriate product sections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Requirements for incorporation of scheduled products into the Work are specified in appropriate product sections.

3.02 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification.
1. Exterior Finish Schedule: A tabulation of materials, finishes, and colors for each exterior space shown on Drawings.
 2. Color List.

END OF SECTION

EXTERIOR FINISH SCHEDULE

Item/Material	Finish	Color
Exterior Concrete Walls – Abovegrade	Water Repellent, per Specification	Clear, Penetrating
Exterior Concrete Walls – Belowgrade	Waterproofing, per Specification	Manufacturer’s Standard
Translucent Wall Panel Frame - Aluminum	Factory Finish, per Specification, Match Existing	Custom Color to Match Existing
Translucent Wall Panel	Factory Finish, per Specification, Match Existing	Match Existing
Aluminum Door and Frame	Factory Finish, per Specification	Match Existing Translucent Wall Panel Frame Color
Aluminum Railings	Anodized, Class 1	Match Existing

COLOR LIST

NOTES:

- No. 1 Color selections for this Project may be noted in Door and Hardware Schedule, Exterior Finish Schedule, and on the Drawings, by the Letter-Number combination in the Mark column of this list.
- No. 2 Some color selections may be made in various specification sections.
- No. 3 Use only the colors noted or scheduled. If a color selection is not made, request one from Design Engineer.

Mark	Item	Manufacturer	Color	Other Requirements
O	OPENINGS			
O-1	Door and Frame		Match Existing Translucent Panel Frame color	
O-2	Translucent Panel Frame		Match Existing Color	
O-3	Translucent Wall Panel	Per Section 08 45 00	Match Existing Color	Match Existing Grid Pattern

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Water Works Association (AWWA):
 - a. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - b. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - c. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
 2. Environmental Protection Agency (EPA).
 3. NACE International (NACE): SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 4. NSF International (NSF): 61, Drinking Water System Components - Health Effects.
 5. Occupational Safety and Health Act (OSHA).
 6. Research Council on Structural Connections (RCSC): Specification for Structural Joints using High-Strength Bolts.
 7. The Society for Protective Coatings (SSPC):
 - a. PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 - b. PA 10, Guide to Safety and Health Requirements for Industrial Painting Projects.
 - c. SP 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP 6, Commercial Blast Cleaning.
 - h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
 - i. SP 10, Near-White Blast Cleaning.
 - j. SP 11, Power Tool Cleaning to Bare Metal.
 - k. SP 13, Surface Preparation of Concrete.
 - l. SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
 - m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.02 DEFINITIONS

A. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness, mils.
5. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
6. Mil: Thousandth of an inch.
7. PPDS: Paint Product Data Sheet.
8. PSDS: Paint System Data Sheet.
9. PVC: Polyvinyl Chloride.
10. SFPG: Square Feet per Gallon.
11. SFPGPC: Square Feet per Gallon per Coat.
12. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Data Sheets:
 - 1) For each product, furnish a Paint Product Data Sheet (PPDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PPDS form is appended to the end of this section.
 - 2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
 - 3) Technical and performance information that demonstrates compliance with specification.
 - 4) Furnish copies of paint system submittals to the coating applicator.
 - 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
 - b. Detailed chemical and gradation analysis for each proposed abrasive material.
2. Samples:
 - a. Proposed Abrasive Materials: Minimum 5-pound sample for each type.

- b. Reference Panel:
 - 1) Surface Preparation:
 - a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel prepared to specified requirements for each grade of sandblast specified herein, prepared to specified requirements.
 - b) Provide panel representative of the steel used; prevent deterioration of surface quality.
 - c) Upon approval by Design Engineer, preserve panel as reference source for inspection.
 - 2) Paint:
 - a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
 - b) Furnish additional samples as required until colors, finishes, and textures are approved.
 - c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

- 1. Applicator's Qualification: List of references substantiating experience.
- 2. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
- 3. Manufacturer's written verification that submitted material is suitable for the intended use and compliance with qualification listed in Article Quality Assurance.
- 4. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
- 5. Manufacturer's written instructions and special details for applying each type of paint.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Provide projects and references in the application of specified products.
- B. Regulatory Requirements:
 - 1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.

2. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.
 - b. SSPC PA 10.
 - c. Federal, state, and local agencies having jurisdiction.
- C. The intention of these Specifications is for new, interior, and exterior metal submerged metal surfaces to be painted, whether specifically mentioned or not, except as modified herein. Exterior concrete surfaces will not be painted, unless specifically indicated in Contract Documents.
- D. Perform painting in accordance with recommendations of the following:
 1. Paint manufacturer's instructions.
 2. Federal, state, and local agencies having jurisdiction.
- E. No products shall be considered that decreases the film thickness, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as specified, including all accent colors and custom colors in all coating systems, and must document satisfactory performance of their coating system for at least two wastewater treatment plants.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Shipping:
 1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
 2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.
 3. Deliver materials to Site in unopened containers that plainly show designated name, date of manufacture, color, and manufacturer.
- B. Storage:
 1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
 2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable, or in dust or smoke-laden atmosphere, damp or humid weather.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air. Strictly adhere to manufacturer's written recommendations.

1.07 EXTRA MATERIALS

- A. Provide 2 gallons of each color and sheen used for touchup painting and painting other small areas.
- B. Fusion Bonded Coating: Provide appropriate liquid repair kits for field use.

PART 2 PRODUCTS

2.01 GENERAL

- A. Product shall be certified compliant with these requirements by an ANSI accredited certification organization.

2.02 MANUFACTURERS

- A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions as this Project.
- B. Provide projects and references for verifiable experience in manufacture of specified product.
- C. Each of the following manufacturers is capable of supplying most of the products specified herein:
 1. Sherwin Williams.
 2. TNEMEC Company.
 3. Azko Nobel (Devoe International).
 4. Carboline Coatings.
 5. PPG Industrial Coatings.
 6. Or approved equal.

2.03 ABRASIVE MATERIALS

- A. Select abrasive type and size to produce surface profile that meets coating manufacturer’s recommendations for specific primer and coating system to be applied.

2.04 PAINT MATERIALS

A. General:

1. Material Quality: Manufacturer’s highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Bituminous Paint	Single-component, coal-tar pitch
100% Solids Epoxy	Amine-cured epoxy, 100% volume solids, suitable for immersion service in raw wastewater
100% Solids Polyurethane	100% solids polyurethane in accordance with AWWA C222
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry; approved for potable water contact and conforming to NSF 61, where required
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies aggregated; aggregate may be packaged separately
Epoxy Primer— Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer— Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service

Product	Definition
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required
Wax Tape	Cold applied three-part system petrolatum wax tape in accordance with AWWA C217

2.05 MIXING

A. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.06 SHOP FINISHES

A. Shop Blast Cleaning: Reference Paragraph Shop Coating Requirements.

B. Surface Preparation: Provide Construction Manager minimum 7 days' advance notice to start of shop surface preparation work and coating application work.

C. Shop Coating Requirements:

1. When required by equipment specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.

2. Where manufacturer's standard coating is not suitable for intended service condition, Design Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

D. Pipe:

1. Ductile Iron Pipe:
 - a. Use SSPC standards as a guide for desired prepared surface. Follow recommendations of pipe and coating manufacturers for means and methods to achieve SSPC-equivalent surface.
 - b. The surface preparation and application of the primer and finish coats shall be performed by pipe manufacturer.
 - c. For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturers.
 - d. Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.
2. Steel Pipe:
 - a. Surface preparation and application of primer and finish coats shall be performed by pipe manufacturer.
 - b. For pipe with epoxy lining, do not place end cap seals until pipe lining material has sufficiently dried.
 - c. For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide Construction Manager minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Construction Manager, unless Construction Manager grants prior approval to perform the Work in Construction Manager's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Construction Manager.

3.02 EXAMINATION

A. Factory Finished Items:

1. Schedule inspection with Construction Manager before repairing damaged factory-finished items delivered to Site.
2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. In event of conflict, more stringent shall apply.
2. Notify Construction Manager minimum 7 days' prior to start of surface preparation work or coating application work.
3. Perform work only in presence of Construction Manager, unless Construction Manager grants prior approval to perform work in Construction Manager's absence.
4. Factory Finished Item: Schedule inspection with Construction Manager before repairing damaged factory-finished items delivered to Site.
5. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

C. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.

- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering.
- E. Protect surfaces adjacent to or downwind of Work area from overspray. Contractor shall be responsible for any damages resulting from overspray.

3.04 SURFACE PREPARATION

A. Field Abrasive Blasting:

- 1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.
- 2. Refer to coating systems for degree of abrasive blasting required.
- 3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.

B. Surface Contamination Testing:

- 1. A surface contamination analysis test shall be performed every 500 square feet by means of a Chlor Test CSN Salts, or approved equal.
- 2. Surface with chloride levels exceeding 3 µg/square centimeter for submerged surfaces and 5 µg/square centimeter for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR*RID (CHLOR*RID International, Chandler, AZ).
- 3. Follow manufacturer's recommendations and procedures for the use of this product to remove the surface contamination.

C. Metal Surface Preparation:

- 1. Submit samples prior to surface preparation blasting.
- 2. Comply with current requirements of SSPC Specifications summarized below:
 - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
 - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
 - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.

- d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
 - e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
 - g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
 - i. SP 16, Brush Blasting of Non-Ferrous Metals: A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).
3. The words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” and “blast cleaning,” or similar words of equal intent in these Specifications or in paint manufacturer’s specification refer to the applicable SSPC Specification.
 4. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers’ recommendations for wet blast additives and first coat application shall apply.

5. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.
6. Hand tool clean areas that cannot be cleaned by power tool cleaning.
7. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
8. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
9. Preblast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
10. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
 - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
 - c. Use only dry blast cleaning methods.
 - d. Do not reuse abrasive, except for designed recyclable systems.
 - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
11. Post-Blast Cleaning and Other Cleaning Requirements:
 - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
 - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

D. Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation:

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
2. Brush blast in accordance with SSPC SP 16.
3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.
4. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
5. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

E. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.
2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
 - a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
 - b. Brush-off blasting.
 - c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.
7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

F. Existing Painted Surfaces to be Repainted Surface Preparation:

1. Detergent wash and freshwater rinse.
2. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
3. Feather surrounding intact coating.
4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
5. Apply one full finish coat of specified primer to entire surface.
6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.

7. Application of Cosmetic Coat:
 - a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
 - b. Check compatibility by application to a small area prior to starting painting.
 - c. If lifting or other problems occur, request disposition from Design Engineer.
8. Perform blasting as required to restore damaged surfaces. Materials, equipment, and procedures shall meet requirements of SSPC.

3.05 SURFACE CLEANING

A. Brush-off Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.
3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
5. Construction Manager will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
6. Repair or replace surface damaged by blast cleaning.

B. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. Inspection: Schedule with Construction Manager in advance for approval of cleaned surfaces and all coats prior to succeeding coat.
2. The intention of these Specifications is for new, interior and exterior metal, and submerged metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.

3. Extent of Coating (Immersion): Coatings shall be applied to internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel internals, and stainless steel internals, unless otherwise specified.
4. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.
5. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
6. Sand wood lightly between coats to achieve required finish.
7. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
8. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
9. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
10. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.
11. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
12. Keep paint materials sealed when not in use.
13. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.

B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:

1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.
2. Prepare surface and apply primer in accordance with System No. 10 specification.
3. Apply intermediate and finish coats of the coating system appropriate for the exposure.

C. Porous Surfaces, Such as Concrete and Masonry:

1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.
2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
 - a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.

3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

D. Film Thickness and Coverage:

1. Number of Coats:
 - a. Minimum required without regard to coating thickness.
 - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Application Thickness:
 - a. Do not exceed coating manufacturer's recommendations.
 - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
 - a. Perform with properly calibrated instruments.
 - b. Recoat and repair as necessary for compliance with Specification.
 - c. Coats are subject to inspection by Construction Manager and coating manufacturer's representative.
4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Design Engineer before starting work in question.
- B. Additional requirements are included in Piping Schedule on Drawings.

C. System No. 4 Exposed Metal—Highly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer— Ferrous Metal	1 coat, 2.5 MDFT
	High Build Epoxy	1 coat, 4 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
 - a. Exposed metal surfaces, located inside or outside of structures and exposed to weather.
2. System No. 29 may also be used for exposed metal surfaces inside of structures, except on ductile iron materials.

D. System No. 7 Concrete Encased Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	High Build Epoxy	2 coats, 16 MDFT

1. Use on the following items or areas:
 - a. Use on concrete encased ferrous metals including wall pipes, pipe sleeves, access manholes, gate guides, and thimbles; and the following specific surfaces:
 - 1) As noted in Piping Schedule on Drawings.

E. System No. 8 Buried Metal—General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	High Build Epoxy	2 coats, 16 MDFT

1. Use on the following items or areas:
 - a. As noted in Piping Schedule on Drawings.
 - b. Buried, belowgrade portions of miscellaneous steel items, except buried stainless steel or ductile iron.

F. System No. 10 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Epoxy Primer—Other	As recommended by coating manufacturer Remaining coats as required for exposure

1. Use on the following items or areas:
 - a. As shown in Piping Schedule on Drawings.
 - b. Exterior exposed copper pipe surfaces top coat with System No. 4.

G. System No. 12 Coating for Buried Ductile Iron Pipe:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Whitebook Section 209.1.1.2.9	Prime in accordance with manufacturer’s recommendations	
	100% Solids Polyurethane	24 mils MDFT
	-OR- Liquid Epoxy	24 mils MDFT
	-OR- Wax Tape	80 mils total thickness

1. Use on the following items or areas:
 - a. Coal tar epoxies shall not be used.
 - b. As shown on Piping Schedule as shown on Drawings and Section 40 27 00, Process Piping—General.

H. System No. 25 Exposed FRP, PVC:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

1. Use on the following items or areas:
 - a. All exposed-to-view PVC and CPVC surfaces, and FRP surfaces without integral UV-resistant gel coat.

I. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on the following items or areas:
 - a. Aluminum surfaces embedded or in contact with concrete.

J. System No. 29 Fusion Bonded Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 16 MDFT for Steel Pipe; 24 MDFT for Ductile Iron Pipe.

1. Use on the following items or areas:
 - a. For steel pipe and fittings, meet all requirements of AWWA C213.
 - b. For ductile iron pipe and fittings, meet all requirements of AWWA C116.
 - c. Use where specified in the Contract Documents.

3.08 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Design Engineer before starting work in question.
- B. As shown in Section 09 06 00, Schedules for Finishes. Additional requirements are included in Piping Schedule on Drawings.
- C. System No. 106 Galvanized Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Manufacturer's Recommended Primer	1 coat, as recommended by manufacturer
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

- 1. Use on the following items or areas:
 - a. Hollow metal frames and doors.

3.09 COLORS

- A. Provide as designated herein and shown in Piping Schedule on Drawings.
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
 - 1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
 - 2. Paint equipment and piping one color as selected.
 - 3. Paint nonsubmerged portions of equipment the same color as the piping it serves, except as itemized below:
 - a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
 - b. Fire Protection Equipment and Apparatus: OSHA Red.
 - c. Radiation Hazards: OSHA Purple.

- d. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

D. Pipe Identification Painting:

1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
2. Pipe Color Coding: In accordance with Piping Schedule on Drawings.
3. On exposed stainless steel piping, apply color 24 inches in length along pipe axis at connections to equipment, valves, or branch fittings, at wall boundaries, and at intervals along piping not greater than 9 feet on center.
4. Pipe Supports: Painted light gray, as approved by Design Engineer.
5. Fiberglass reinforced plastic (FRP) pipe, polyvinylidene fluoride (PVDF), and polyvinyl chloride (PVC) pipe located inside of buildings and enclosed structures will not require painting, except as noted or scheduled.

3.10 FIELD QUALITY CONTROL

A. Testing Equipment:

1. Provide calibrated electronic type dry film thickness gauge to test coating thickness specified in mils.
2. Provide low-voltage wet sponge type electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less MDFT, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide high-voltage holiday detector for coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

B. Testing:

1. Thickness and Continuity Testing:
 - a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2.
 - b. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
 - c. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE SP0188.

- d. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE SP0188.
 - e. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Construction Manager.
- C. Inspection: Leave staging and lighting in place until Construction Manager has inspected surface or coating. Replace staging removed prior to approval by Construction Manager. Provide additional staging and lighting as requested by Construction Manager.
- D. Unsatisfactory Application:
1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
 2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
 3. Repair defects in accordance with written recommendations of coating manufacturer.
- E. Damaged Coatings, Pinholes, and Holidays:
1. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
 2. Remove rust and contaminants from metal surface. Provide surface cleanliness and profile in accordance with surface preparation requirements for specified paint system.
 3. Feather edges and repair in accordance with recommendations of paint manufacturer.
 4. Repair fusion bonded coatings as recommended by original applicator.
 5. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.
- F. Warranty Inspections: To be conducted during the eleventh month following completion of Work. Any defective Work shall be repaired by the Contractor in accordance with the Specification. Any location where paint has peeled, bubbled, or cracked and any location where rusting is evident shall be considered to be a failure of the system and require replacement to Construction Manager's satisfaction.

3.11 MANUFACTURER'S SERVICES

- A. In accordance with Section 01 43 33, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:
 - 1. On first day of application of any coating system.
 - 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
 - 3. As required to resolve field problems attributable to or associated with manufacturer's product.
 - 4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.12 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.13 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification:
 - 1. Paint System Data Sheet (PSDS).
 - 2. Paint Product Data Sheet (PPDS).

END OF SECTION

PAINT SYSTEM DATA SHEET (PSDS)

Complete this PSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PSDS.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

PAINT PRODUCT DATA SHEET (PPDS)

Product: _____

Complete and attach manufacturer’s Technical Data Sheet to this PPDS for each product submitted. Provide manufacturer’s recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer’s recommendations for the following:

Mixing Ratio: _____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.:_____ max.:_____

Surface Temperature Limitations: min.:_____ max.:_____

Surface Profile Requirements: min.:_____ max.:_____

Attach additional sheets detailing manufacturer’s recommended storage requirements and holiday testing procedures.

TECHNICALS (VOLUME 3)

PURE WATER PROGRAM
FOR
GREATER SAN DIEGO, CALIFORNIA

BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS

for the construction of the

SAN DIEGO NCWRP EXPANSION AND
NCPWF INFLUENT PUMP STATION AND PIPELINE

PACKAGE 1
FLOW EQUALIZATION

VOLUME 3
SPECIFICATIONS
DIVISIONS 22 THROUGH 49

Issued for Construction

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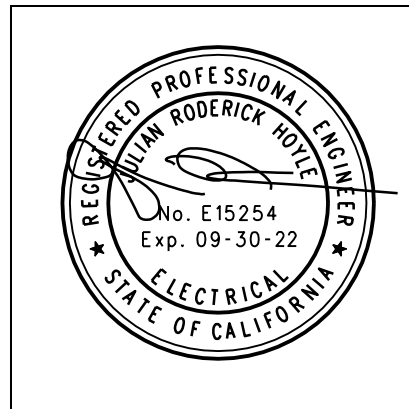
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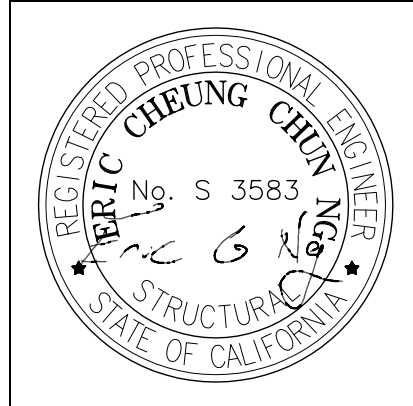
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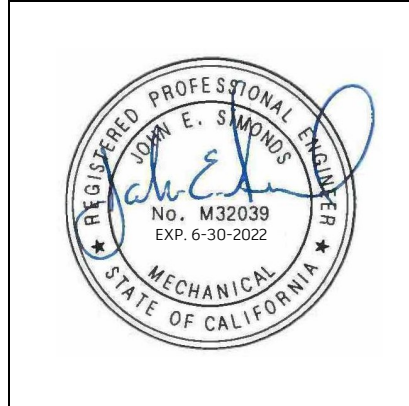
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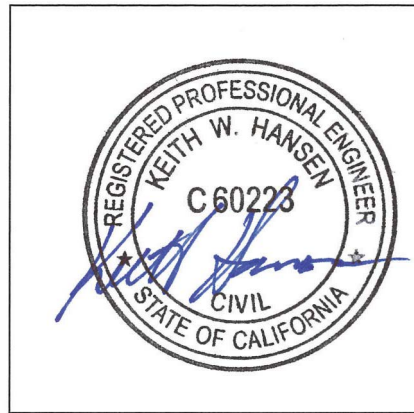
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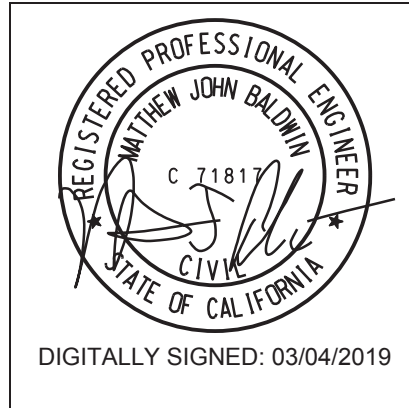
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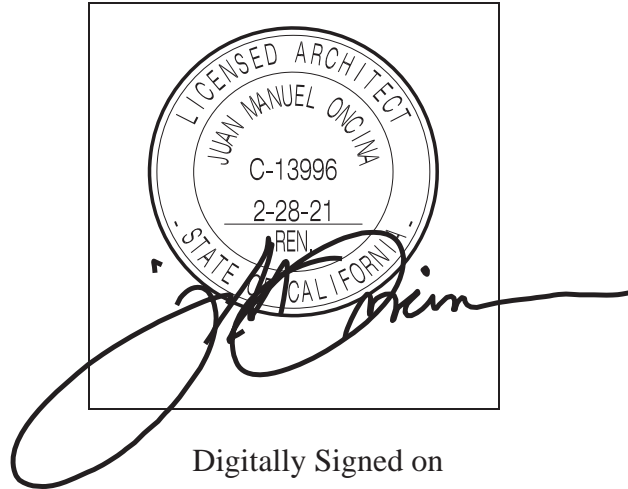
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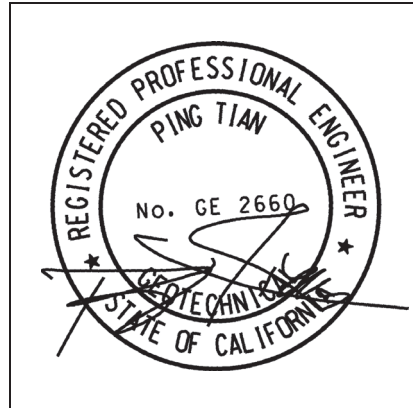


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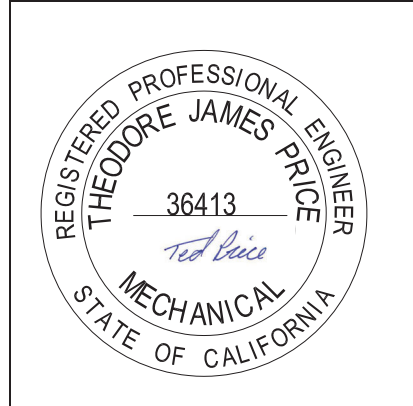
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SECTION 22 10 01
PLUMBING PIPING AND ACCESSORIES

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Changes in location of equipment or piping that affect connecting or adjacent work, before proceeding with the Work.
2. Complete list of products proposed for installation.

PART 2 PRODUCTS

2.01 HOSE VALVES

A. HV-1, Hose Valve:

1. Cast bronze globe valve, 1-1/2-inch size, with NPT screwed ends, union bonnet, rising stem, Teflon disc, hand wheel, and NPT by NST hose thread adapter outlet connection and outlet cap.
2. Rated 150-pound SWP, 300-WOG.
3. Manufacturers and Products:
 - a. Nibco; Catalog No. T-235-Y, Angle No. T-335-Y.
 - b. Crane Co.; Catalog No. 7TF, Angle No. 17TF.
 - c. Or approved equal.

2.02 PIPE HANGERS AND SUPPORTS

A. Refer to Section 40 05 15, Piping Support Systems.

B. Water Pressure Reducing Valves 1/2-Inch Through 2-1/2 Inches:

1. Spring controlled, with a neoprene diaphragm.
2. Sizes and Ratings:
 - a. PRV-1: 1-1/2-inch IPS, maximum 100 gpm, with inlet pressure 120 psig; outlet pressure 80 psig.
3. Manufacturers and Products:
 - a. Fisher; Type 75.
 - b. Watts; No. 223.
 - c. Or approved equal.

2.03 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hose:

1. Furnish 50-foot length of 1-1/2-inch, EPDM black cover and EPDM tube, reinforced with two textile braids. Furnish each length with brass male and female NST hose thread couplings to fit hose nozzle(s) and hose valve(s) specified.
2. Rated minimum working pressure of 200 psi.
3. Manufacturers:
 - a. Goodyear.
 - b. Boston.
 - c. Or approved equal.

B. Hose Nozzles:

1. Furnish 1-1/2-inch cast brass satin finish nozzle with adjustable fog, straight-stream, and shutoff features and rubber bumper. Provide nozzle with female NST hose thread.
2. Manufacturers:
 - a. Croker.
 - b. Elkhart.
 - c. Or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide isolation valves and strainers at pressure regulators.

END OF SECTION

SECTION 22 10 01.03 CAST IRON SOIL PIPE (CISP) AND FITTINGS		
Item	Size	Description
Pipe	6" and smaller	Hubless, CISPI 301, service weight, no-hub ends.
	8" and larger	Hub and spigot, ASTM A74, service weight, single hub and spigot.
Joints	6" and smaller	Coupling: Conform to ASTM C564, ASTM C1277, ASTM C1540, and CISPI 310. Compression: Neoprene sealing sleeve with 24-gauge Type 304 stainless steel shield and clamp assembly. Joints to dissimilar material shall comply with ASTM C1460.
	8" and larger	Rubber gaskets, ASTM C564.
Fittings	6" and smaller	Conform to ASTM A888 and CISPI 301.
	8" and larger	Conform to ASTM A74.
Coating	All	Bituminous-coated inside and out; marked with manufacturer's name or trademark and CISPI symbol.

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals: Catalog information and rough-in dimensions for plumbing fixtures, products, and specialties.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Drainage Products:
 - 1. General:
 - a. Smith.
 - b. Wade.
 - c. Zurn.
 - d. Or approved equal.

2.02 GENERAL

- A. Drainage Products: Indicated by fixture number as shown on Drawings.

2.03 MATERIALS

- A. Drainage Products:
 - 1. RD-1, Roof Drain:
 - a. Materials: Cast-iron body with combined flashing clamp and gravel stop, and cast-iron dome.
 - b. Options: Extension collar, sump receiver, underdeck clamp.
 - c. Manufacturer and Product:
 - 1) Jay R. Smith Mfg. Co.; Model 1010Y-E-R-C-CID.
 - 2) Or approved equal.
 - 2. OD-1, Overflow Drain:
 - a. Materials: Cast-iron body with combined flashing clamp and gravel stop, and cast-iron dome.
 - b. Options: Extension collar, sump receiver, underdeck clamp, and 2-inch-high cast-iron standpipe.
 - c. Manufacturer and Product:
 - 1) Jay R. Smith Mfg. Co.; Model 1070Y-E-R-C-CID-CIS.
 - 2) Or approved equal.

- B. Hose Valves: Refer to Section 22 10 01, Plumbing Piping and Accessories.
- C. Sealant: In accordance with Section 07 92 00, Joint Sealants.

PART 3 EXECUTION

3.01 PREPARATION

- A. Drawings do not attempt to show exact details of fixtures. Changes in locations of fixtures, advisable in opinion of Contractor, shall be submitted to Design Engineer for review before proceeding with the Work.

3.02 INSTALLATION

- A. Drainage Products:
 - 1. Drains: Set top flashing cap flush with roof. Set underdeck clamp flush with underside of deck.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. Air Moving and Conditioning Association, Inc. (AMCA): 203, Field Performance Measurement of Fan Systems.
 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE): HVAC Applications Handbook.
 3. Associated Air Balance Council (AABC): National Standards for Field Management and Instrumentation Total System Balance.
 4. National Environmental Balancing Bureau (NEBB):
 - a. Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
 - b. Procedural Standards for Measuring Sound and Vibration.
 5. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): HVAC Testing, Adjusting, and Balancing Manual.

1.02 SUBMITTALS

- A. Informational Submittals:
1. Documentation of experience record of testing authority.
 2. Documentation of current AABC or NEBB certifications for those technicians in responsible charge of the Work under this Contract.
 3. Submit detailed test and balance procedures, including test conditions for systems to be tested, prior to beginning the Work.
 4. Written verification of calibration of testing and balancing equipment.
 5. Balancing Log Report following completion of system adjustments including test results, adjustments, and rebalancing procedures.

1.03 QUALITY ASSURANCE

- A. Air Balancing and Test Agency Qualifications:
1. Certification by AABC or NEBB for testing, adjusting, and balancing of HVAC systems.
 2. Corporately and financially independent organization functioning as an unbiased testing authority.

3. Professionally independent of manufacturers, suppliers, and installers of HVAC equipment being tested.
4. Have a proven record of experience on similar projects.
5. Employer of engineers and technicians regularly engaged in testing, adjusting, and balancing of HVAC equipment and systems.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide materials, tools, test equipment, computers, and instrumentation required to complete the Work included.
- B. Test Hole Plugs: Plug test holes in ducts with plugs made for that purpose and replace any insulation removed to specified conditions.
- C. Drives for Belt-Driven Fans:
 1. Furnish cast iron or flanged steel sheaves.
 2. Sheaves and belt combination shall be capable of providing 150 percent of motor horsepower.

PART 3 EXECUTION

3.01 GENERAL

- A. Adjust and balance air systems in accordance with standard procedures and recognized practices of the AABC or SMACNA.
- B. Adjust and balance the following system:
 1. Foul Air Exhaust Air Systems:
 - a. Fans 12F111 and 12F112:
 - 1) Fan Capacity: 7,500 cfm each.
 - 2) Fan Motor Size: 10 hp.
 - b. Flow Rates from Flow Equalization Basins: 5,000 cfm each.

3.02 ADJUSTING AND BALANCING AIR SIDE

- A. Preparation:
 1. Prior to beginning the Work, perform the following activities:
 - a. Review shop drawings and installed system for adequate and accessible balancing devices and test points.
 - b. Recommend to Design Engineer dampers that need to be added or replaced in order to obtain proper air control.

- c. Verify proper startup procedures have been completed on the system.
- d. Verify controls installation is complete and system is in stable operation under automatic control.
- e. Verify test instruments have been calibrated to a recognized standard and are within manufacturer's recommended calibration interval before beginning the Work.

B. General:

1. When adjustments are made to a portion of a fan system, reread other portions of that same system to determine effects imposed by adjustments. Readjust as necessary.
2. Lock and mark final positions of balancing dampers with permanent felt pen.

C. Equipment Data:

1. Collect the following data and included in final report:
 - a. Type of unit.
 - b. Equipment identification number.
 - c. Equipment nameplate data (including manufacturer, model, size, type, and serial number).
 - d. Motor data (frame, hp, volts, FLA rpm, and service factor).
 - e. Sheave manufacturer, size, and bore.
 - f. Belt size and number.
 - g. Sheave centerline distance and adjustment limits.
 - h. Starter and motor overload protection data.
 - i. Include changes made during course of system balancing.

D. Fan Systems:

1. Measure fan system performance in accordance with AMCA 203.
2. In each system, at least one airpath from fan to final branch duct termination shall have dampers fully open. Achieve final air quantities by adjusting fan speed.
3. Adjust Fan Air Volumes:
 - a. Adjust fan speeds and motor drives for required equipment air volumes, with allowable variation of plus 10 percent minus 0 percent.
 - b. After final adjustments, do not operate motor above nameplate amperage on any phase.
 - c. After final adjustments, do not operate fan above maximum rated speed.

- d. Perform airflow test readings under simulated or actual conditions of full cooling, full heating, minimum outside air, full outside air and exhaust, and full return air.
 - e. Provide and make drive and belt changes on motors or fans as required to adjust equipment to specified conditions. Drives shall be able to deliver 150 percent of motor horsepower. Provide written notice to air handling unit manufacturer and Owner if drive or belt changes were made.
4. Adjust outside air dampers, return air dampers, relief air dampers, exhaust air dampers, and motorized louvers for maximum and minimum air requirements.
 5. Read and record static pressures at unit inlet and discharge, each filter set, coils, dampers, plenums, and mixing dual-duct or adjustable-volume boxes, on every supply, return, and exhaust fan for each test condition.
 6. Read and record motor amperage on all phases for each test condition.

3.03 FIELD QUALITY CONTROL

- A. General: Perform functional tests as required by Section 01 91 14, Testing, Integration, and Startup.
- B. Balancing Log Report Requirements:
 1. Include narrative description for each system explaining testing and balancing methodology and assumptions used. Clearly identify test conditions for tests performed. Include control setpoint.
 2. Log and record operational information from every test for each system, as necessary to accomplish services described.
 3. Include equipment data for units tested.
 4. Include reduced set of HVAC Drawings or system schematic diagrams with each element uniquely identified and indexed to balance log.
 5. Indicate recorded site values, and velocity and mass correction factors used to provide equivalent standard air quantities.
 6. Include separate section in log, if necessary, describing operating difficulties in air systems that could not be eliminated by specified procedures. Identify these problems by system and location within building; include outline or summary of condition and its effect on building, and describe corrective actions attempted and recommended.

- C. Quality Control Verification:
1. After adjustments have been completed and balance logs submitted, balancing and testing agency shall be available to demonstrate the following:
 - a. Air balancing procedures and verification of test results.

END OF SECTION

SECTION 23 31 16.16
THERMOSET FIBERGLASS-REINFORCED
PLASTIC DUCTS AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Air Movement and Control Association (AMCA): 500-D, Laboratory Methods of Testing Dampers for Rating.
2. American National Standards Institute (ANSI).
3. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125, and 250).
 - b. B16.5, Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24.
 - c. B18.22.1, Plain Washers.
4. ASTM International (ASTM):
 - a. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - b. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - c. C582, Standard Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment.
 - d. D3982, Standard Specification for Contact Molded "Fiberglass" (Glass Fiber Reinforced Thermosetting Resin) Duct and Hoods.
 - e. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
5. Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA): Thermoset FRP Duct Construction Manual.

1.02 SUBMITTALS

A. Action Submittals:

1. Duct:
 - a. Statement of resins and reinforcing proposed for use.
 - b. Pressure, vacuum, and temperature rating of duct.

- c. Dimensions of subassemblies to be shipped.
 - d. Manufacturer's data and descriptive literature for duct accessories.
 - e. Drawings showing layout, support, and joint details.
 - f. Stamped and signed structural engineering design calculations.
 - g. Information, details, and requirements for installation and support of duct and torque values for flange bolting.
 - h. Name of manufacturer.
2. Supports:
 - a. Location plan.
 - b. Type and details.
 - c. Materials of construction.
 - d. Stamped and signed structural engineering design calculations for special supports.
 3. Expansion Joints/Flexible Connectors:
 - a. Type and model.
 - b. Materials of construction.
 - c. Force required for expansion/contraction.
 - d. Name of manufacturer.
 4. Butterfly Dampers and Blast Gates:
 - a. Statement of resins and reinforcing proposed for use.
 - b. Pressure, vacuum, and temperature rating.
 - c. Materials of construction.
 - d. Total weight including operator.
 - e. Drawings showing overall dimensions and connection size.
 - f. Type and model.
 - g. Name of manufacturer.
 5. Counterbalanced Backdraft Dampers:
 - a. Statement of resins and reinforcing proposed for use.
 - b. Pressure, vacuum, and temperature rating.
 - c. Materials of construction.
 - d. Total weight including operator.
 - e. Drawings showing overall dimensions and connection size.
 - f. Type and model.
 - g. Name of manufacturer.
 6. Vibration Isolation Devices:
 - a. Type and model.
 - b. Material.
 - c. Name of manufacturer.
 7. Intake Hoods:
 - a. Statement of resins and reinforcing proposed for use.
 - b. Materials of construction.
 - c. Drawings showing overall dimensions and connection size.

- d. Type and model.
- e. Name of manufacturer.

B. Informational Submittals:

- 1. Qualifications:
 - a. Fabricator: List of references substantiating experience.
 - b. Installer: Manufacturer's certification that installer is qualified for installation work.
- 2. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
- 3. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
- 4. Manufacturer's factory inspection report.
- 5. Manufacturer's installation instructions.
- 6. Detailed information on structural, mechanical, electrical, or other modifications necessary to adapt the arrangement or details shown to the ductwork installation.
- 7. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
- 8. Damper and Blast Gate: AMCA 500-D leakage test results by AMCA-approved laboratory.
- 9. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

1.03 QUALITY ASSURANCE

A. Qualifications:

- 1. Fabricator: Provide projects and references.
- 2. Installer: Provide projects and references.
- 3. Joint Installer: Provide projects and references.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Shipping:

- 1. Do not ship ducting by nesting small diameter components inside larger diameter components.
- 2. Protect flanged sections by bolting to wooden blinds 2 inches greater than outside diameter of flange.
- 3. For nonflanged components, use either rigid plugs inside ends to prevent deflection or protect with wooden boxes.

4. Crate materials whenever practical prior to shipment.
5. Firmly fasten and pad components shipped to prevent shifting or flexing of components while in transit.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Make field joints only when ambient temperature is above 55 degrees F and below 100 degrees F.

PART 2 PRODUCTS

2.01 MATERIALS

A. Resin:

1. Resin System: Premium corrosion-resistant, fire-retardant vinylester, or other qualified thermosetting resin. Resin to be selected by fabricator, subject to approval of Design Engineer, and suitable for intended service with no fillers or thixotropic agents.
2. Liner Resin: Premium grade and corrosion resistant.
3. Structural wall resin may be of different chemical resistance, subject to conditions of service and approval of Design Engineer.
4. Flame Spread Index: ASTM E84, less than 25; fire retardant additives used only in structural layer.
5. Structural wall resin shall contain a minimum of 3 percent antimony trioxide to achieve required flame spread index.
6. Add ultraviolet absorbers to surfacing resin to improve weather resistance.
7. Color: Use no dyes, pigments, or colorants, except in exterior gel coat. Exterior gel coat shall be white.
8. For interior duct, final coat shall be factory applied intumescent coating to achieve designated results for low smoke development.

B. Reinforcement:

1. Veil: Chemical surfacing mat, Type C (chemical) glass, 10 mils thick, with finish and binder compatible with lay-up resin.
2. Corrosion Barrier: Resin-rich interior surface of nominal 100 mils to 120 mils thick, using chopped strand mat backing the veil. Use no additive in corrosion barrier.
3. Chopped Strand Mat: Type E glass, minimum 1-1/2 ounces per square foot, with silane finish and styrene soluble binder.
4. Continuous Roving for Chopper Gun Spray-Up: Type E glass.

5. Woven Roving: Type E glass, nominal 24 ounces per square yard, 4 by 5 weave, with silane type finish.
6. Continuous Roving for Filament Winding: Type E glass with silane type finish.

C. Fasteners:

1. Bolts: ASTM A193/A193M, Type 316 stainless steel, ANSI coarse thread series, Grade B 8M hex head.
2. Nuts: ASTM A194/A194M, Type 316 stainless steel, Grade 8M.
3. Washers: ASME B18.22.1, flat, Type 316 stainless steel.

2.02 DUCTWORK

A. Design Requirements:

1. Conform to ASTM D3982.
2. Duct manufacturer's design for round section, including duct wall thickness and stiffeners.
3. Take into account expansion from seasonal temperature variations.

B. Service Conditions:

1. System Maximum Pressure: 12 inches of water column.
2. System Maximum Vacuum: 12 inches of water column.
3. Atmosphere Ducted: Hydrogen sulfide rich (200 ppmV) air saturated with water vapor.
4. Location: Outside and buried.
5. Ambient Temperature: 20 degrees F to 110 degrees F.
6. Seismic Requirements: As shown on Structural Drawings.
7. Wind and Snow Loads: As shown on Structural Drawings.

C. Minimum Wall Thickness:

1. The total duct wall thickness including veil, corrosion barrier, and structural layers shall not be less than as follows:
 - a. Duct Sizes Up to and Including 24 Inches in Diameter: 0.25 inch.
 - b. Duct Sizes Over 24 Inches in Diameter: 0.30 inch.

2.03 FABRICATION

A. Physical Properties: Meet or exceed requirements of ASTM D3982.

B. Squareness of ends, fittings, elbows, and butt joints shall meet or exceed requirements of ASTM D3982.

- C. Keep use of flanges to a minimum; butt joints are preferred method of joining sections of duct.
- D. Butt joints shall only be permitted in duct sections that are accessible for inside overlay. Internal overlay to consist of two layers of 1-1/2 ounce per square foot of fiberglass mat followed by one layer of surfacing veil, as a minimum.
- E. Flanges for Duct to Duct Connections and Duct Wall Thicknesses: ASTM D3982, rated for specified pressure and vacuum.
- F. Flange dimensions (except thickness) and drilling patterns for flanges that connect to equipment, valves, or dampers are to correspond to ASME B16.5, Class 150 or ASME B16.1, Class 125.
- G. Furnish gussets on flanged nozzles from ducts.
- H. Back Face of Flanges: Spot-faced, flat and parallel to flange face, and of sufficient diameter to accept ANSI metal washer under bolt head or nut.
- I. Laminate:
 - 1. Reinforce inner surface of ducts with resin-rich surfacing veil 10 mils thick to 20 mils thick.
 - 2. Construct interior layer of resin reinforced with at least two plies of chopped strand mat; thickness at least 100 mils.
 - 3. Glass content of combined inner surface and interior layer shall be 27 percent plus or minus 5 percent.
- J. Duct and Fittings:
 - 1. Type: Contact molded or filament wound, meeting requirements of ASTM D3982.
 - 2. Joints: Butt wrapped except flanged at connections to expansion joints, butterfly valves, blast gates, or mechanical equipment.
 - 3. Fittings: Plain end or flanged, manufacturer's standard sizes.
 - 4. Gaskets: EPDM, 3/16-inch thick, full-face, Type A Durometer of 50-60.
- K. Manufacturers:
 - 1. Spundstrand.
 - 2. Belco.
 - 3. Daniel Company.
 - 4. ECS.
 - 5. No or approved equal.

L. Supports:

1. Supports for FRP ductwork shall be provided per Section 40 05 15, Piping Support Systems.
2. Type: As shown on Drawings.
3. Maximum Duct Deflection: 1/4 inch, including special sections at road crossings.
4. Support Spacing: 10 feet maximum.

M. Marking:

1. Identify each duct component with fabricator's name, resin, minimum thickness, and date of manufacture.
2. Use permanent marking. Seal decals and labels into laminate exterior with resin.
3. For piece marking used for installation, use oil-based paint for easy removal.

N. Cure products to at least 90 percent of minimum Barcol hardness specified by resin manufacturer.

O. Expansion Joints/Flexible Connections:

1. Provide where indicated on Drawings or as required for proper duct installation.
2. Type: W-design configuration with integral flanges suitable for service with FRP duct.
3. Material: EPDM.
4. Backing Rings: 3/8-inch-thick, 2 inches wide, Type 316 stainless steel. ASME B16.1, Class 25 diameter and drilling.
5. Length: 6 inches, flange-to-flange.
6. Extension: 2 inches.
7. Compression: 1/2 inch.
8. Lateral Offset: 1 inch.
9. Thickness: 1/4 inch, minimum.
10. Manufacturer and Product:
 - a. Holz Rubber Company, Inc.; Style 945.
 - b. Or approved equal.

P. Butterfly Dampers:

1. Dampers:
 - a. Single-blade type, complete with channel-type frame, close-fitting axle, and bearings.

- b. Same inside diameter as connecting ductwork.
 - c. Axles of Type 316 stainless steel not less than 3/4 inch in diameter and shall be continuous through damper.
 - d. When used for isolation service, shall be furnished with blade seal and shaft seal.
 - e. When used for balancing only, shall be furnished with full circumference molded in blade stop.
 - f. Isolation dampers shall have maximum leakage rate of 5.25 cubic feet per minute per square foot of damper area, at a differential pressure of 30 inches WC.
2. Operators:
 - a. Balancing Dampers: Provide adjustment handle with full slot quadrant to allow full adjustability and locking nut.
 - b. Isolation Dampers: Provide multi-turn handwheel operator. Provide chain wheel accessory for installations over 8 feet above adjacent level.
 3. Design Requirements:
 - a. Each damper shall be designed for the following conditions:
 - 1) Air Temperature Range: 20 degrees F to 110 degrees F.
 - 2) Differential Pressure: 15-inch WC.
 4. Materials:
 - a. FRP materials for dampers shall be same resin as used in ductwork.
 - b. Requirements for flame spread and smoke development shall be same as required for ductwork.
 5. Construction:
 - a. Frames: Fiberglass reinforced plastic with resin as described herein.
 - b. Blades: Fiberglass reinforced plastic with resin as described herein. Blade thickness and stiffeners as required to meet design conditions.
 - c. Axles: Continuous Type 316 stainless steel. Axle to extend 6 inches beyond frame.
 - d. Bearings: Molded PTFE.
 - e. Blade Stops: FRP with resin as described herein.
 - f. Blade Seals: EPDM.
 - g. Shaft Seals: EPDM.
 - h. Flanges: As specified to match ductwork flanges.

Q. Counter Balanced Backdraft Dampers:

1. Dampers:
 - a. Multi-blade parallel action type, complete with channel type frame, close fitting axle, and bearings.
 - b. Same inside dimensions as connecting ductwork.
 - c. Axles not less than 3/4-inch in diameter and shall be continuous through damper.
 - d. Shall be furnished with blade seals and jamb seals.
2. Design Requirements:
 - a. Each damper shall be designed for the following conditions:
 - 1) Air Temperature Range: 20 degrees F to 110 degrees F.
 - 2) Differential Pressure: 15-inch WC.
3. Materials:
 - a. FRP materials for dampers shall be same resin as used in ductwork.
 - b. Requirements for flame spread and smoke development shall be same as required for ductwork.
4. Construction
 - a. Frames: Fiberglass reinforced plastic with resin as described herein.
 - b. Blades: Airfoil shaped fiberglass reinforced plastic with resin as described herein. Blade thickness and stiffeners as required to meet design conditions.
 - c. Axles: Continuous FRP rod with resin as described herein.
 - d. Bearings: Molded PTFE.
 - e. Blade Stops: FRP with resin as described herein.
 - f. Blade Seals: Neoprene.
 - g. Shaft Seals: Neoprene.
 - h. Flanges: As specified to match ductwork flanges.
 - i. Linkage Type: Type 316 stainless steel all out of airstream.
 - j. Counterbalance Assembly: Type 316 stainless steel all out of airstream.

R. Vibration Isolation Devices:

1. Provide at each support location and where contact with ductwork is made.
2. Supports shall be configured to allow for vibration isolation material thickness.
3. Material: Minimum 3/16-inch thickness EPDM bonded to support structure. Material shall not be bonded to ductwork.

S. Intake Hoods:

1. Provide where indicated on Drawings.
2. Configuration as indicated on Drawings with minimum free area of not less than the throat size as indicated on Drawings.
3. Materials: FRP materials for intake hoods shall be the same resin used in ductwork or approved equal.
4. Fasteners: Type 316 stainless steel in accordance with Article Materials.
5. Provide matching curb assessor.
6. Intake Damper: As specified herein.
7. Manufacturer and Product:
 - a. Fiber-Aire; Model MA.
 - b. Or approved equal.

2.04 BURIED AND SUBMERGED DUCTWORK

- A. As specified in Section 40 27 00.12, Fiberglass Reinforced Plastic (FRP) Pipe and Fittings Data Sheet.

2.05 SOURCE QUALITY CONTROL

- A. Factory Inspection: Inspect fabrications for required construction, intended function and conformance with referenced standards.
- B. Inspection of products is required prior to shipment, unless specifically waived in writing by Design Engineer.
- C. Notify Construction Manager 1 week prior to estimated date of inspection.
- D. Repairs authorized by Design Engineer shall be reinspected before final acceptance, unless specifically waived.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify dimensions and conditions in field.
- B. Layout routing in straight lines parallel to building lines.
- C. Coordinate support locations with layout and joints.

3.02 INSTALLATION

A. Ductwork:

1. Cut, fit, and install in accordance with duct manufacturer's recommendations. The SMACNA manual may be used for guidance, but duct manufacturer's recommendations shall take precedence.
2. Seal cut edges with compatible resin.
3. Ductwork shall be free of vibration when in operation. Vibration isolation devices shall be provided and installed by Contractor.
4. Install plumb and straight and in proper alignment.
5. Provide for expansion and contraction of ductwork and fittings.
6. Anti-seize thread compound shall be applied to all nuts and bolts.
7. Flange bolts shall be tightened to torque values specified by manufacturer. Install flat washer under each nut and bolt head.

B. Field Joints:

1. Provide material in kit form; one kit for one joint.
2. Make joints only when ambient temperature is above 55 degrees F and below 100 degrees F.
3. Made by manufacturer certified installer.

C. Dampers: Unless otherwise necessary for proper operation of damper, axles shall be installed in horizontal position.

3.03 FIELD TESTING

- #### A. Field test ductwork after installation and before concealment or burying, with air test to 90 percent of maximum working pressure for a period of 4 hours. A pressure drop of greater than 10 percent during the 4-hour test shall constitute a leak. Leaks shall be corrected and duct retested until no further leaks appear.

3.04 MANUFACTURER'S SERVICES

A. Manufacturer's Representative:

1. Present at Site or classroom designated by Owner for minimum person-days listed below, travel time excluded:
 - a. 1 person-day for installation assistance, including pre-installation training of Contractor personnel in joint assembly.
 - b. 1 person-day for inspection and completion of Manufacturer's Certificate of Proper Installation.

B. See Section 01 43 33, Manufacturers' Field Services.

3.05 ADJUSTING

- A. After duct leakage testing, provide complete air balancing of entire system as described in Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3.06 CLEANING

- A. Blow ductwork clean using system fans; purged continuously for not less than 48 hours at a flow rate not less than design flow rate. If required, system fan shall be throttled on inlet side to prevent motor overload. Temporary screen shall be installed on system fan inlet to protect fan from entering debris.
- B. Dampers shall be smooth, clean, and free of dirt when installed.

END OF SECTION

SECTION 23 34 00
ROOF GRAVITY VENTILATOR

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Air Movement and Control Association International (AMCA):
 - a. 99, Standards Handbook.
 - b. 201, Fans and Systems.
2. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
3. ASTM International (ASTM):
 - a. B117, Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - b. D2247, Standard Practice for Testing Water Resistance of Coatings in 100 Percent Relative Humidity.
 - c. D2794, Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 - d. D3363, Standard Test Method for Film Hardness by Pencil Test.
 - e. D4167, Standard Specification for Fiber-Reinforced Plastic Fans and Blowers.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
4. National Electrical Manufacturers Association (NEMA).
5. National Fire Protection Association (NFPA): 45, Standard on Fire Protection for Laboratories Using Chemicals.
6. Occupational Safety and Health Act (OSHA).
7. Society for Protective Coatings (SSPC):
 - a. SP 3, Power Tool Cleaning.
 - b. SP 5, White Metal Blast Cleaning.
 - c. SP 6, Commercial Blast Cleaning.
 - d. SP 10, Near-White Blast Cleaning.

1.02 DEFINITIONS

A. The following is a list of abbreviations which may be used in this section:

1. dB: Decibel.
2. XP: Explosion Proof.

1.03 SUBMITTALS

A. Action Submittals:

1. Provide following for specified products:
 - a. Identification as referenced in Contract Documents.
 - b. Manufacturer's name and model number.
 - c. Descriptive specifications, literature, and drawings.
 - d. Dimensions and weights.
 - e. Capacities and ratings.
 - f. Construction materials.
 - g. Factory run test and vibration test reports.
 - h. Factory finish system.
 - i. Color selection charts where applicable.
 - j. Corrosion protection coating product data.
2. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.
3. Or Approved Equal Equipment:
 - a. Where submitted equipment results in change to fan inlet or outlet ductwork configuration shown on Drawings, submit system effect factor calculations indicating increased static pressure requirements as described in AMCA 201.
 - b. Where submitted equipment results in change to ductwork and equipment configuration shown on Drawings, submit detailed information on structural, mechanical, electrical, or other modifications necessary to adapt arrangement to equipment furnished.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
2. Recommended procedures for protection and handling of products prior to installation.
3. Manufacturer's installation instructions.
4. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
5. Test reports.
6. Operation and maintenance data in conformance with Section 01 78 23, Operation and Maintenance Data. Include as-built version of equipment schedules.

1.04 QUALITY ASSURANCE

- A. Performance Ratings: Tested in accordance with AMCA 210.
- B. Sound Ratings: Tested in accordance with AMCA 300.
- C. Fabrication: In accordance with AMCA 99.

1.05 EXTRA MATERIALS

- A. Furnish, tag, and box for shipment and storage the following spare parts, special tools, and materials:

Item	Quantity
Backdraft Damper Counterbalance Bearings	One complete set per unit
Special tools required to maintain or dismantle	One complete set for each different size unit

- B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT SCHEDULES

- A. Some specific equipment requirements are listed in Equipment Schedule as shown on Drawings.

2.02 GENERAL

- A. Finishes:
 1. Carbon Steel Parts: Factory finish as follows, unless indicated otherwise.
 - a. Parts cleaned and chemically pretreated with phosphatizing process.
 - b. Manufacturer’s standard primer.
 - c. Manufacturer’ standard topcoat.
 2. Aluminum Parts: Finished smooth and left unpainted, unless stated otherwise.
 3. Stainless Steel Parts: Finished smooth and left unpainted.

2.03 ROOF GRAVITY VENTILATOR, LOUVERED

- A. General: Factory-assembled louvered exhaust or gravity relief vent; including housing and accessories, suitable for roof mounting.
- B. Housing:
1. Construction:
 - a. Rectangular, tiered extruded aluminum construction, with welded miter cut joints, 12-gauge minimum thickness.
 - b. Louvered on all four sides.
 - c. Aluminum support structure, 8-gauge minimum thickness.
 2. Base:
 - a. Reinforced and braced.
 - b. Integral snow and storm baffle.
 - c. Minimum panel thickness, 12-gauge.
 - d. Miter cut continuously welded curb cap corners.
 3. Hood:
 - a. Overhang sufficient to provide weatherproof inlet.
 - b. Minimum panel thickness, 14-gauge.
 - c. Antic condensate insulation coating inside hood.
- C. Accessories:
1. Provide as follows:
 - a. Gravity Backdraft Damper: Gravity operation, adjustable counterweight, aluminum construction.
 - b. Bird Screen: Aluminum construction.
 - c. Roof Curb Flashing:
 - 1) Manufacturer's standard.
 - 2) As shown on Drawings.
 - 3) Aluminum construction.
 - d. Inlet Screen: Removable 1-inch mesh screen of coated steel construction over exposed inlets.
 - e. Corrosion Protection Coating:
 - 1) Provide factory-applied corrosion protection coating on these unit components:
 - a) Housing.
 - b) Accessories.
 - c) Interior surfaces in contact with airstream.
 - 2) Coating system shall be baked epoxy, and shall be in accordance with Article Corrosion Protection Coating.

D. Manufacturers and Products:

1. Cook; Model TRE.
2. ACME; Model LEV (exhaust); Model LIV (intake).
3. Greenheck; Model WRH (relief); Model WIH (intake).
4. Or approved equal.

2.04 CORROSION PROTECTION COATING

A. General: Factory-applied corrosion protection coating for application to air intake components and accessories, where required by this section.

1. Surface Preparation: Sandblast surface to SSPC SP 10.
2. Application: Electrostatic spray.
3. Curing: Oven baked at a metal temperature not to exceed 400 degrees F.
4. Finished Thickness: 2.5-mil to 3.5-mil dry film thickness.
5. Performance:
 - a. Coating shall meet or exceed following criteria:
 - 1) Salt Spray Test: Minimum 1,000-hour duration, ASTM B117 test method.
 - 2) Humidity Resistance: Minimum 1,000-hour duration, ASTM D2247 test method.
 - 3) Impact Resistance: 100-inch-pounds, ASTM D2794 test method.
 - 4) Pencil Hardness: 2H, ASTM D3363 test method.
 - 5) UV Resistance: UV inhibited life of minimum 10 years when exposed to sun in State of Florida.
 - 6) Service Temperature: Maximum 230 degrees F, continuous.

2.05 ACCESSORIES

A. Equipment Identification Plates: Furnish 16-gauge Type 316 stainless steel identification plate securely mounted on each separate equipment component in a readily visible location. Plate shall bear 3/8-inch-high engraved block type black enamel filled equipment identification number and letters indicated in this Specification and as shown on Drawings.

B. Lifting Lugs: Furnish suitably attached for equipment assemblies and components weighing over 100 pounds.

2.06 SOURCE QUALITY CONTROL

A. Acoustical Levels: Perform noise tests in accordance with AMCA 300 and AMCA 301.

- B. Balancing: Meet requirements set forth in Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units level and plumb.
- B. Secure roof-mounted units to roof curbs with Type 316 stainless steel hardware.
- C. Labeling: Label air intakes in accordance with Article Accessories.
- D. Equipment Support and Restraints: Air intake unit shall be supported off of concrete curbs as indicated on Drawings.

3.02 FIELD QUALITY CONTROL

- A. Functional Tests:
 - 1. Verify blocking and bracing used during shipping are removed.
 - 2. Verify cleaning and adjusting are complete.
 - 3. Verify lubrication for bearings and other moving parts.

3.03 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative:
 - 1. Present at site or classroom designated by Owner, for minimum person-days listed below, travel time excluded:
 - a. 1/2 person-day for installation assistance and inspection.
 - b. 1/2 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
- B. Refer to Section 01 43 33, Manufacturers' Field Services.

3.04 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Lubricate bearings.
- C. Balancing: Perform air system balancing as specified in Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

3.05 CLEANING

- A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.
- B. On completion of installation, internally clean air intakes according to manufacturers' written instructions. Remove foreign material and construction debris.

END OF SECTION

SECTION 26 05 02
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Requirements specified within this section apply to Division 26, Electrical. Work specified herein shall be performed as if specified in the individual sections.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. National Electrical Contractors Association (NECA): National Electrical Installation Standards.
 2. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - b. Z535.4, Product Safety Signs and Labels.
 3. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 4. UL.

1.03 DESIGN REQUIREMENTS

- A. Design and submit conduit layout design, including conduit stub-up location, as required in Section 26 05 33, Raceway and Boxes.

1.04 ELECTRIC SERVICE DIVISION OF RESPONSIBILITY

- A. Incoming underground electrical service facilities provided by the serving utility as part of its normal obligation to customers is work provided outside this Contract. Under this Contract, provide customer required service provisions and electrical work including, but not limited to, primary trench and backfill, primary duct system, service equipment pad site preparation and pad, metering components and associated conduit, and secondary facilities. Schedule and coordinate work of serving utility as required to provide electric service to the Work.

1.05 SUBMITTALS

A. Action Submittals:

1. Provide manufacturers' data for the following:
 - a. Nameplates, signs, and labels.

1.06 QUALITY ASSURANCE

- A. Provide the Work in accordance with NFPA 70. Where required by Authority Having Jurisdiction (AHJ), material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ, in order to provide a basis for approval under the NEC.
- B. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark or label.
- C. Provide materials and equipment acceptable to AHJ for Class, Division, and Group of hazardous area indicated.

1.07 ENVIRONMENTAL CONDITIONS

- A. Refer to the Area Classification and Material Selection Table on Drawings.

PART 2 PRODUCTS

2.01 GENERAL

- A. Where two or more units of the same class of material or equipment are required, provide products of a single manufacturer. Component parts of materials or equipment need not be products of the same manufacturer.
- B. Material and equipment installed in heated and ventilated areas shall be capable of continuous operation at their specified ratings within an ambient temperature range of 40 degrees F to 104 degrees F.
- C. Materials and equipment installed outdoors shall be capable of continuous operation at their specified rating within the ambient temperature range stated in Section 01 61 00, Common Product Requirements.

2.02 EQUIPMENT FINISH

- A. Manufacturer's standard finish color, except where specific color is indicated. If manufacturer has no standard color, finish equipment in accordance with light gray color finish as approved by Owner.

2.03 NAMEPLATES

- A. Material: Laminated plastic.
- B. Attachment Screws: Stainless steel.
- C. Color: Black, engraved to a white core.
- D. Letter Height:
 - 1. Pushbuttons/Selector Switches: 1/8 inch.
 - 2. Other Electrical Equipment: 3/8 inch.

2.04 SIGNS AND LABELS

- A. Sign size, lettering, and color shall be in accordance with NEMA Z535.4.

PART 3 EXECUTION

3.01 GENERAL

- A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned. Contractor shall be responsible for actual location of equipment and devices and for proper routing and support of raceways, subject to approval of Design Engineer.
- B. Check approximate locations of light fixtures, switches, electrical outlets, equipment, and other electrical system components shown on Drawings for conflicts with openings, structural members, and components of other systems and equipment having fixed locations. In the event of conflicts, notify Design Engineer in writing.
- C. Install work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Keep openings in boxes and equipment closed during construction.
- E. Lay out work carefully in advance. Do not cut or notch any structural member or building surface without specific approval of Design Engineer. Carefully perform cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, paving, or other surfaces required for the installation, support, or anchorage of conduit, raceways, or other electrical materials and equipment. Following such work, restore surfaces to original condition.

3.02 ANCHORING AND MOUNTING

- A. Equipment anchoring and mounting shall be in accordance with Section 01 88 15, Anchorage and Bracing.

3.03 COMBINING CIRCUITS INTO COMMON RACEWAY

- A. Homerun circuits shown on Drawings indicate functional wiring requirements for power and control circuits. Circuits may be combined into common raceways in accordance with the following requirements:
1. Analog control circuits from devices in same general area to same destination.
 - a. No power or AC discrete control circuits shall be combined in same conduit with analog circuits.
 - b. No Class 2 or Class 3 circuits including, but not limited to, HVAC control circuits, fire alarm circuits, paging system circuits shall be combined with power or Class 1 circuits.
 - c. Analog circuits shall be continuous from source to destination. Do not add TJB, splice, or combine into a multi-pair cable without authorization of Design Engineer.
 - d. Raceways shall be sized per General Circuit and Raceway Schedule and do not exceed 40 percent fill.
 - e. Changes shall be documented on Record Drawings.
 2. Discrete control circuits from devices in the same general area to the same destination.
 - a. No power or analog control circuits shall be combined in same conduit with discrete circuits.
 - b. No Class 2 or Class 3 circuits including, but not limited to, HVAC control circuits, fire alarm circuits, and paging system circuits shall be combined with power or Class 1 circuits.
 - c. Raceways shall be sized per the General Circuit and Raceway Schedule and do not exceed 40 percent fill, as required by the NEC.
 - d. Changes shall be documented on Record Drawings.
 3. Power circuits from loads in same general area to same source location (such as panelboard, switchboard, low voltage motor control center).
 - a. Lighting Circuits: Combine no more than three circuits to a single raceway. Contractor shall be responsible for increasing conduit and conductor size if derating is required by NEC.
 - b. Receptacle Circuits, 120-Volt Only: Combine no more than three circuits to a single raceway. Provide a separate neutral conductor for each circuit. Contractor shall be responsible for increasing conduit and conductor size if derating is required by NEC.

- c. All Other Power Circuits: Do not combine power circuits without authorization of Design Engineer.

3.04 NAMEPLATES, SIGNS, AND LABELS

- A. Multiple Power Supply Sign: Install permanent plaque or directory at each service disconnect location denoting other services, feeders, and branch circuits supplying the building and the area served by each.
- B. Equipment Nameplates:
 - 1. Provide a nameplate to label electrical equipment including switchgear, switchboards, motor control centers, panelboards, motor starters, transformers, terminal junction boxes, disconnect switches, switches and control stations.
 - 2. Switchgear, motor control center, transformer, and terminal junction box nameplates shall include equipment designation.
 - 3. Disconnect switch, starter, and control station nameplates shall include name and number of equipment powered or controlled by that device.
 - 4. Switchboard and panelboard nameplates shall include equipment designation, service voltage, and phases.

3.05 LOAD BALANCE

- A. Drawings and Specifications indicate circuiting to electrical loads and distribution equipment.
- B. Balance electrical load between phases as nearly as possible on switchboards, panelboards, motor control centers, and other equipment where balancing is required.
- C. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

3.06 CLEANING AND TOUCHUP PAINTING

- A. Cleaning: Throughout the Work, clean interior and exterior of devices and equipment by removing debris and vacuuming.
- B. Touchup Paint:
 - 1. Touchup scratches, scrapes, and chips on exterior and interior surfaces of devices and equipment with finish matching type, color, and consistency and type of surface of original finish.

2. If extensive damage is done to equipment paint surfaces, refinish entire equipment in a manner that provides a finish equal to or better than factory finish, that meets requirements of Specification, and is acceptable to Design Engineer.

3.07 PROTECTION FOLLOWING INSTALLATION

- A. Protect materials and equipment from corrosion, physical damage, and effects of moisture on insulation and contact surfaces.
- B. When equipment intended for indoor installation is installed at Contractor's convenience in areas where subject to dampness, moisture, dirt or other adverse atmosphere until completion of construction, ensure adequate protection from these atmospheres is provided and acceptable to Design Engineer.

END OF SECTION

SECTION 26 05 04
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A1011/A1011M, Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy and High-Strength Low Alloy Formability.
 - b. E814, Method of Fire Tests of Through-Penetration Fire Stops.
 2. Canadian Standards Association (CSA).
 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE): 18, Standard for Shunt Power Capacitors.
 4. International Society of Automation (ISA): RP12.06.01, Wiring Practices for Hazardous (Classified) Locations Instrumentation–Part 1: Intrinsic Safety.
 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - b. C12.1, Code for Electricity Metering.
 - c. C12.6, Phase-Shifting Devices Used in Metering, Marking and Arrangement of Terminals.
 - d. ICS 2, Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
 - e. ICS 5, Industrial Control and Systems: Control Circuit and Pilot Devices.
 - f. KS 1, Enclosed and Miscellaneous Distribution Switches (600 Volts Maximum).
 6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 7. UL:
 - a. 98, Standard for Enclosed and Dead-Front Switches.
 - b. 248, Standard for Low Voltage Fuses.
 - c. 486E, Standard for Equipment Wiring Terminals for use with Aluminum and/or Copper Conductors.
 - d. 489, Standard for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
 - e. 508, Standard for Industrial Control Equipment.
 - f. 810, Standard for Capacitors.

- g. 943, Standard for Ground-Fault Circuit-Interrupters.
- h. 1059, Standard for Terminal Blocks.
- i. 1479, Fire Tests of Through-Penetration Fire Stops.

1.02 SUBMITTALS

A. Action Submittals:

- 1. Provide manufacturers' data for the following:
 - a. Control devices.
 - b. Control relays.
 - c. Circuit breakers.
 - d. Fused switches.
 - e. Nonfused switches.
 - f. Timers.
 - g. Fuses.
 - h. Intrinsic safety barriers.
 - i. Enclosures: Include enclosure data for products having enclosures.
- 2. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals: Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.

PART 2 PRODUCTS

2.01 MOLDED CASE CIRCUIT BREAKER THERMAL MAGNETIC, LOW VOLTAGE

A. General:

- 1. Type: Molded case.
- 2. Trip Ratings: 15 amps to 800 amps.
- 3. Voltage Ratings: 120, 240, 277, 480, and 600V ac.
- 4. Suitable for mounting and operating in any position.
- 5. UL 489.

B. Operating Mechanism:

- 1. Overcenter, trip-free, toggle type handle.
- 2. Quick-make, quick-break action.
- 3. Locking provisions for padlocking breaker in OPEN position.
- 4. ON/OFF and TRIPPED indicating positions of operating handle.
- 5. Operating handle to assume a CENTER position when tripped.

C. Trip Mechanism:

1. Individual permanent thermal and magnetic trip elements in each pole.
2. Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
3. Two and three pole, common trip.
4. Automatically opens all poles when overcurrent occurs on one pole.
5. Test button on cover.
6. Calibrated for 40 degrees C ambient, unless shown otherwise.
7. Do not provide single-pole circuit breakers with handle ties where multi-pole circuit breakers are shown.

D. Short Circuit Interrupting Ratings:

1. Equal to, or greater than, available fault current or interrupting rating shown.
2. Series Connected Ratings: Do not apply series connected short circuit ratings.

E. Ground Fault Circuit Interrupter (GFCI): Where indicated, equip breaker as specified above with ground fault sensor and rated to trip on 5-mA ground fault within 0.025 second (UL 943, Class A sensitivity, for protection of personnel).

1. Ground fault sensor shall be rated same as circuit breaker.
2. Push-to-test button.

F. Magnetic Only Type Breakers: Where shown; instantaneous trip adjustment which simultaneously sets magnetic trip level of each individual pole continuously through a 3X to 10X trip range.

G. Accessories: Shunt trip, auxiliary switches, handle lock ON devices, mechanical interlocks, key interlocks, unit mounting bases, double lugs as shown or otherwise required. Shunt trip operators shall be continuous duty rated or have coil-clearing contacts.

H. Connections:

1. Supply (line side) at either end.
2. Mechanical wire lugs, except crimp compression lugs where shown.
3. Lugs removable/replaceable for breaker frames greater than 100 amperes.
4. Suitable for 75 degrees C rated conductors without derating breaker or conductor ampacity.

5. Use bolted bus connections, except where bolt-on is not compatible with existing breaker provisions.
- I. Enclosures for Independent Mounting:
 1. See Article Enclosures.
 2. Service Entrance Use: Breakers in required enclosure and required accessories shall be UL 489 listed.
 3. Interlock: Enclosure and switch shall interlock to prevent opening cover with switch in the ON position. Provide bypass feature for use by qualified personnel.

2.02 FUSED SWITCH, INDIVIDUAL, LOW VOLTAGE

- A. UL 98 listed for use and location of installation.
- B. NEMA KS 1.
- C. Short Circuit Rating: 200,000 amps rms symmetrical with Class R, Class J, or Class L fuses installed.
- D. Quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type with external markings clearly indicating ON/OFF positions.
- E. Connections:
 1. Mechanical lugs, except crimp compression lugs where shown.
 2. Lugs removable/replaceable.
 3. Suitable for 75 degrees C rated conductors at NEC 75 degrees C ampacity.
- F. Fuse Provisions:
 1. 30-amp to 600-amp rated shall incorporate rejection feature to reject all fuses except Class R.
 2. 601-amp rated and greater shall accept Class L fuses, unless otherwise shown.
- G. Enclosures: See Article Enclosures.
- H. Interlock: Enclosure and switch to prevent opening cover with switch in ON position. Provide bypass feature for use by qualified personnel.

2.03 NONFUSED SWITCH, INDIVIDUAL, LOW VOLTAGE

- A. NEMA KS 1.
- B. Quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type with external markings clearly indicating ON/OFF positions.
- C. Lugs: Suitable for use with 75 degrees C wire at NEC 75 degrees C ampacity.
- D. Auxiliary Contact:
 - 1. Operation: Make before power contacts make and break before power contacts break.
 - 2. Contact Rating: 7,200VA make, 720VA break, at 600V, NEMA ICS 5 Designation A600.
- E. Enclosures: See Article Enclosures.
- F. Interlock: Enclosure and switch to prevent opening cover with switch in ON position. Provide bypass feature for use by qualified personnel.

2.04 FUSE, 250-VOLT AND 600-VOLT

- A. Power Distribution, General:
 - 1. Current-limiting, with 200,000 ampere rms interrupting rating.
 - 2. Provide to fit mountings specified with switches.
 - 3. UL 248.
- B. Power Distribution, Ampere Ratings 1 Amp to 600 Amps:
 - 1. Class: RK-1.
 - 2. Type: Dual element, with time delay.
 - 3. Manufacturers and Products:
 - a. Bussmann; Types LPS-RK (600 volts) and LPN-RK (250 volts).
 - b. Littelfuse; Types LLS-RK (600 volts) and LLN-RK (250 volts).
 - c. Or approved equal.
- C. Power Distribution, Ampere Ratings 601 Amps to 6,000 Amps:
 - 1. Class: L.
 - 2. Double O-rings and silver links.
 - 3. Manufacturers and Products:
 - a. Bussmann; Type KRP-C.
 - b. Littelfuse, Inc.; Type KLPC.
 - c. Or approved equal.

D. Cable Limiters:

1. 600V or less; crimp to copper cable, bolt to bus or terminal pad.
2. Manufacturer and Product:
 - a. Bussmann; K Series.
 - b. Or approved equal.

E. Ferrule:

1. 600V or less, rated for applied voltage, small dimension.
2. Ampere Ratings: 1/10 amp to 30 amps.
3. Dual-element time-delay, time-delay, or nontime-delay as required.
4. Provide with blocks or holders as indicated and suitable for location and use.
5. Manufacturers:
 - a. Bussmann.
 - b. Littlefuse, Inc.
 - c. Or approved equal.

2.05 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

- A. Contact Rating: 7,200VA make, 720VA break, at 600V, NEMA ICS 5 Designation A600.
- B. Selector Switch Operating Lever: Standard.
- C. Indicating Light: LED, full voltage, push-to-test.
- D. Pushbutton Color:
 1. ON or START.
 2. OFF or STOP: Red.
- E. Pushbutton and selector switch lockable in OFF position where indicated.
- F. Legend Plate:
 1. Material: Aluminum.
 2. Engraving: Enamel filled in high contrasting color.
 3. Text Arrangement: 11-character/spaces on one line, 14-character/spaces on each of two lines, as required, indicating specific function.
 4. Letter Height: 7/64 inch.

- G. Manufacturers and Products:
 - 1. Heavy-Duty, Oil-Tight Type:
 - a. General Electric Co.; Type CR 104P.
 - b. Square D Co.; Type T.
 - c. Eaton/Cutler-Hammer; Type 10250T.
 - d. Or approved equal.
 - 2. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
 - a. Square D Co.; Type SK.
 - b. General Electric Co.; Type CR 104P.
 - c. Eaton/Cutler-Hammer; Type E34.
 - d. Crouse-Hinds; Type NCS.
 - e. Or approved equal.

2.06 TERMINAL BLOCK, 600 VOLTS

- A. UL 486E and UL 1059.
- B. Size components to allow insertion of necessary wire sizes.
- C. Capable of termination of control circuits entering or leaving equipment, panels, or boxes.
- D. Screw clamp compression, dead front barrier type, with current bar providing direct contact with wire between compression screw and yoke.
- E. Yoke, current bar, and clamping screw of high strength and high conductivity metal.
- F. Yoke shall guide all strands of wire into terminal.
- G. Current bar shall ensure vibration-proof connection.
- H. Terminals:
 - 1. Capable of wire connections without special preparation other than stripping.
 - 2. Capable of jumper installation with no loss of terminal or rail space.
 - 3. Individual, rail mounted.
- I. Marking system, allowing use of preprinted or field-marked tags.

- J. Manufacturers:
 - 1. Weidmuller, Inc.
 - 2. Ideal.
 - 3. Electrovert USA Corp.
 - 4. Or approved equal.

2.07 MAGNETIC CONTROL RELAY

- A. Industrial control with field convertible contacts rated 10 amps continuous, 7,200VA make, 720VA break.
- B. NEMA ICS 2, Designation: A600 (600 volts).
- C. Time Delay Relay Attachment:
 - 1. Pneumatic type, timer adjustable as shown.
 - 2. Field convertible from ON delay to OFF delay and vice versa.
- D. Latching Attachment: Mechanical latch, having unlatching coil and coil clearing contacts.
- E. Manufacturers and Products:
 - 1. Eaton/Cutler-Hammer; D26 Type M.
 - 2. General Electric Co.; Type CR120A.
 - 3. Square D; Type X.
 - 4. Or approved equal.

2.08 TIME DELAY RELAY

- A. Industrial relay with contacts rated 5 amps continuous, 3,600VA make, 360VA break.
- B. NEMA ICS 2 Designation: B150 (150 volts).
- C. Solid-state electronic, field convertible ON/OFF delay.
- D. One normally open and one normally closed contact (minimum).
- E. Repeat accuracy plus or minus 2 percent.
- F. Timer adjustment from 1 second to 60 seconds, unless otherwise indicated on Drawings.

G. Manufacturers and Products:

1. Square D Co.; Type XO.
2. Eaton/Cutler-Hammer; Type D26MR.
3. General Electric Co.; Type CR120.
4. Or approved equal.

2.09 RESET TIMER

A. Drive: Synchronous motor, solenoid-operated clutch.

B. Mounting: Semiflush panel.

C. Contacts: 10 amps, 120 volts.

D. Manufacturers and Products:

1. Eagle Signal Controls; Bulletin 125.
2. Automatic Timing and Controls; Bulletin 305.
3. Or approved equal.

2.10 ELAPSED TIME METER

A. Drive: Synchronous motor.

B. Range: 0 hour to 99,999.9 hours, nonreset type.

C. Mounting: Semiflush panel.

D. Manufacturers and Products:

1. General Electric Co.; Type 240, 2-1/2-inch Big Look.
2. Eagle Signal Controls; Bulletin 705.
3. Or approved equal.

2.11 MAGNETIC CONTACTOR

A. UL listed.

B. Electrically operated, electrically held.

- C. Main Contacts:
 - 1. Power driven in one direction with mechanical spring dropout.
 - 2. Silver alloy with wiping action and arc quenchers.
 - 3. Continuous-duty, rated as shown.
 - 4. Poles: As shown.
- D. Control: As shown.
- E. Auxiliary Contacts: Quantity as shown, rated 7200VA make, 720VA break, at 600V, A600 per NEMA ICS 5.
- F. Enclosures: See Article Enclosures.
- G. Manufacturers and Products:
 - 1. Eaton/Cutler-Hammer; Class A201.
 - 2. General Electric Co.; CR 353.
 - 3. Square D Co.; Class 8910.
 - 4. Or approved equal.

2.12 SUPPORT AND FRAMING CHANNELS

- A. Carbon Steel Framing Channel:
 - 1. Material: Rolled, mild strip steel, 12-gauge minimum, ASTM A1011/A1011M, Grade 33.
 - 2. Finish: Hot-dip galvanized after fabrication.
- B. PVC-Coated Framing Channel: Carbon steel framing channel with 40-mil polyvinyl chloride coating.
- C. Stainless Steel Framing Channel: Rolled, Type 316 stainless steel, 12-gauge minimum.
- D. Manufacturers:
 - 1. B-Line Systems, Inc.
 - 2. Unistrut Corp.
 - 3. Aickinstrut.
 - 4. Or approved equal.

2.13 INTRINSIC SAFETY BARRIER

- A. Provides a safe energy level for exposed wiring in a Class I, Division 1 or Division 2 hazardous area when circuit is connected to power source in nonhazardous area.
- B. Rating: Power source shall be rated 24V dc or 120V ac as shown on Drawings, with not more than 250 volts available under fault conditions.
- C. Contact Rating: 5 amps, 250V ac.
- D. Mounting: Rail or surface.
- E. Manufacturers and Products:
 - 1. MTL, Inc.; Series 2000 or Series 3000.
 - 2. R. Stahl, Inc.
 - 3. Or approved equal.

2.14 ENCLOSURES

- A. Finish: Sheet metal structural and enclosure parts shall be completely painted using an electrodeposition process so interior and exterior surfaces as well as bolted structural joints have a complete finish coat on and between them.
- B. Color: Manufacturer's standard color (gray) baked-on enamel, unless otherwise shown.
- C. Barriers: Provide metal barriers within enclosures to separate wiring of different systems and voltage.
- D. Enclosure Selections: Except as shown otherwise, provide electrical enclosures according to the Area Classification and Material Selection Table on Drawings.

PART 3 EXECUTION

3.01 GENERAL

- A. Install equipment in accordance with manufacturer's recommendations.

3.02 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

- A. Install heavy-duty, oil-tight type in nonhazardous, indoor, dry locations, including motor control centers, control panels, and individual stations, unless otherwise shown.

- B. Install heavy-duty, watertight and corrosion-resistant type in nonhazardous, outdoor, or normally wet areas, unless otherwise shown.

3.03 SUPPORT AND FRAMING CHANNEL

- A. Install where required for mounting and supporting electrical equipment, raceway, and cable tray systems.
- B. Channel type shall be as indicated in the Area Classification and Material Selection Table on Drawings.
- C. Paint cut ends prior to installation with the following:
 - 1. Carbon Steel Channel: Zinc-rich primer.
 - 2. Painted Channel: Rust-inhibiting epoxy or acrylic paint.
 - 3. Nonmetallic Channel: Epoxy resin sealer.
 - 4. PVC-Coated Channel: PVC patch.

3.04 INTRINSIC SAFETY BARRIERS

- A. Install in compliance with ISA RP12.06.01.
- B. Arrange conductors such that wiring from hazardous areas cannot short to wiring from nonhazardous area.
- C. Stencil “INTRINSICALLY SAFE CIRCUIT” on all boxes enclosing barriers.

END OF SECTION

**SECTION 26 05 05
CONDUCTORS**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - b. B3, Standard Specification for Soft or Annealed Copper Wire.
 - c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - d. B496, Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors.
 2. Insulated Cable Engineer's Association, Inc. (ICEA):
 - a. S-58-679, Standard for Control Cable Conductor Identification.
 - b. S-73-532, Standard for Control Thermocouple Extensions and Instrumentation Cables.
 - c. T-29-520, Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input of 210,000 Btu/hour.
 3. National Electrical Manufacturers' Association (NEMA):
 - a. CC 1, Electric Power Connectors for Substations.
 - b. WC 57, Standard for Control, Thermocouple Extension, and Instrumentation Cables.
 - c. WC 70, Standard for Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
 5. Telecommunications Industry Association (TIA): TIA-568-C, Commercial Building Telecommunications Cabling Standard.
 6. UL:
 - a. 44, Standard for Safety for Thermoset-Insulated Wires and Cables.
 - b. 62, Standard for Safety for Flexible Cord and Cables.
 - c. 486A-486B, Standard for Safety for Wire Connectors.
 - d. 486C, Standard for Safety for Splicing Wire Connectors.
 - e. 510, Standard for Safety for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

- f. 1277, Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
- g. 1581, Standard for Safety for Reference Standard for Electrical Wires, Cables, and Flexible Cords.

1.02 SUBMITTALS

A. Action Submittals:

- 1. Product Data:
 - a. Wire and cable.
 - b. Wire and cable accessories.

1.03 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

- 1. Provide the Work in accordance with NFPA 70. Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
- 2. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.

PART 2 PRODUCTS

2.01 CONDUCTORS 600 VOLTS AND BELOW

- A. Conform to applicable requirements of NEMA WC 70.
- B. Conductor Type:
 - 1. 120-Volt and 277-Volt Lighting, 10 AWG and Smaller: Solid copper.
 - 2. 120-Volt Receptacle Circuits, 10 AWG and Smaller: Solid copper.
 - 3. All Other Circuits: Stranded copper.
- C. Insulation: Type THHN/THWN-2, except for sizes No. 6 and larger, with XHHW-2 insulation.
- D. Direct Burial and Aerial Conductors and Cables:
 - 1. Type USE/RHH/RHW insulation, UL 854 listed, or Type RHW-2/USE-2.
 - 2. Conform to physical and minimum thickness requirements of NEMA WC 70.

E. Flexible Cords and Cables:

1. Type SOW-A/50 with ethylene propylene rubber insulation in accordance with UL 62.
2. Conform to physical and minimum thickness requirements of NEMA WC 70.

2.02 600-VOLT RATED CABLE

A. General:

1. Type TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 70,000 Btu per hour, and NFPA 70, Article 340, or UL 13 meeting requirements of NFPA 70, Article 725.
2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.
3. Suitable for installation in open air, in cable trays, or conduit.
4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.
5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.

B. Type 1, Multiconductor Control Cable:

1. Conductors:
 - a. 14 AWG, seven-strand copper.
 - b. Insulation: 15-mil PVC with 4-mil nylon.
 - c. UL 1581 listed as Type THHN/THWN rated VW-1.
 - d. Conductor group bound with spiral wrap of barrier tape.
 - e. Color Code: In accordance with ICEA S-58-679, Method 1, Table 2.
2. Cable: Passes the ICEA T-29-520, 210,000 Btu per hour Vertical Tray Flame Test.
3. Manufacturers:
 - a. Okonite Co.
 - b. Southwire.
 - c. Or approved equal.

C. Type 2, Multiconductor Power Cable:

1. General:
 - a. Meet or exceed UL 1581 for cable tray use.
 - b. Meet or exceed UL 1277 for direct burial and sunlight-resistance.
 - c. Overall Jacket: PVC.

2. Conductors:
 - a. Class B stranded, coated copper.
 - b. Insulation: Chemically cross-linked ethylene-propylene or cross-linked polyethylene.
 - c. UL rated VW-1 or listed Type XHHW-2.
 - d. Color Code:
 - 1) Conductors, size 8 AWG and smaller, colored conductors, ICEA S-58-679, Method 1, Table 1.
 - 2) Conductors, size 6 AWG and larger, ICEA S-73-532, Method 4.
 3. Cable shall pass ICEA T-29-520, 210,000 Btu per hour Vertical Tray Flame Test.
 4. Manufacturers:
 - a. Okonite Co.
 - b. Southwire.
 - c. Or approved equal.
- D. Type 3, 16 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 57 requirements.
1. Outer Jacket: 45-mil nominal thickness.
 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.
 3. Dimension: 0.31-inch nominal OD.
 4. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
 - b. 20 AWG, seven-strand tinned copper drain wire.
 - c. Insulation: 15-mil nominal PVC.
 - d. Jacket: 4-mil nominal nylon.
 - e. Color Code: Pair conductors, black and red.
 5. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.
 - c. Belden.
 - d. Or approved equal.
- E. Type 4, 16 AWG, Twisted, Shielded Triad Instrumentation Cable: Single triad, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 57 requirements.
1. Outer Jacket: 45-mil nominal.
 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer, overlapped to provide 100 percent coverage.

3. Dimension: 0.32-inch nominal OD.
 4. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
 - b. 20 AWG, seven-strand, tinned copper drain wire.
 - c. Insulation: 15-mil nominal PVC.
 - d. Jacket: 4-mil nylon.
 - e. Color Code: Triad conductors black, red, and blue.
 5. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.
 - c. Belden.
 - d. Or approved equal.
- F. Type 5, 18 AWG, Multitwisted Shielded Pairs, with a Common Overall Shield, Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable, meeting NEMA WC 57 requirements.
1. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8.
 - b. Tinned copper drain wires.
 - c. Pair drain wire size AWG 20, group drain wire size AWG 18.
 - d. Insulation: 15-mil PVC.
 - e. Jacket: 4-mil nylon.
 - f. Color Code: Pair conductors, black and red with red conductor numerically printed for group identification.
 - g. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer.
 2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.
 3. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.
 - c. Belden.
 - d. Or approved equal.
- G. Type 6, 18 AWG, Multitwisted Pairs with Common Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable meeting NEMA WC 57.
1. Conductors:
 - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8.
 - b. Tinned copper drain wire size AWG 18.

- c. Insulation: 15-mil nominal PVC.
- d. Jacket: 4-mil nylon.
- e. Color Code: Pair conductors, black and red with red conductor numerically printed for group identification.
2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.
3. Manufacturers:
 - a. Okonite Co.
 - b. Alpha Wire Corp.
 - c. Belden.
 - d. Or approved equal.

2.03 SPECIAL CABLES

- A. Type 30, Unshielded Twisted Pair (UTP) Telephone and Data Cable, 600V:
 1. Category 6 UTP, UL listed, and third party verified to comply with TIA/EIA 568-C Category 6 requirements.
 2. Suitable for high speed network applications including gigabit Ethernet and video. Cable shall be interoperable with other standards compliant products and shall be backward compatible with Category 5 and Category 5e.
 3. Provide four each individually twisted pair, 23 AWG conductors, with FEP insulation and blue PVC jacket.
 4. NFPA 70 Plenum (CMP) rated; comply with flammability plenum requirements of NFPA 70 and NFPA 262.
 5. Cable shall withstand a bend radius of 2.5-inch minimum at a temperature of minus 20 degrees C maximum without jacket or insulation cracking.
 6. Manufacturer and Product:
 - a. Belden; 7927A.
 - b. Or approved equal.

2.04 GROUNDING CONDUCTORS

- A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation.
- B. Direct Buried: Bare stranded copper.

2.05 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

A. Tape:

1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, Scotch Brand 33+, rated for 90 degrees C minimum, meeting requirements of UL 510.
2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.
3. Arc and Fireproofing:
 - a. 30-mil, elastomer.
 - b. Manufacturers and Products:
 - 1) 3M; Scotch Brand 77, with Scotch Brand 69 glass cloth tapebinder.
 - 2) Plymouth; 53 Plyarc, with 77 Plyglas glass cloth tapebinder.
 - 3) Or approved equal.

B. Identification Devices:

1. Sleeve:
 - a. Permanent, PVC, yellow or white, with legible machine-printed black markings.
 - b. Manufacturers and Products:
 - 1) Raychem; Type D-SCE or ZH-SCE.
 - 2) Brady; Type 3PS.
 - 3) Or approved equal.
2. Heat Bond Marker:
 - a. Transparent thermoplastic heat bonding film with acrylic pressure sensitive adhesive.
 - b. Self-laminating protective shield over text.
 - c. Machine printed black text.
 - d. Manufacturer and Product:
 - 1) 3M Co.; Type SCS-HB.
 - 2) Or approved equal.
3. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.
4. Tie-On Cable Marker Tags:
 - a. Chemical-resistant white tag.
 - b. Size: 1/2 inch by 2 inches.
 - c. Manufacturer and Product:
 - 1) Raychem; Type CM-SCE.
 - 2) Or approved equal.
5. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.

C. Connectors and Terminations:

1. Nylon, Self-Insulated Crimp Connectors:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Sta-Kon.
 - 2) Burndy; Insulug.
 - 3) ILSCO.
 - 4) Or approved equal.
2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
 - a. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
 - b. Seamless.
 - c. Manufacturers and Products:
 - 1) Thomas & Betts; Sta-Kon.
 - 2) Burndy; Insulink.
 - 3) ILSCO; ILSCONS.
 - 4) Or approved equal.
3. Self-Insulated, Freespring Wire Connector (Wire Nuts):
 - a. UL 486C.
 - b. Plated steel, square wire springs.
 - c. Manufacturers and Products:
 - 1) Thomas & Betts.
 - 2) Ideal; Twister.
 - 3) Or approved equal.
4. Self-Insulated, Set Screw Wire Connector:
 - a. Two-piece compression type with set screw in brass barrel.
 - b. Insulated by insulator cap screwed over brass barrel.
 - c. Manufacturers:
 - 1) 3M Co.
 - 2) Thomas & Betts.
 - 3) Marrette.
 - 4) Or approved equal.

D. Cable Lugs:

1. In accordance with NEMA CC 1.
2. Rated 600 volts of same material as conductor metal.
3. Uninsulated Crimp Connectors and Terminators:
 - a. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
 - b. Manufacturers and Products:
 - 1) Thomas & Betts; Color-Keyed.
 - 2) Burndy; Hydent.

- 3) ILSCO.
- 4) Or approved equal.
4. Uninsulated, Bolted, Two-Way Connectors and Terminators:
 - a. Manufacturers and Products:
 - 1) Thomas & Betts; Locktite.
 - 2) Burndy; Quiklug.
 - 3) ILSCO.
 - 4) Or approved equal.
- E. Cable Ties:
 1. Nylon, adjustable, self-locking, and reusable.
 2. Manufacturer and Product:
 - a. Thomas & Betts; TY-RAP.
 - b. Or approved equal.
- F. Heat Shrinkable Insulation:
 1. Thermally stabilized cross-linked polyolefin.
 2. Single wall for insulation and strain relief.
 3. Dual wall, adhesive sealant lined, for sealing and corrosion resistance.
 4. Manufacturers and Products:
 - a. Thomas & Betts; SHRINK-KON.
 - b. Raychem; RNF-100 and ES-2000.
 - c. Or approved equal.

2.06 PULLING COMPOUND

- A. Nontoxic, noncorrosive, noncombustible, nonflammable, water-based lubricant; UL listed.
- B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.
- C. Approved for intended use by cable manufacturer.
- D. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.
- E. Manufacturers:
 1. Ideal Co.
 2. Polywater, Inc.
 3. Cable Grip Co.
 4. Or approved equal.

2.07 WARNING TAPE

- A. As specified in Section 26 05 33, Raceway and Boxes.

2.08 SOURCE QUALITY CONTROL

- A. Conductors 600 Volts and Below: Test in accordance with UL 44 and UL 854.

PART 3 EXECUTION

3.01 GENERAL

- A. Conductor installation shall be in accordance with manufacturer's recommendations.
- B. Conductor and cable sizing shown is based on copper.
- C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.
- D. Terminate conductors and cables, unless otherwise indicated.
- E. Tighten screws and terminal bolts in accordance with UL 486A-486B.
- F. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.
- G. Bundling: Where single conductors and cables in manholes, handholes, vaults, cable trays, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 12 inches on center.
- H. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.
- I. Concrete-Encased Raceway Installation: Prior to installation of conductors, pull through each raceway a mandrel approximately 1/4 inch smaller than raceway inside diameter.
- J. Cable Tray Installation:
 - 1. Install wire and cable parallel and straight in tray.
 - 2. Bundle, in groups, wire and cable of same voltage having a common routing and destination; use cable ties, at maximum intervals of 8 feet.
 - 3. Clamp cable bundles prior to making end termination connections.

4. Separate cables of different voltage rating in same cable tray with barriers.
5. Fasten wires, cables, and bundles to tray with nylon cable straps at the following maximum intervals:
 - a. Horizontal Runs: 20 feet.
 - b. Vertical Runs: 5 feet.

3.02 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below:

1. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering area 1-1/2 inches to 2 inches wide.
2. 8 AWG and Smaller: Provide colored conductors.
3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts, Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts, Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue
480Y/277 Volts, Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Brown Orange Yellow
Note: Phase A, B, C implies direction of positive phase rotation.		

4. Tracer: Outer covering of white with identifiable colored strip, other than green, in accordance with NFPA 70.

3.03 CIRCUIT IDENTIFICATION

- A. Identify power, instrumentation, and control conductor circuits at each termination, and in accessible locations such as manholes, handholes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.

- B. Circuits Appearing in Circuit Schedules: Identify using circuit schedule designations.
- C. Circuits Not Appearing in Circuit Schedules:
 - 1. Assign circuit name based on device or equipment at load end of circuit.
 - 2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.
- D. Method:
 - 1. Conductors 3 AWG and Smaller: Identify with sleeves or heat bond markers.
 - 2. Cables and Conductors 2 AWG and Larger:
 - a. Identify with marker plates or tie-on cable marker tags.
 - b. Attach with nylon tie cord.
 - 3. Taped-on markers or tags relying on adhesives not permitted.

3.04 CONDUCTORS 600 VOLTS AND BELOW

- A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.
- B. Do not splice incoming service conductors and branch power distribution conductors 6 AWG and larger, unless specifically indicated or approved by Design Engineer.
- C. Connections and Terminations:
 - 1. Install wire nuts only on solid conductors. Wire nuts are not allowed on stranded conductors.
 - 2. Install nylon self-insulated crimp connectors and terminators for instrumentation and control, circuit conductors.
 - 3. Install self-insulated, set screw wire connectors for two-way connection of power circuit conductors 12 AWG and smaller.
 - 4. Install uninsulated crimp connectors and terminators for instrumentation, control, and power circuit conductors 4 AWG through 2/0 AWG.
 - 5. Install uninsulated, bolted, two-way connectors and terminators for power circuit conductors 3/0 AWG and larger.
 - 6. Install uninsulated terminators bolted together on motor circuit conductors 10 AWG and larger.
 - 7. Place no more than one conductor in any single-barrel pressure connection.

8. Install crimp connectors with tools approved by connector manufacturer.
 9. Install terminals and connectors acceptable for type of material used.
 10. Compression Lugs:
 - a. Attach with a tool specifically designed for purpose. Tool shall provide complete, controlled crimp and shall not release until crimp is complete.
 - b. Do not use plier type crimpers.
- D. Do not use soldered mechanical joints.
- E. Splices and Terminations:
1. Insulate uninsulated connections.
 2. Indoors: Use general purpose, flame retardant tape or single wall heat shrink.
 3. Outdoors, Dry Locations: Use flame retardant, cold- and weather-resistant tape or single wall heat shrink.
 4. Belowgrade and Wet or Damp Locations: Use dual wall heat shrink.
- F. Cap spare conductors with UL listed end caps.
- G. Cabinets, Panels, and Motor Control Centers:
1. Remove surplus wire, bridle and secure.
 2. Where conductors pass through openings or over edges in sheet metal, remove burrs, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.
- H. Control and Instrumentation Wiring:
1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.
 2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.
 3. Locate splices in readily accessible cabinets or junction boxes using terminal strips.
 4. Where connections of cables installed under this section are to be made under Section 40 90 00, Instrumentation and Control, leave pigtailed of adequate length for bundled connections.

5. Cable Protection:
 - a. Under Infinite Access Floors: May install without bundling.
 - b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under floor or grouped into bundles at least 1/2 inch in diameter.
 - c. Maintain integrity of shielding of instrumentation cables.
 - d. Ensure grounds do not occur because of damage to jacket over shield.

- I. Extra Conductor Length: For conductors to be connected by others, install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C2, National Electrical Safety Code (NESC).
 - b. 3003.2, Recommended Practice for Equipment Grounding and Bonding in Industrial and Commercial Power Systems.
2. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC).

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Product data for the following:
 - 1) Exothermic weld connectors.
 - 2) Mechanical connectors.
 - 3) Compression connectors.

1.03 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
2. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.

PART 2 PRODUCTS

2.01 GROUND ROD

A. Material: Copper-clad.

B. Diameter: Minimum 5/8 inch.

C. Length: 8 feet.

2.02 GROUND CONDUCTORS

A. As specified in Section 26 05 05, Conductors.

2.03 CONNECTORS

A. Exothermic Weld Type:

1. Outdoor Weld: Suitable for exposure to elements or direct burial.
2. Indoor Weld: Utilize low-smoke, low-emission process.
3. Manufacturers and Products:
 - a. Erico Products, Inc.; Cadweld and Cadweld Exolon.
 - b. Thermoweld.
 - c. Or approved equal.

B. Compression Type:

1. Compress-deforming type; wrought copper extrusion material.
2. Single indentation for conductors 6 AWG and smaller.
3. Double indentation with extended barrel for conductors 4 AWG and larger.
4. Barrels prefilled with oxide-inhibiting and antiseizing compound and sealed.
5. Manufacturers and Products:
 - a. Burndy Corp.; Hyground Irreversible Compression.
 - b. Thomas and Betts Co.
 - c. ILSCO.
 - d. Or approved equal.

C. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.

1. Manufacturers:
 - a. Burndy Corp.
 - b. Thomas and Betts Co.
 - c. Or approved equal.

2.04 GROUNDING WELLS

A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.

B. Manufacturers and Products:

1. Christy Co.; No. G5.
2. Lightning and Grounding Systems, Inc.; I-R Series.
3. Or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Grounding shall be in compliance with NFPA 70 and IEEE C2.
- B. Ground electrical service neutral at service entrance equipment with grounding electrode conductor to grounding electrode system.
- C. Ground each separately derived system neutral with common grounding electrode conductor to grounding electrode system.
- D. Bond together all grounding electrodes that are present at each building or structure served to form one common grounding electrode system.
- E. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.
- F. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.
- G. Shielded Instrumentation Cables:
 1. Ground shield to ground bus at power supply for analog signal.
 2. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.
 3. Do not ground instrumentation cable shield at more than one point.

3.02 WIRE CONNECTIONS

- A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.
- B. Nonmetallic Raceways and Flexible Tubing: Install equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.
- C. Connect ground conductors to raceway grounding bushings.

- D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.
- E. Connect enclosure of equipment containing ground bus to that bus.
- F. Bolt connections to equipment ground bus.
- G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.
- H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.
- I. Metallic Equipment Enclosures: Use furnished ground lug; if none furnished, tap equipment housing and install solderless terminal connected to box with machine screw. For circuits greater than 20 amps, use minimum 5/16-inch diameter bolt.

3.03 MOTOR GROUNDING

- A. Extend equipment ground bus via grounding conductor installed in motor feeder raceway; connect to motor frame.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.
- C. Motors Less than 10 hp: Use furnished ground lug in motor connection box; if none furnished, provide compression, spade-type terminal connected to conduit box mounting screw.
- D. Motors 10 hp and Above: Use furnished ground lug in motor connection box; if none furnished, tap motor frame or equipment housing; furnish compression, one-hole, lug type terminal connected with minimum 5/16-inch brass threaded stud with bolt and washer.
- E. Circuits 20 Amps or Above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.

3.04 GROUND RODS

- A. Install full length with conductor connection at upper end.
- B. Install with connection point below finished grade, unless otherwise shown.
- C. Space multiple ground rods by one rod length.

- D. Install to 8 feet below local frost depth.

3.05 GROUNDING WELLS

- A. Install for ground rods located inside buildings, asphalt and paved areas, and where shown on Drawings.
- B. Install riser ring and cover flush with surface.
- C. Place 6 inches of crushed rock in bottom of each well.

3.06 CONNECTIONS

A. General:

1. Abovegrade Connections: Install exothermic weld, mechanical, or compression-type connectors; or brazing.
2. Belowgrade Connections: Install exothermic weld or compression type connectors.
3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
4. Notify Owner prior to backfilling ground connections.

B. Exothermic Weld Type:

1. Wire brush or file contact point to bare metal surface.
2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
3. Avoid using badly worn molds.
4. Mold to be completely filled with metal when making welds.
5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

C. Compression Type:

1. Install in accordance with connector manufacturer's recommendations.
2. Install connectors of proper size for grounding conductors and ground rods specified.
3. Install using connector manufacturer's compression tool having proper sized dies and operate per manufacturer's instructions.

D. Mechanical Type:

1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
2. Install in accordance with connector manufacturer's recommendations.
3. Do not conceal mechanical connections.

3.07 METAL STRUCTURE GROUNDING

- A. Bond metal sheathing and exposed metal vertical structural elements to grounding system.
- B. Bond electrical equipment supported by metal platforms to the platforms.
- C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.08 MANHOLE AND HANDHOLE GROUNDING

- A. Install one ground rod inside each manhole and handhole larger than 24-inch by 24-inch inside dimensions.
- B. Ground Rod Floor Protrusion: 4 inches to 6 inches above floor.
- C. Make connections of grounding conductors fully visible and accessible.
- D. Connect all noncurrent-carrying metal parts, and any metallic raceway grounding bushings to ground rod with 6 AWG copper conductor.

3.09 TRANSFORMER GROUNDING

- A. Bond neutrals of transformers within buildings to system ground network, and to any additional indicated grounding electrodes.
- B. Bond neutrals of substation transformers to substation grounding grid and system grounding network.
- C. Bond neutrals of pad-mounted transformers to four locally driven ground rods and buried ground wire encircling transformer and system ground network.

3.10 SURGE PROTECTION EQUIPMENT GROUNDING

- A. Connect surge arrestor ground terminals to equipment ground bus.

END OF SECTION

**SECTION 26 05 33
RACEWAY AND BOXES**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): HB, Standard Specifications for Highway Bridges.
 2. ASTM International (ASTM):
 - a. A123/123M, Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 - b. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - c. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - d. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
 - e. D149, Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 3. National Electrical Contractor's Association, Inc. (NECA): Installation standards.
 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. C80.1, Electrical Rigid Steel Conduit (ERSC).
 - c. C80.5, Electrical Rigid Aluminum Conduit (ERAC).
 - d. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - e. TC 2, Electrical Polyvinyl Chloride (PVC) Conduit.
 - f. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - g. TC 6, Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation.
 - h. TC 14, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - i. VE 1, Metallic Cable Tray Systems.
 5. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 6. Telecommunications Industry Association (TIA): 569B, Commercial Building Standard for Telecommunications Pathways and Spaces.

7. UL:
 - a. 1, Standard for Safety for Flexible Metal Conduit.
 - b. 5, Standard for Safety for Surface Metal Raceways and Fittings.
 - c. 6, Standard for Safety for Electrical Rigid Metal Conduit – Steel.
 - d. 6A, Standard for Safety for Electrical Rigid Metal Conduit – Aluminum, Red Brass and Stainless.
 - e. 360, Standard for Safety for Liquid-Tight Flexible Steel Conduit.
 - f. 514B, Standard for Safety for Conduit, Tubing, and Cable Fittings.
 - g. 651, Standard for Safety for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - h. 651A, Standard for Safety for Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - i. 870, Standard for Safety for Wireways, Auxiliary Gutters, and Associated Fittings.
 - j. 1660, Standard for Safety for Liquid-Tight Flexible Nonmetallic Conduit.
 - k. 1684, Standard for Safety for Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - l. 2024, Standard for Safety for Optical Fiber and Communication Cable Raceway.

1.02 SUBMITTALS

A. Action Submittals:

1. Manufacturer's Literature:
 - a. Conduit and conduit fittings.
 - b. Wireways.
 - c. Junction boxes.
 - d. Terminal junction boxes.
2. Precast Manholes and Handholes:
 - a. Dimensional drawings and descriptive literature.
 - b. Traffic loading calculations.
 - c. Accessory information.
3. Cable Tray Systems:
 - a. Dimensional drawings, calculations, and descriptive information.
 - b. NEMA load/span designation and how it was selected.
 - c. Support span length and pounds-per-foot actual and future cable loading at locations, with safety factor used.
 - d. Location and magnitude of maximum simple beam deflection of tray for loading specified.
 - e. Layout drawings and list of accessories being provided.
4. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

5. Conduit Layout:
 - a. Provide Drawings for underground and concealed conduits including, but not limited to, ductbanks, under floor slabs, concealed in floor slabs, and concealed in walls.
 - b. Provide plan and section showing arrangement and location of conduit and duct bank required for:
 - 1) Low and medium voltage feeder and branch circuits.
 - 2) Instrumentation and control systems.
 - 3) Communications systems.
 - 4) Empty conduit for future use.
 - c. Electronic CAD; scale not greater than 1 inch equals 20 feet.
- B. Informational Submittals:
 1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
 2. Manufacturer's certification of training for PVC-coated rigid galvanized steel conduit installer.

1.03 QUALITY ASSURANCE

- A. Authority Having Jurisdiction (AHJ):
 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 2. Materials and equipment manufactured within scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.
- B. PVC-Coated, Rigid Galvanized Steel Conduit Installer: Certified by conduit manufacturer as having received minimum 2 hours of training on installation procedures.

PART 2 PRODUCTS

2.01 CONDUIT AND TUBING

- A. Rigid Galvanized Steel Conduit (RGS):
 1. Meet requirements of NEMA C80.1 and UL 6.
 2. Material: Hot-dip galvanized with chromated protective layer.

- B. PVC Schedule 40 Conduit:
1. Meet requirements of NEMA TC 2 and UL 651.
 2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors.
- C. PVC Schedule 80 Conduit:
1. Meet requirements of NEMA TC 2 and UL 651.
 2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors.
- D. PVC-Coated Rigid Galvanized Steel Conduit:
1. Meet requirements of NEMA RN 1.
 2. Material:
 - a. Meet requirements of NEMA C80.1 and UL 6.
 - b. Exterior Finish: PVC coating, 40-mil nominal thickness; bond to metal shall have tensile strength greater than PVC.
 - c. Interior Finish: Urethane coating, 2-mil nominal thickness.
 3. Threads: Hot-dipped galvanized and factory coated with urethane.
 4. Bendable without damage to interior or exterior coating.
- E. Flexible Metal, Liquid-Tight Conduit:
1. UL 360 listed for 105 degrees C insulated conductors.
 2. Material: Galvanized steel with extruded PVC jacket.
- F. Flexible, Nonmetallic, Liquid-Tight Conduit:
1. Material: PVC core with fused flexible PVC jacket.
 2. UL 1660 listed for:
 - a. Dry Conditions: 80 degrees C insulated conductors.
 - b. Wet Conditions: 60 degrees C insulated conductors.
 3. Manufacturers and Products:
 - a. Carlon; Carflex or X-Flex.
 - b. T & B; Xtraflex LTC or EFC.
 - c. Or approved equal.

2.02 FITTINGS

- A. Rigid Galvanized Steel:
1. General:
 - a. Meet requirements of UL 514B.

- b. Type: Threaded, galvanized. Set screw and threadless compression fittings not permitted.
- 2. Bushing:
 - a. Material: Malleable iron with integral insulated throat, rated for 150 degrees C.
 - b. Manufacturers and Products:
 - 1) Appleton; Series BU-I.
 - 2) O-Z/Gedney; Type HB.
 - 3) Or approved equal.
- 3. Grounding Bushing:
 - a. Material: Malleable iron with integral insulated throat rated for 150 degrees C, with solderless lugs.
 - b. Manufacturers and Products:
 - 1) Appleton; Series GIB.
 - 2) O-Z/Gedney; Type HBLG.
 - 3) Or approved equal.
- 4. Conduit Hub:
 - a. Material: Malleable iron with insulated throat with bonding screw.
 - b. UL listed for use in wet locations.
 - c. Manufacturers and Products:
 - 1) Appleton, Series HUB-B.
 - 2) O-Z/Gedney; Series CH.
 - 3) Meyers; ST Series.
 - 4) Or approved equal.
- 5. Conduit Bodies:
 - a. Sized as required by NFPA 70.
 - b. Manufacturers and Products (For Normal Conditions):
 - 1) Appleton; Form 35 threaded unilets.
 - 2) Crouse-Hinds; Form 7 or Form 8 threaded condulets.
 - 3) Killark; Series O electrolets.
 - 4) Thomas & Betts; Form 7 or Form 8.
 - 5) Or approved equal.
 - c. Manufacturers (For Hazardous Locations):
 - 1) Appleton.
 - 2) Crouse-Hinds.
 - 3) Killark.
 - 4) Or approved equal.
- 6. Couplings: As supplied by conduit manufacturer.
- 7. Unions:
 - a. Concrete tight, hot-dip galvanized malleable iron.
 - b. Manufacturers and Products:
 - 1) Appleton; Series SCC bolt-on coupling or Series EC three-piece union.

- 2) O-Z/Gedney; Type SSP split coupling or Type 4 Series, three-piece coupling.
 - 3) Or approved equal.
 8. Conduit Sealing Fitting:
 - a. Manufacturers and Products:
 - 1) Appleton; Type EYF, EYM, or ESU.
 - 2) Crouse-Hinds; Type EYS or EZS.
 - 3) Killark; Type EY or Type EYS.
 - 4) Or approved equal.
 9. Drain Seal:
 - a. Manufacturers and Products:
 - 1) Appleton; Type EYD.
 - 2) Crouse-Hinds; Type EYD or Type EZD.
 - 3) Or approved equal.
 10. Drain/Breather Fitting:
 - a. Manufacturers and Products:
 - 1) Appleton; Type ECDB.
 - 2) Crouse-Hinds; ECD.
 - 3) Or approved equal.
 11. Expansion Fitting:
 - a. Manufacturers and Products:
 - 1) Deflection/Expansion Movement:
 - a) Appleton; Type DF.
 - b) Crouse-Hinds; Type XD.
 - c) Or approved equal.
 - 2) Expansion Movement Only:
 - a) Appleton; Type XJ.
 - b) Crouse-Hinds; Type XJ.
 - c) Thomas & Betts; XJG-TP.
 - d) Or approved equal.
 12. Cable Sealing Fitting:
 - a. To form watertight nonslip cord or cable connection to conduit.
 - b. For Conductors with OD of 1/2-Inch or Less: Neoprene bushing at connector entry.
 - c. Manufacturers and Products:
 - 1) Appleton; CG-S.
 - 2) Crouse-Hinds; CGBS.
 - 3) Or approved equal.

B. PVC Conduit and Tubing:

 1. Meet requirements of NEMA TC 3.
 2. Type: PVC, slip-on.

C. PVC-Coated Rigid Galvanized Steel Conduit:

1. Meet requirements of UL 514B.
2. Fittings: Rigid galvanized steel type, PVC coated by conduit manufacturer.
3. Conduit Bodies: Cast metal hot-dipped galvanized or urethane finish. Cover shall be of same material as conduit body. PVC coated by conduit manufacturer.
4. Finish: 40-mil PVC exterior, 2-mil urethane interior.
5. Overlapping pressure-sealing sleeves.
6. Conduit Hangers, Attachments, and Accessories: PVC-coated.
7. Manufacturers:
 - a. Robroy Industries.
 - b. Ocal.
 - c. Or approved equal.
8. Expansion Fitting:
 - a. Manufacturer and Product:
 - 1) Ocal; OCAL-BLUE XJG.
 - 2) Or approved equal.

D. Flexible, Nonmetallic, Liquid-Tight Conduit:

1. Meet requirements of UL 514B.
2. Type: High strength plastic body, complete with lock nut, O-ring, threaded ferrule, sealing ring, and compression nut.
3. Body/compression nut (gland) design to ensure high mechanical pullout strength and watertight seal.
4. Manufacturers and Products:
 - a. Carlon; Type LT.
 - b. O-Z/Gedney; Type 4Q-P.
 - c. Thomas & Betts; Series 6300.
 - d. Or approved equal.

E. Flexible Coupling, Hazardous Locations:

1. Approved for use in atmosphere involved.
2. Rating: Watertight and UL listed for use in Class I, Division 1 and Division 2 areas.
3. Outer bronze braid and an insulating liner.
4. Conductivity equal to a similar length of rigid metal conduit.
5. Manufacturers and Products:
 - a. Crouse-Hinds; Type ECGJH or Type ECLK.
 - b. Appleton; EXGJH or EXLK.
 - c. Or approved equal.

2.03 OUTLET AND DEVICE BOXES

- A. Sheet Steel: One-piece drawn type, zinc-plated or cadmium-plated.
- B. Cast Metal:
 - 1. Box: Malleable iron or cast ferrous metal.
 - 2. Cover: Gasketed, weatherproof, malleable iron, or cast ferrous metal, with stainless steel screws.
 - 3. Hubs: Threaded.
 - 4. Lugs: Cast mounting.
 - 5. Manufacturers and Products, Nonhazardous Locations:
 - a. Crouse-Hinds; Type FS or Type FD.
 - b. Appleton; Type FS or Type FD.
 - c. Killark.
 - d. Or approved equal.
 - 6. Manufacturers and Products, Hazardous Locations:
 - a. Crouse-Hinds; Type GUA or Type EAJ.
 - b. Appleton; Type GR.
 - c. Or approved equal.
- C. Cast Aluminum:
 - 1. Material:
 - a. Box: Cast, copper-free aluminum.
 - b. Cover: Gasketed, weatherproof, cast copper-free aluminum with stainless steel screws.
 - 2. Hubs: Threaded.
 - 3. Lugs: Cast mounting.
 - 4. Manufacturers and Products, Nonhazardous Locations:
 - a. Crouse-Hinds; Type FS-SA or Type FD-SA.
 - b. Appleton; Type FS or Type FD.
 - c. Killark.
 - d. Or approved equal.
 - 5. Manufacturers and Products, Hazardous Locations:
 - a. Crouse-Hinds; Type GUA-SA.
 - b. Appleton; Type GR.
 - c. Or approved equal.
- D. PVC-Coated Cast Metal:
 - 1. Type: One-piece.
 - 2. Material: Malleable iron, cast ferrous metal, or cast aluminum.
 - 3. Coating:
 - a. Exterior Surfaces: 40-mil PVC.
 - b. Interior Surfaces: 2-mil urethane.

4. Manufacturers:
 - a. Robroy Industries.
 - b. Ocal.
 - c. Or approved equal.

2.04 JUNCTION AND PULL BOXES

- A. Outlet Box Used as Junction or Pull Box: As specified under Article Outlet and Device Boxes.
- B. Conduit Bodies Used as Junction Boxes: As specified under Article Fittings.
- C. Cast Metal Box:
 1. NEMA 250, Type 4.
 2. Box: Cast malleable iron, or ferrous metal, electrogalvanized finished, with drilled and tapped conduit entrances and exterior mounting lugs.
 3. Cover: Hinged with clamps.
 4. Gasket: Neoprene.
 5. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
 6. Manufacturers and Products, Surface Mounted Nonhinged Type:
 - a. Crouse-Hinds; Series W.
 - b. O-Z/Gedney; Series Y.
 - c. Or approved equal.
 7. Manufacturer and Product, Surface Mounted, Hinged Type:
 - a. O-Z/Gedney; Series YW.
 - b. Or approved equal.
 8. Manufacturers and Products, Recessed Type:
 - a. Crouse-Hinds; Type WJBF.
 - b. O-Z/Gedney; Series YR.
 - c. Or approved equal.
- D. Cast Metal Box, Hazardous Locations:
 1. NEMA 250 Type 7 or Type 9 as required for Class, Division, and Group involved.
 2. Box: Cast ferrous metal, electro-galvanize finished or copper-free aluminum with drilled and tapped conduit entrances.
 3. Cover: Nonhinged with bolts.
 4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
 5. Manufacturers and Products:
 - a. Crouse-Hinds; Type EJB.
 - b. Appleton; Type AJBEW.
 - c. Or approved equal.

- E. Stainless Steel Box:
1. NEMA 250 Type 4X.
 2. Box: 14-gauge, ASTM A240/A240M, Type 316 stainless steel, with white enamel painted interior mounting panel.
 3. Cover: Hinged with clamps.
 4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
 5. Manufacturers:
 - a. Hoffman Engineering Co.
 - b. Robroy Industries.
 - c. Wiegman.
 - d. Or approved equal.
- F. Concrete Box, Traffic Areas:
1. Box: Reinforced, cast concrete with extension and bottom slab.
 2. Provide knockouts for conduit entry.
 3. Cover: Steel checked plate; H/20 loading with screw down.
 4. Cover Marking: ELECTRICAL, COMMUNICATIONS, or as shown.
 5. Manufacturer and Product:
 - a. Utility Vault Co.; 3030 SB.
 - b. Or approved equal.

2.05 TERMINAL JUNCTION BOX

- A. Cover: Hinged, unless otherwise shown.
- B. Interior Finish: Paint with white enamel or lacquer.
- C. Terminal Blocks:
1. Separate connection point for each conductor entering or leaving box.
 2. Spare Terminal Points: 25 percent, minimum.

2.06 METAL WIREWAYS

- A. Meet requirements of UL 870.
- B. Type: Steel-enclosed, lay-in type.
- C. Cover: Removable, screw type.
- D. Rating: Indoor.
- E. Finish: Rust inhibiting phosphatizing primer and gray baked enamel.

- F. Hardware: Plated to prevent corrosion; screws installed toward the inside protected by spring nuts or otherwise guarded to prevent wire insulation damage.
- G. Knockouts: Without knockouts, unless otherwise indicated.
- H. Manufacturers:
 - 1. Circle AW.
 - 2. Hoffman.
 - 3. Square D.
 - 4. Or approved equal.

2.07 ACCESSORIES

- A. Duct Bank Spacers:
 - 1. Modular Type:
 - a. Nonmetallic, interlocking, for multiple conduit sizes.
 - b. Suitable for all types of conduit.
 - c. Manufacturers:
 - 1) Underground Device, Inc.
 - 2) Carlon.
 - 3) Or approved equal.
 - 2. Template Type:
 - a. Nonmetallic, custom made one-piece spacers.
 - b. Suitable for all types of conduit.
 - c. Material: HDPE or polypropylene, 1/2-inch minimum thickness.
 - d. Conduit openings cut 1 inch larger than conduit outside diameter.
 - e. Additional openings for stake-down, rebar, and concrete flow through as required.
 - f. Manufacturer and Product:
 - 1) SP Products; Quik Duct.
 - 2) Or approved equal.
- B. Identification Devices:
 - 1. Raceway Tags:
 - a. Material: Permanent, nylon.
 - b. Raceway Designation: Pressure stamped, embossed, or engraved.
 - c. Tags relying on adhesives or taped-on markers not permitted.
 - 2. Warning Tape:
 - a. Material: Polyethylene, 4-mil gauge with detectable strip.
 - b. Color: Red.
 - c. Width: Minimum 6 inches.

- d. Designation: Warning on tape that electric circuit is located below tape.
 - e. Identifying Letters: Minimum 1-inch-high permanent black lettering imprinted continuously over entire length.
 - f. Manufacturers and Products:
 - 1) Panduit; Type HTDU.
 - 2) Reef Industries; Terra Tape.
 - 3) Or approved equal.
- C. Heat Shrinkable Tubing:
- 1. Material: Heat-shrinkable, cross-linked polyolefin.
 - 2. Semi-flexible with meltable adhesive inner liner.
 - 3. Color: Black.
 - 4. Manufacturers:
 - a. Raychem.
 - b. 3M.
 - c. Or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Conduit and tubing sizes shown are based on use of copper conductors. Reference Section 26 05 05, Conductors, concerning conduit sizing for aluminum conductors.
- B. Comply with NECA Installation Standards.
- C. Crushed or deformed raceways not permitted.
- D. Maintain raceway entirely free of obstructions and moisture.
- E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.
- F. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.
- G. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.
- H. Group raceways installed in same area.
- I. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.

- J. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.
- K. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.
- L. Block Walls: Do not install raceways in same horizontal course or vertical cell with reinforcing steel.
- M. Install watertight fittings in outdoor, underground, or wet locations.
- N. Paint threads and cut ends, before assembly of fittings, galvanized conduit, PVC-coated galvanized conduit, or IMC installed in exposed or damp locations with zinc-rich paint or liquid galvanizing compound.
- O. Metal conduit shall be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.
- P. Do not install raceways in concrete equipment pads, foundations, or beams without Design Engineer approval.
- Q. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.
- R. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.
- S. Install conduits for fiber optic cables, telephone cables, and Category 6 data cables in strict conformance with the requirements of TIA 569B.

3.02 REUSE OF EXISTING CONDUITS

- A. Where Drawings indicate existing conduits may be reused, they may be reused only where they meet the following criteria:
 - 1. Conduit is in useable condition with no deformation, corrosion, or damage to exterior surface.
 - 2. Conduit is sized per the NEC.
 - 3. Conduit is of the type specified in Contract Documents.
 - 4. Conduit is supported as specified in Contract Documents.
- B. Conduit shall be reamed with wire brush, then with a mandrel approximately 1/4 inch smaller than raceway inside diameter then cleaned prior to pulling new conductors.

3.03 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

- A. Minimum Cover: 2 inches, including fittings.
- B. Conduit placement shall not require changes in reinforcing steel location or configuration.
- C. Provide nonmetallic support during placement of concrete to ensure raceways remain in position.
- D. Conduit larger than 1-inch shall not be embedded in concrete slabs, walls, foundations, columns, or beams unless approved by Design Engineer.
- E. Slabs and Walls (Requires Design Engineer Approval):
 - 1. Trade size of conduit not to exceed one-fourth of slab or wall thickness.
 - 2. Install within middle two-fourths of slab or wall.
 - 3. Separate conduit less than 2-inch trade size by a minimum ten times conduit trade size, center-to-center, unless otherwise shown.
 - 4. Separate conduit 2-inch and greater trade size by a minimum eight times conduit trade size, center-to-center, unless otherwise shown.
 - 5. Cross conduit at an angle greater than 45 degrees, with minimum separation of 1 inch.
 - 6. Separate conduit by a minimum six times the outside dimension of expansion/deflection fittings at expansion joints.
 - 7. Conduit shall not be installed below the maximum water surface elevation in walls of water holding structures.
- F. Columns and Beams (Requires Design Engineer Approval):
 - 1. Trade size of conduit not to exceed one-fourth of beam thickness.
 - 2. Conduit cross-sectional area not to exceed 4 percent of beam or column cross section.

3.04 CONDUIT APPLICATION

- A. Diameter: Minimum 3/4 inch.
- B. In addition to the requirements below, refer to the Area Classification Table on Drawings.
- C. Direct Earth Burial: PVC Schedule 40.
- D. Concrete-Encased Ductbank: PVC Schedule 40 for ac circuits, PVC-Coated Rigid Galvanized Steel for dc, analog, or copper communication or other circuits sensitive to electromagnetic interference.

- E. Under Slabs-on-Grade: PVC Schedule 40 for ac circuits, PVC-Coated Rigid Galvanized Steel for dc, analog, or copper communication or other circuits sensitive to electromagnetic interference.
- F. Transition from Underground or Concrete Embedded to Exposed: PVC-coated rigid steel conduit.

3.05 FLEXIBLE CONNECTIONS

- A. For motors, wall or ceiling mounted fans and unit heaters, dry type transformers, electrically operated valves, instrumentation, and other locations approved by Design Engineer where flexible connection is required to minimize vibration:
 - 1. Conduit Size 4 Inches or Less: Flexible, nonmetallic liquid-tight conduit.
 - 2. Conduit Size Over 4 Inches: Nonflexible.
 - 3. Wet or Corrosive Areas: Flexible, nonmetallic liquid-tight.
 - 4. Hazardous Areas: Flexible coupling suitable for Class I, Division 1 and Division 2 areas.
- B. Outdoor Areas, Process Areas Exposed to Moisture, and Areas Required to be Oiltight and Dust-Tight: Flexible metal, liquid-tight conduit.
- C. Flexible Conduit Length: 18 inches minimum, 60 inches maximum; sufficient to allow movement or adjustment of equipment.

3.06 PENETRATIONS

- A. Make at right angles, unless otherwise shown.
- B. Notching or penetration of structural members, including footings and beams, not permitted.
- C. Fire-Rated Walls, Floors, or Ceilings: Firestop openings around penetrations to maintain fire-resistance rating as specified in Section 26 05 04, Basic Electrical Materials and Methods.
- D. Apply heat shrinkable tubing or single layer of wraparound duct band to metallic conduit protruding through concrete floor slabs to a point 2 inches above and 2 inches below concrete surface.
- E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide nonshrink grout dry-pack, or use watertight seal device.

F. Entering Structures:

1. General: Seal raceway at first box or outlet with oakum or expandable plastic compound to prevent entrance of gases or liquids from one area to another.
2. Concrete Roof or Membrane Waterproofed Wall or Floor:
 - a. Provide a watertight seal.
 - b. Without Concrete Encasement: Install watertight entrance seal device on each side.
 - c. With Concrete Encasement: Install watertight entrance seal device on accessible side.
 - d. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.
 - e. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.
3. Heating, Ventilating, and Air Conditioning Equipment:
 - a. Penetrate equipment in area established by manufacturer.
 - b. Terminate conduit with flexible nonmetallic conduit at junction box or conduit attached to exterior surface of equipment prior to penetrating equipment.
 - c. Seal penetration with Type 5 sealant, as specified in Section 07 92 00, Joint Sealants.
4. Corrosive-Sensitive Areas:
 - a. Seal conduit passing through walls.
 - b. Seal conduit entering equipment panel boards and field panels containing electronic equipment.
 - c. Seal penetration with Type 5 sealant, as specified in Section 07 92 00, Joint Sealants.
5. Existing or Precast Wall (Underground): Core drill wall and install watertight entrance seal device.
6. Nonwaterproofed Wall or Floor (Underground, without Concrete Encasement):
 - a. Provide Schedule 40 galvanized pipe sleeve, or watertight entrance seal device.
 - b. Fill space between raceway and sleeve with expandable plastic compound or oakum and lead joint, on each side.
7. Manholes and Handholes:
 - a. Metallic Raceways: Provide insulated grounding bushings.
 - b. Nonmetallic Raceways: Provide bell ends flush with wall.
 - c. Install such that raceways enter as near as possible to one end of wall, unless otherwise shown.

3.07 SUPPORT

- A. Support from structural members only, at intervals not exceeding NFPA 70 requirements. Do not exceed 10 feet in any application. Do not support from piping, pipe supports, or other raceways.
- B. Multiple Adjacent Raceways: Provide ceiling trapeze. For trapeze-supported conduit, allow 25 percent extra space for future conduit.
- C. Application/Type of Conduit Strap:
 - 1. Rigid Steel Conduit: Zinc coated steel, pregalvanized steel or malleable iron.
 - 2. PVC-Coated Rigid Steel Conduit: PVC-coated metal.
 - 3. Nonmetallic Conduit: Nonmetallic or PVC-coated metal.
- D. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:
 - 1. Wood: Wood screws.
 - 2. Hollow Masonry Units: Toggle bolts.
 - 3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
 - 4. Steelwork: Machine screws.
 - 5. Location/Type of Hardware: Refer to the Area Classification and Materials Selection Table on Drawings.
- E. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.
- F. Support aluminum conduit on concrete surfaces with stainless steel or nonmetallic spacers, or aluminum or nonmetallic framing channel.

3.08 BENDS

- A. Install concealed raceways with a minimum of bends in the shortest practical distance.
- B. Make bends and offsets of longest practical radius. Bends in conduits and ducts being installed for fiber optic cables shall be not less than 20 times cable diameter, 15 inches minimum.
- C. Install with symmetrical bends or cast metal fittings.

- D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.
- E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.
- F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.
- G. PVC Conduit:
 - 1. Bends 30 Degrees and Larger: Provide factory-made elbows.
 - 2. 90-Degree Bends: Provide rigid steel elbows, PVC-coated rigid steel where direct buried.
 - 3. Use manufacturer's recommended method for forming smaller bends.
- H. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

3.09 EXPANSION/DEFLECTION FITTINGS

- A. Provide on raceways at structural expansion joints and in long tangential runs.
- B. Provide expansion/deflection joints for 50 degrees F maximum temperature variation.
- C. Install in accordance with manufacturer's instructions.

3.10 PVC CONDUIT

- A. Solvent Welding:
 - 1. Apply manufacturer recommended solvent to joints.
 - 2. Install in order that joint is watertight.
- B. Adapters:
 - 1. PVC to Metallic Fittings: PVC terminal type.
 - 2. PVC to Rigid Metal Conduit or IMC: PVC female adapter.
- C. Belled-End Conduit: Bevel unbelled end of joint prior to joining.

3.11 PVC-COATED RIGID STEEL CONDUIT

- A. Install in accordance with manufacturer's instructions.
- B. Tools and equipment used in cutting, bending, threading and installation of PVC-coated rigid conduit shall be designed to limit damage to PVC coating.
- C. Provide PVC boot to cover exposed threading.

3.12 WIREWAYS

- A. Install in accordance with manufacturer's instructions.
- B. Locate with cover on accessible vertical face of wireway, unless otherwise shown.
- C. Applications:
 - 1. Metal wireway in indoor dry locations.
 - 2. Nonmetallic wireway in indoor wet, outdoor, and corrosive locations.

3.13 TERMINATION AT ENCLOSURES

- A. Cast Metal Enclosure: Install manufacturer's premolded insulating sleeve inside metallic conduit terminating in threaded hubs.
- B. Nonmetallic, Cabinets, and Enclosures:
 - 1. Terminate conduit in threaded conduit hubs, maintaining enclosure integrity.
 - 2. Metallic Conduit: Provide ground terminal for connection to maintain continuity of ground system.
- C. Metal Boxes, Cabinets, and Enclosures:
 - 1. General:
 - a. Install insulated bushing on ends of conduit where grounding is not required.
 - b. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.
 - c. Utilize sealing locknuts or threaded hubs on sides and bottom of NEMA 3R and NEMA 12 enclosures.
 - d. Terminate conduits at threaded hubs at the tops of NEMA 3R and NEMA 12 boxes and enclosures.
 - e. Terminate conduits at threaded conduit hubs at NEMA 4 and NEMA 4X boxes and enclosures.

2. Rigid Galvanized Conduit:
 - a. Provide one lock nut each on inside and outside of enclosure.
 - b. Install grounding bushing at source enclosure.
 - c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad.
3. Electric Metallic Tubing: Provide gland compression, insulated connectors.
4. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.
5. Flexible, Nonmetallic Conduit: Provide nonmetallic, liquid-tight strain relief connectors.
6. PVC-Coated Rigid Galvanized Steel Conduit: Provide PVC-coated, liquid-tight, metallic connector.
7. PVC Schedule 40 Conduit: Provide PVC terminal adapter with lock nut, except where threaded hubs required above.

D. Control Center, Switchboard, Switchgear, and Free-Standing Enclosures:

1. Terminate metal conduit entering bottom with grounding bushing; provide grounding jumper extending to equipment ground bus or grounding pad.
2. Terminate PVC conduit entering bottom with bell end fittings.

3.14 UNDERGROUND RACEWAYS

- A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.
- B. Cover: Maintain minimum 2-foot cover above concrete encasement, unless otherwise shown.
- C. Make routing changes as necessary to avoid obstructions or conflicts.
- D. Couplings: In multiple conduit runs, stagger so couplings in adjacent runs are not in same transverse line.
- E. Union type fittings not permitted.
- F. Spacers:
 1. Provide preformed, nonmetallic spacers designed for such purpose, to secure and separate parallel conduit runs in a trench or concrete encasement.
 2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 10 feet.

- G. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.
- H. Installation with Other Piping Systems:
 - 1. Crossings: Maintain minimum 12-inch vertical separation.
 - 2. Parallel Runs: Maintain minimum 12-inch separation.
 - 3. Installation over valves or couplings not permitted.
- I. Provide expansion fittings that allow minimum of 4 inches of movement in vertical conduit runs from underground where exposed conduit will be fastened to or will enter building or structure.
- J. Provide expansion/deflection fittings in conduit runs that exit building or structure belowgrade. Conduit from building wall to fitting shall be PVC-coated rigid steel.
- K. Concrete Encasement: As specified in Section 03 30 00, Cast-in-Place Concrete.
- L. Backfill: As specified in Section 31 23 23.15, Trench Backfill.

3.15 UNDER SLAB RACEWAYS

- A. Make routing changes as necessary to avoid obstructions or conflicts.
- B. Support raceways so as to prevent bending or displacement during backfilling or concrete placement.
- C. Install raceways with no part embedded within slab and with no interference with slab on grade construction.
- D. Raceway spacing, in a single layer or multiple layers:
 - 1. 3 inches clear between adjacent 2-inch or larger raceway.
 - 2. 2 inches clear between adjacent 1-1/2-inch or smaller raceway.
- E. Multiple Layers of Raceways: Install under slab on grade in trench below backfill zone, as specified in Section 31 23 23.15, Trench Backfill.
- F. Individual Raceways and Single Layer Multiple Raceways: Install at lowest elevation of backfill zone with spacing as specified herein. Where conduits cross at perpendicular orientation, installation of conduits shall not interfere with placement of under slab fill that meets compaction and void limitations of earthwork specifications.

- G. Under slab raceways that emerge from below slab to top of slab as exposed, shall be located to avoid conflicts with structural slab rebar. Coordinate raceway stub ups with location of structural rebar.
- H. Fittings:
 - 1. Union type fittings are not permitted.
 - 2. Provide expansion/deflection fittings in raceway runs that exit building or structure below slab. Locate fittings 18 inches, maximum, beyond exterior wall. Raceway type between building exterior wall to fitting shall be PVC-coated rigid steel.
 - 3. Couplings: In multiple raceway runs, stagger so couplings in adjacent runs are not in same traverse line.

3.16 OUTLET AND DEVICE BOXES

A. General:

- 1. Install plumb and level.
- 2. Install suitable for conditions encountered at each outlet or device in wiring or raceway system, sized to meet NFPA 70 requirements.
- 3. Open no more knockouts in sheet steel device boxes than are required; seal unused openings.
- 4. Install galvanized mounting hardware in industrial areas.

B. Size:

- 1. Depth: Minimum 2 inches, unless otherwise required by structural conditions. Box extensions not permitted.
 - a. Hollow Masonry Construction: Install with sufficient depth such that conduit knockouts or hubs are in masonry void space.
- 2. Ceiling Outlet: Minimum 4-inch octagonal device box, unless otherwise required for installed fixture.
- 3. Switch and Receptacle: Minimum 2-inch by 4-inch device box.

C. Locations:

- 1. Drawing locations are approximate.
- 2. To avoid interference with mechanical equipment or structural features, relocate outlets as directed by Owner.
- 3. Light Fixture: Install in symmetrical pattern according to room layout, unless otherwise shown.

D. Mounting Height:

1. General:
 - a. Dimensions given to centerline of box.
 - b. Where specified heights do not suit building construction or finish, adjust up or down to avoid interference.
 - c. Do not straddle CMU block or other construction joints.
2. Convenience Receptacle:
 - a. General Interior Areas: 15 inches above floor.
 - b. General Interior Areas (Counter Tops): Install device plate bottom or side flush with top of backsplash, or 6 inches above counter tops without backsplash.
 - c. Outdoor Areas: 24 inches above finished grade.
3. Special-Purpose Receptacle: 24 inches above floor or as shown.
4. Switch, Motor Starting: 48 inches above floor, unless otherwise indicated on Drawings.

E. Flush Mounted:

1. Install with concealed conduit.
2. Install proper type extension rings or plaster covers to make edges of boxes flush with finished surface.
3. Holes in surrounding surface shall be no larger than required to receive box.

F. Supports:

1. Support boxes independently of conduit by attachment to building structure or structural member.
2. Install bar hangers in frame construction or fasten boxes directly as follows:
 - a. Wood: Wood screws.
 - b. Concrete or Brick: Bolts and expansion shields.
 - c. Hollow Masonry Units: Toggle bolts.
 - d. Steelwork: Machine screws.
3. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
4. Provide plaster rings where necessary.
5. Boxes embedded in concrete or masonry need not be additionally supported.

G. Install separate junction boxes for flush or recessed lighting fixtures where required by fixture terminal temperature.

H. Boxes Supporting Fixtures: Provide means of attachment with adequate strength to support fixture.

3.17 JUNCTION AND PULL BOXES

A. General:

1. Install plumb and level.
2. Installed boxes shall be accessible.
3. Do not install on finished surfaces.
4. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.
5. Use conduit bodies as junction and pull boxes where no splices are required and allowed by applicable codes.
6. Install pull boxes where necessary in raceway system to facilitate conductor installation.
7. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.
8. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.

B. Mounting Hardware: Refer to the Area Classification and Material Selection Table on Drawings.

C. Supports:

1. Support boxes independently of conduit by attachment to building structure or structural member.
2. Install bar hangers in frame construction or fasten boxes directly as follows:
 - a. Wood: Wood screws.
 - b. Concrete or Brick: Bolts and expansion shields.
 - c. Hollow Masonry Units: Toggle bolts.
 - d. Steelwork: Machine screws.
3. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
4. Boxes embedded in concrete or masonry need not be additionally supported.

D. At or Belowgrade:

1. Install boxes for belowgrade conduit flush with finished grade in locations outside of paved areas, roadways, or walkways.
2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
3. Obtain Owner's written acceptance prior to installation in paved areas, roadways, or walkways.
4. Use boxes and covers suitable to support anticipated weights.

- E. Install Drain/breather fittings in NEMA 250 Type 4 and Type 4X enclosures.

3.18 MANHOLES AND HANDHOLES

- A. Excavate, shore, brace, backfill, and final grade in accordance with Section 31 23 16, Excavation, and Section 31 23 23.15, Trench Backfill.
- B. Do not install until final raceway grading has been determined.
- C. Install such that raceway enters at nearly right angle and as near as possible to end of wall, unless otherwise shown.
- D. Grounding: As specified in Section 26 05 26, Grounding and Bonding for Electrical Systems.
- E. Identification: Field stamp covers with manhole or handhole number as shown. Stamped numbers to be 1-inch minimum height.

3.19 EMPTY RACEWAYS

- A. Provide permanent, removable cap over each end.
- B. Provide PVC plug with pull tab for underground raceways with end bells.
- C. Provide nylon pull cord.
- D. Identify, as specified in Article Identification Devices, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

3.20 IDENTIFICATION DEVICES

- A. Raceway Tags:
 - 1. Identify origin and destination.
 - 2. For exposed raceways, install tags at each terminus, near midpoint, and at minimum intervals of every 50 feet, whether in ceiling space or surface mounted.
 - 3. Install tags at each terminus for concealed raceways.
 - 4. Provide nylon strap for attachment.
- B. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of run.

3.21 PROTECTION OF INSTALLED WORK

- A. Protect products from effects of moisture, corrosion, and physical damage during construction.
- B. Provide and maintain manufactured watertight and dust-tight seals over conduit openings during construction.
- C. Touch up painted conduit threads after assembly to cover nicks or scars.
- D. Touch up coating damage to PVC-coated conduit with patching compound approved by manufacturer. Compound shall be kept refrigerated according to manufacturers' instructions until time of use.

END OF SECTION

SECTION 26 08 00
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. D877, Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
 - b. D923, Standard Practice for Sampling Electrical Insulating Liquids.
 - c. D924, Standard Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids.
 - d. D971, Standard Test Method for Interfacial Tension of Oil Against Water by the Ring Method.
 - e. D974, Standard Test Method for Acid and Base Number by Color-Indicator Titration.
 - f. D1298, Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method.
 - g. D1500, Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale).
 - h. D1524, Standard Test Method for Visual Examination of Used Electrical Insulating Oils of Petroleum Origin in the Field.
 - i. D1533, Standard Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration.
 - j. D1816, Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
 2. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - b. C2, National Electrical Safety Code.
 3. InterNational Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

4. National Electrical Manufacturers Association (NEMA):
 - a. AB 4, Guidelines for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications.
 - b. PB 2, Deadfront Distribution Switchboards.
5. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 70B, Recommended Practice for Electrical Equipment Maintenance.
 - c. 70E, Standard for Electrical Safety in the Workplace.
 - d. 101, Life Safety Code.
6. National Institute for Certification in Engineering Technologies (NICET).
7. Occupational Safety and Health Administration (OSHA): CFR 29, Part 1910, Occupational Safety and Health Standards.

1.02 SUBMITTALS

A. Informational Submittals:

1. Submit 60 days prior to performing inspections or tests:
 - a. Schedule for performing inspection and tests.
 - b. List of references to be used for each test.
 - c. Sample copy of equipment and materials inspection form(s).
 - d. Sample copy of individual device test form.
 - e. Sample copy of individual system test form.
2. Submit test or inspection reports and certificates for each electrical item tested within 30 days after completion of test.
3. Operation and Maintenance Data:
 - a. In accordance with Section 01 78 23, Operation and Maintenance Data.
 - b. After test or inspection reports and certificates have been reviewed by Construction Manager and returned, insert a copy of each in Operation and Maintenance Manual.

1.03 QUALITY ASSURANCE

A. Testing Firm Qualifications:

1. Corporately and financially independent organization functioning as an unbiased testing authority.
2. Professionally independent of manufacturers, suppliers, and installers of electrical equipment and systems being tested.

3. Employer of engineers and technicians regularly engaged in testing and inspecting of electrical equipment, installations, and systems.
 4. Supervising engineer accredited as Certified Electrical Test Technologist by NICET or NETA and having testing experience on similar projects.
 5. Technicians certified by NICET or NETA.
 6. Assistants and apprentices assigned to Project at ratio not to exceed two certified to one noncertified assistant or apprentice.
 7. Registered Professional Engineer to provide comprehensive Project report outlining services performed, results of such services, recommendations, actions taken, and opinions.
 8. In compliance with OSHA CFR 29, Part 1910.7 criteria for accreditation of testing laboratories or a full member company of NETA.
- B. Test equipment shall have an operating accuracy equal to or greater than requirements established by NETA ATS.
- C. Test instrument calibration shall be in accordance with NETA ATS.

1.04 SEQUENCING AND SCHEDULING

- A. Perform inspection and electrical tests after equipment listed herein has been installed.
- B. Perform tests with apparatus de-energized whenever feasible.
- C. Inspection and electrical tests on energized equipment shall be:
 1. Scheduled with Owner prior to de-energization.
 2. Minimized to avoid extended period of interruption to the operating plant equipment.
- D. Notify Owner at least 48 hours prior to performing tests on energized electrical equipment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Perform tests in accordance with requirements of Section 01 91 14, Testing, Integration, and Startup.

- B. Tests and inspections shall establish:
 - 1. Electrical equipment is operational within industry and manufacturer's tolerances and standards.
 - 2. Installation operates properly.
 - 3. Equipment is suitable for energization.
 - 4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, NFPA 101, and IEEE C2.
- C. Perform inspection and testing in accordance with NETA ATS, industry standards, and manufacturer's recommendations.
- D. Adjust mechanisms and moving parts of equipment for free mechanical movement.
- E. Verify nameplate data for conformance to Contract Documents and approved Submittals.
- F. Realign equipment not properly aligned and correct unlevelness.
- G. Properly anchor electrical equipment found to be inadequately anchored.
- H. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench/screw driver to manufacturer's recommendations, or as otherwise specified in NETA ATS.
- I. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.
- J. Investigate and Repair or Replace:
 - 1. Electrical items that fail tests.
 - 2. Active components not operating in accordance with manufacturer's instructions.
 - 3. Damaged electrical equipment.
- K. Electrical Enclosures:
 - 1. Remove foreign material and moisture from enclosure interior.
 - 2. Vacuum and wipe clean enclosure interior.
 - 3. Remove corrosion found on metal surfaces.
 - 4. Repair or replace, as determined by Construction Manager door and panel sections having dented surfaces.
 - 5. Repair or replace, as determined by Construction Manager poor fitting doors and panel sections.

6. Repair or replace improperly operating latching, locking, or interlocking devices.
 7. Replace missing or damaged hardware.
 8. Finish:
 - a. Provide matching paint and touch up scratches and mars.
 - b. If required because of extensive damage, as determined by Construction Manager, refinish entire assembly.
- L. Replace fuses and circuit breakers that do not conform to size and type required by Contract Documents or approved Submittals.

3.02 CHECKOUT AND STARTUP

A. Equipment Line Current Tests:

1. Check line current in each phase for each piece of equipment.
2. If phase current for a piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.

3.03 PANELBOARDS AND SWITCHBOARDS

A. Visual and Mechanical Inspection:

1. Include the following inspections and related work:
 - a. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
 - b. Exercise and perform operational tests of mechanical components and other operable devices in accordance with manufacturer's instruction manual.
 - c. Check panelboard mounting, area clearances, and alignment and fit of components.
 - d. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
 - e. Perform visual and mechanical inspection for overcurrent protective devices.

B. Electrical Tests:

1. Include the following items performed in accordance with manufacturer's instruction:
 - a. Insulation Resistance Tests:
 - 1) Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
 - 2) Each phase of each bus section.
 - 3) Phase-to-phase and phase-to-ground for 1 minute.
 - 4) With breakers open.
 - 5) With breakers closed.
 - 6) Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
 - b. Ground continuity test ground bus to system ground.

3.04 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:

1. Inspect each individual exposed power cable No. 6 and larger for:
 - a. Physical damage.
 - b. Proper connections in accordance with single-line diagram.
 - c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
 - d. Color coding conformance with specification.
 - e. Proper circuit identification.
2. Mechanical Connections for:
 - a. Proper lug type for conductor material.
 - b. Proper lug installation.
 - c. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
3. Shielded Instrumentation Cables for:
 - a. Proper shield grounding.
 - b. Proper terminations.
 - c. Proper circuit identification.
4. Control Cables for:
 - a. Proper termination.
 - b. Proper circuit identification.
5. Cables Terminated Through Window Type CTs: Verify neutrals and grounds are terminated for correct operation of protective devices.

B. Electrical Tests for Conductors No. 6 and Larger:

1. Insulation Resistance Tests:
 - a. Utilize 1,000V dc megohmmeter for 600-volt insulated conductors.
 - b. Test each conductor with respect to ground and to adjacent conductors for 1 minute.
 - c. Evaluate ohmic values by comparison with conductors of same length and type.
 - d. Investigate values less than 50 megohms.
2. Continuity test by ohmmeter method to ensure proper cable connections.

C. Low-voltage cable tests may be performed by installer in lieu of independent testing firm.

3.05 SAFETY SWITCHES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:

1. Proper blade pressure and alignment.
2. Proper operation of switch operating handle.
3. Adequate mechanical support for each fuse.
4. Proper contact-to-contact tightness between fuse clip and fuse.
5. Cable connection bolt torque level in accordance with NETA ATS, Table 100.12.
6. Proper phase barrier material and installation.
7. Verify fuse sizes and types correspond to one-line diagram or approved Submittals.
8. Perform mechanical operational test and verify electrical and mechanical interlocking system operation and sequencing.

B. Electrical Tests:

1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
 - b. Phase-to-phase and phase-to-ground for 1 minute on each pole.
 - c. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Contact Resistance Tests:
 - a. Contact resistance in microhms across each switch blade and fuse holder.
 - b. Investigate deviation of 50 percent or more from adjacent poles or similar switches.

3.06 MOLDED CASE CIRCUIT BREAKERS

- A. General: Inspection and testing limited to circuit breakers rated 70 amperes and larger and to motor circuit protector breakers rated 50 amperes and larger.
- B. Visual and Mechanical Inspection:
1. Proper mounting.
 2. Proper conductor size.
 3. Feeder designation according to nameplate and one-line diagram.
 4. Cracked casings.
 5. Connection bolt torque level in accordance with NETA ATS, Table 100.12.
 6. Operate breaker to verify smooth operation.
 7. Compare frame size and trip setting with circuit breaker schedules or one-line diagram.
 8. Verify that terminals are suitable for 75 degrees C rated insulated conductors.
- C. Electrical Tests:
1. Insulation Resistance Tests:
 - a. Utilize 1,000V dc megohmmeter for 480-volt and 600-volt circuit breakers and 500V dc megohmmeter for 208/240-volt circuit breakers.
 - b. Pole-to-pole and pole-to-ground with breaker contacts opened for 1 minute.
 - c. Pole-to-pole and pole-to-ground with breaker contacts closed for 1 minute.
 - d. Test values to comply with NETA ATS, Table 100.1.
 2. Contact Resistance Tests:
 - a. Contact resistance in microhms across each pole.
 - b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
 3. Primary Current Injection Test to Verify:
 - a. Long-time minimum pickup and delay.
 - b. Short-time pickup and delay.
 - c. Ground fault pickup and delay.
 - d. Instantaneous pickup by run-up or pulse method.
 - e. Trip characteristics of adjustable trip breakers shall be within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - f. Trip times shall be within limits established by NEMA AB 4, Table 5-3. Alternatively, use NETA ATS, Table 100.7.

- g. Instantaneous pickup value shall be within values established by NEMA AB 4, Table 5-4. Alternatively, use NETA ATS, Table 100.8.

3.07 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds in panelboard and switchboard assemblies for proper connection and tightness.
2. Ground bus connections in panelboard and switchboard assemblies for proper termination and tightness.
3. Accessible connections to grounding electrodes for proper fit and tightness.
4. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

END OF SECTION

**SECTION 26 14 13
SWITCHBOARDS**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. National Electrical Manufacturers Association (NEMA):
 - a. PB 2, Deadfront Distribution Switchboards.
 - b. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 3. UL:
 - a. 489, Standard for Safety for Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
 - b. 891, Standard for Safety for Switchboards.
 - c. 1561, Standard for Safety for Dry-Type General Purpose and Power Transformers.

1.02 SUBMITTALS

- A. Action Submittals:
1. Descriptive product information.
 2. Itemized Bill of Material.
 3. Dimensional drawings.
 4. Circuit Breakers: Copies of time-current characteristics.
 5. Bus data.
 6. Incoming line section equipment data.
 7. Conduit entrance locations.
 8. Anchoring instructions and details.
 9. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.
- B. Informational Submittals:
1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
 2. Manufacturer's installation instructions.
 3. Factory Test Report.

4. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.

1.03 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
2. Materials and equipment manufactured within scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Materials, equipment, and accessories specified in this section shall be products of:

1. General Electric.
2. Eaton/Cutler-Hammer.
3. Siemens.
4. Square D.
5. Or approved equal.

2.02 GENERAL REQUIREMENTS

- A. Equipment suitable for 480-volt, three-phase, three-wire solid grounded-wye electrical system. Comply with NEMA PB 2 and UL 891.
- B. Switchboard and its major components to be manufactured and assembled by single manufacturer in order to achieve standardization for appearance, operation and maintenance, spare parts replacement, and manufacturer's services.
- C. Lifting lugs on equipment and devices weighing over 100 pounds.

D. Operating Conditions:

1. Ambient Temperature: Maximum 40 degrees C.
2. Equipment shall be fully rated without derating for the above operating conditions.

2.03 STATIONARY STRUCTURE

- A. Type: NEMA PB 2 construction, dead front, completely metal enclosed, self-supporting.

2.04 ENCLOSURE

- A. Equipment Finish: Baked enamel applied over rust-inhibiting phosphated base coating.

1. Color:
 - a. Exterior: Manufacturer's standard.
 - b. Interior: White.
 - c. Unpainted Parts: Plated for corrosion resistance.

B. Outdoor Enclosure:

1. NEMA 250, Type 4X, Type 316 stainless steel enclosing NEMA 250, Type 1, enclosed switchboard.
2. Hinged, full-height doors with three-point latch operated by vault-type handle with multiple padlocking provisions. Ventilating louvers with filters in front door and rear panels.

2.05 BUSWORK

- A. Material: Phase noninsulated copper tin-plated copper throughout entire length of sufficient cross section to limit temperature rise at rated current to 55 degrees C.
- B. Bus Arrangement: A-B-C, left-to-right, top-to-bottom, and front-to-rear, as viewed from front.
- C. Brace for short-circuit currents as shown.
- D. Main Bus: Nontapered, continuous current rating as shown.
- E. Ground Bus:
1. Tin-plated copper.
 2. Rating: 300 amperes.

3. Bolted to each vertical section.
4. Bus Connections and Joints: Bolted.

2.06 PROTECTIVE DEVICES

A. Molded-Case Circuit Breakers:

1. Main and Branch Feeder Protective Devices: Group mounted, suitable for use with 75 degree C wire at full 75 degree C ampacity when mounted in switchboard.
2. Arrangement: Fully rated main and branch feeder circuit breakers.
3. Breakers 225-Ampere Frame and Above: Continuously adjustable magnetic pickups five to ten times trip rating.
4. Interrupting Rating: Provide rating identical to or larger than bus short circuit current rating, as shown on Drawings.

2.07 POWER METER (CIRCUIT MONITOR)

A. General:

1. Solid state device with LED displays.
2. Direct voltage input up to 600V ac.
3. Current input via current transformer with 5-ampere secondary.
4. Programmable current and potential transformer ratios.
5. Programmable limits to activate up to four alarms.
6. Selectable Voltage Measurements: Line-to-line or line-to-neutral and wye or delta.

B. Simultaneous Display:

1. Volts, three-phase.
2. Amperes, three-phase.
3. Kilowatts.
4. Kilowatt hours.
5. Power factor.
6. Frequency.
7. kW Demand with programmable period intervals.
8. kVA.
9. kVAR.
10. kVARh.
11. Voltage Rating: 95V ac to 135V ac.

2.08 INSTRUMENT TRANSFORMERS

A. Current Transformer (CT), 600 Volts and Below:

1. Type: Molded bar or donut.
2. Accuracy: 0.3 at burden imposed by meters and instruments.
3. Shorting type terminal boards for current transformer leads.

2.09 IDENTIFICATION

A. Nameplates:

1. Master:
 - a. Deep-etched aluminum, with manufacturer's name and model number.
 - b. Riveted to main vertical section.
2. Circuit Breakers:
 - a. Engraved, acrylic.
 - b. Color: Black with white.
 - c. Characters: Block-type, 1/4-inch high.
 - d. Size: Manufacturer's standard.
 - e. Inscription: As shown on one-line diagram.
 - f. Blank plates for future spaces.
 - g. Attachment Screws: Self-tapping.

2.10 FACTORY TESTING

- ### A. Performance tests in accordance with UL 891 and production tests in accordance with NEMA PB-2.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
- B. Secure to mounting pads with anchor bolts of sufficient size and number adequate for specified seismic conditions.
- C. Install plumb and in longitudinal alignment with pad or wall.
- D. Coordinate terminal connections with installation of secondary feeders.

END OF SECTION

**SECTION 26 24 16
PANELBOARDS**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. National Electrical Contractor's Association (NECA): 407, Recommended Practice for Installing and Maintaining Panelboards.
 2. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. 289, Application Guide for Ground Fault Circuit Interrupters.
 - c. KS 1, Enclosed Switches.
 - d. PB 1, Panelboards.
 - e. PB 1.1, General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 3. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 4. UL:
 - a. 67, Standard for Panelboards.
 - b. 98, Standard for Enclosed and Dead-Front Switches.
 - c. 486E, Standard for Equipment Wiring Terminals for use with Aluminum and/or Copper Conductors.
 - d. 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
 - e. 508, Standard for Industrial Control Equipment.
 - f. 870, Wireways, Auxiliary Gutters and Associated Fittings.
 - g. 943, Ground-Fault Circuit-Interrupters.
 - h. 1699, Standard for Arc-Fault Circuit-Interrupters.

1.02 SUBMITTALS

- A. Action Submittals:
1. Manufacturer's data sheets for each type of panelboard, protective device, accessory item, and component.
 2. Manufacturer's shop drawings including dimensioned plan, section, and elevation for each panelboard type, enclosure, and general arrangement.
 3. Tabulation of features for each panelboard to include the following:
 - a. Protective devices with factory settings.
 - b. Provisions for future protective devices.
 - c. Space for future protective devices.
 - d. Voltage, frequency, and phase ratings.

- e. Enclosure type.
- f. Bus and terminal bar configurations and current ratings.
- g. Provisions for circuit terminations with wire range.
- h. Short circuit current rating of assembled panelboard at system voltage.
- i. Features, characteristics, ratings, and factory settings of auxiliary components.
- j. Anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

- 1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
- 2. Manufacturer's recommended installation instructions.

1.03 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this section that are listed and labeled as defined in NEC Article 100.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
- 1. Eaton/Cutler-Hammer.
 - 2. General Electric Co.
 - 3. Square D Co.
 - 4. Siemens.
 - 5. Or approved equal.

2.02 GENERAL

- A. Provide low voltage panelboards for application at 600V or less in accordance with this section.
- B. Provide equipment in accordance with NEMA PB 1, NFPA 70, and UL 67.

C. Wire Terminations:

1. Provide panelboard assemblies, including protective devices, suitable for use with 75 degrees C or greater wire insulation systems at NFPA 70, 75 degrees C conductor ampacity, and in accordance with UL 486E.
2. Lugs for termination of conductors shall comply with Section 26 05 05, Conductors.

D. Load Current Ratings:

1. Unless otherwise indicated, load current ratings for panelboard assemblies, including bus and circuit breakers, are noncontinuous as defined by NEC. Continuous ratings shall be 80 percent of noncontinuous rating.
2. Where indicated "continuous" or "100 percent," selected components and protective devices shall be rated for continuous load current at value shown.

E. Series-Connected Short Circuit Current Ratings: Panelboards shall be fully rated; application of series-connected device ratings is unacceptable.

2.03 OVERCURRENT PROTECTIVE DEVICES

A. Overcurrent Device Mounting and Arrangement: Design panelboards to accommodate device installation and replacement without disturbing adjacent devices and without removing main bus.

B. Overcurrent Protective Devices: In accordance with NEMA KS 1, UL 98, and UL 489. Protective devices shall be adapted to panelboard installation.

C. Provisions for Future Overcurrent Device:

1. Provide space, mountings, and bus connections such that like device may be installed without additional hardware.
2. Panel openings shall be closed with individual removable cover for each provision for future device.
3. Unless otherwise indicated, "spaces" in panelboards shall be fully equipped provision for future like devices.
4. Provisions for future devices shall be suitable devices rated no less than 60 amperes.

D. Branch Protective Devices:

1. Provide Wire Lug Load Connections: Mechanical or crimp compression type, removable/replaceable, and suitable for 75 degrees C rated conductors without derating switch nor conductor ampacity.
2. Provide a nameplate for each circuit, blanks for spares.

2.04 CIRCUIT BREAKERS

A. General: Thermal-magnetic unless otherwise indicated, quick-make, quick-break, molded case, of indicating type showing ON/OFF and TRIPPED positions of operating handle. Circuit breakers shall comply with Section 26 05 04, Basic Electrical Materials and Methods.

B. Bus Connection: Bolt-on circuit breakers in 480Y/277-volt, and plug-in circuit breakers in 208Y/120 and 240/120-volt panelboards.

C. Trip Mechanism:

1. Individual permanent thermal and magnetic trip elements in each pole.
2. Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
3. Two and three pole, common trip.
4. Automatically opens all poles when overcurrent occurs on one pole.
5. Test button on cover.
6. Calibrated for 40 degrees C ambient, unless shown otherwise.

D. Unacceptable Substitution:

1. Do not substitute single-pole circuit breakers with handle ties for multi-pole breakers.
2. Do not use tandem or dual circuit breakers in normal single-pole spaces.

E. Specialty Breakers:

1. Where indicated, provide breakers with the following features:
 - a. Ground Fault Circuit Interrupter (GFCI): Rated to trip on 5-mA ground fault within 0.025 second (UL 943, Class A sensitivity, for protection of personnel). Ground fault sensor shall be rated same as circuit breaker. Breaker shall include push-to-test and reset buttons.

2.05 ENCLOSURES

A. General:

1. Provide as specified in Section 26 05 04, Basic Electrical Materials and Methods.
2. Type 4X, Type 316 stainless steel.
3. Provide surface-mount panelboard front trim with same dimensions as box front.

B. Finish: Rust inhibitor prime followed by manufacturer's standard gray baked enamel or lacquer.

C. NEMA 250 Type 4X Branch Panelboard Enclosure:

1. Secure front trim to box with concealed trim clamps.
2. Overlap flush panelboards front trims with box nominal 3/4 inch on all sides.
3. Provide door in panelboard front trim, with concealed hinges, to access protective device operating handles.
4. Provide multi-point latching for doors over 30 inches in height.
5. Door Lock: Secure with flush catch and tumbler lock; all panelboards keyed alike, with two milled keys each lock.
6. Circuit Directory: Metal frame with transparent plastic face and enclosed card, mounted inside each panel door.

2.06 BUSSING AND TERMINAL BARS

A. Bus:

1. Material: Tin-plated copper full sized throughout length. Provide for mounting of future protective devices along full length of bus regardless of number of units and spaces shown. Machine, drill, and tap as required for current and future positions.

B. Equipment Ground Terminal Bus: Copper with suitably sized provisions for termination of ground conductors, and bonded to box.

1. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
2. Provide individual termination points for all other grounding conductors such as feeder, grounding electrode, etc.
3. Termination points shall be bolted crimp compression lugs for conductors 6 AWG and larger.

- C. Neutral Terminal Bus: Copper with suitably sized provisions for termination of neutral conductors, and isolated from box.
 - 1. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
 - 2. Provide individual termination points for all other neutral conductors.
 - 3. Termination Points: Bolted crimp compression lugs for conductors 6 AWG and larger.
- D. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances for future protective device ampere ratings indicated.

2.07 SPECIAL FEATURES

- A. General: Where indicated on Drawings or schedules, provide special features as specified.
- B. Surge Arresters:
 - 1. Comply with Section 26 43 00, Surge Protection Devices.
 - 2. Provide protective device within panelboard as disconnecting means and short circuit protection per manufacturer's recommendation.
 - 3. Provide factory mounting within panelboard utilizing UL-recognized mounting device.

PART 3 EXECUTION

3.01 GENERAL

- A. Install in accordance with NECA 407, NEMA PB 1.1, and manufacturers' written installation instructions.
- B. Install securely, plumb, in-line and square with walls.
- C. Install top of cabinet trim 78 inches above floor, unless otherwise shown. Install cabinet so tops of protective device operating handles are no more than 78 inches above the floor.
- D. Ground Fault Protection: Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289.
- E. Install filler plates in unused spaces.
- F. Wiring in Panel Gutters: Train conductors neatly in groups; bundle and wrap with nylon wire ties.

- G. Mount flush panels uniformly flush with wall finish.
- H. Provide typewritten circuit directory for each panelboard.
- I. Provide engraved identification for each protective device.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM): A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 2. California Electrical Code (CEC), 2016.
 3. Federal Specifications (FS):
 - a. W-C-596G, General Specification for Connector, Electrical, Power.
 - b. W-S-896F, Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).
 4. Institute of Electrical and Electronic Engineers, Inc. (IEEE):
 - a. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000V and less) AC Power Circuits.
 - b. C62.45, Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and less) AC Power Circuits.
 5. National Electrical Contractors Association (NECA): 1, Standard Practice of Good Workmanship in Electrical Contracting.
 6. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. FB 11, Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations.
 - c. WD 1, General Color Requirements for Wiring Devices.
 - d. WD 6, Wiring Devices – Dimensional Specifications.
 7. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 8. UL:
 - a. 498, Standard for Safety for Attachment Plugs and Receptacles.
 - b. 508, Standard for Safety for Industrial Control Equipment.
 - c. 943, Standard for Safety for Ground-Fault Circuit-Interruption.
 - d. 1010, Standard for Safety for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
 - e. 1436, Standard for Safety for Outlet Circuit Testers and Similar Indicating Devices.
 - f. 1449, Standard for Safety for Surge Protective Devices (SPD).

1.02 SUBMITTALS

- A. Action Submittals: Manufacturer's product data for wiring devices.

PART 2 PRODUCTS

2.01 SWITCHES

- A. Switch, General Purpose:

1. NEMA WD 1 and FS W-S-896F.
2. Totally enclosed, ac type, with quiet tumbler switch and screw terminal.
3. Rivetless one-piece brass or copper alloy contact arm with silver alloy contact.
4. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.
5. Rating: 20 amps, 120/277 volts.
6. Automatic grounding clip and integral grounding terminal on mounting strap.
7. Special Features:
 - a. Provide the following features in comparable devices where indicated:
 - 1) Three-way and four-way.
8. Manufacturers and Products, Industrial Grade:
 - a. Cooper Arrow Hart; AH1220 Series.
 - b. Bryant; 4901 Series.
 - c. Hubbell; 1221 Series.
 - d. Leviton; 1221 Series.
 - e. Or approved equal.

- B. Switch, Motor Rated:

1. Type: Two-pole or three-pole, manual motor starting/disconnect switch without overload protection.
2. UL 508 listed.
3. Totally enclosed snap-action switch. Quick-make, slow-break design with silver alloy contacts.
4. Minimum General Purpose Rating: 30 amperes, 600V ac.
5. Minimum Motor Ratings:
 - a. 2 hp for 120V ac, single-phase, two-pole.
 - b. 3 hp for 240V ac, single-phase, two-pole.
 - c. 15 hp for 480V ac, three-phase, three-pole.
6. Screw-type terminal.

7. Manufacturers and Products:
 - a. Cooper Arrow Hart.
 - b. Hubbell Bryant; HBL78 Series.
 - c. Leviton.
 - d. Or approved equal.

2.02 RECEPTACLES

A. Receptacle, General Purpose:

1. NEMA WD 1 and FS W-C-596G.
2. Duplex, two-pole, three-wire grounding type with screw type wire terminals.
3. Impact resistant nylon cover and body, with finger grooves in face, unless otherwise indicated.
4. One-piece mounting strap with integral ground contact (rivetless construction).
5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, unless otherwise indicated.
7. Size: For 2-inch by 4-inch outlet box.
8. Special Features:
 - a. Provide the following features for all outdoor installations:
 - 1) Listed weather-resistant per CEC 406.9 and installed in compliance with CEC 406.9.
9. Industrial Grade Manufacturers and Products:
 - a. Cooper Arrow Hart; 5362 Series.
 - b. Hubbell Bryant; HBL5362 Series.
 - c. Leviton; 5362 Series.
 - d. Or approved equal.

B. Receptacle, Ground Fault Circuit Interrupter:

1. Meet requirements of general-purpose receptacle.
2. Listed Class A to UL 943, tripping at 5 mA.
3. Rectangular smooth face with push-to-test and reset buttons.
4. Listed weather-resistant per NEC 406.8.
5. Feed-through Capability: 20 amps.
6. Manufacturers and Products:
 - a. Hubbell Bryant; GFTR15GFTR20 Series.
 - b. Cooper Arrow Hart; WRVGF15 Series.
 - c. Leviton; 7899 Series.
 - d. Or approved equal.

- C. Receptacle, Corrosion-Resistant:
 - 1. Meet requirements of general-purpose receptacle.
 - 2. Nickel coated metal parts.
 - 3. Manufacturers and Products:
 - a. Hubbell Bryant; HBL53CM62 Series.
 - b. Leviton; 53CM-62 Series.
 - c. Cooper Arrow Hart; 5362CR Series.
 - d. Or approved equal.

- D. Receptacle, Special-Purpose:
 - 1. Rating and number of poles as indicated or required for anticipated purpose.
 - 2. Provide one matching plug with cord-grip features for each special-purpose receptacle.

- E. Three-Phase Receptacles and Plugs:
 - 1. Receptacles shall be suitable for 480-volt, three-wire service, with ampere ratings as indicated. Receptacles and plugs shall be designed so that the grounding pole is permanently connected to the housing.
 - 2. The grounding pole shall make contact before the line poles are engaged when the plug is connected to the receptacle housing.
 - 3. The plug sleeve shall also make contact with the receptacle housing before the line and load poles make contact.
 - 4. Receptacles shall include cast back box, angle adapter, gaskets, and a gasketed screw type, weathertight cap with chain fastener. Each receptacle shall be provided with one plug.
 - 5. All receptacles shall be provided as NEMA 3R weatherproof.
 - 6. Manufacturers:
 - a. Eaton.
 - b. Leviton.
 - c. Or approved equal.

2.03 DEVICE PLATES

- A. Sectional type plate not permitted.

- B. Cast Metal:
 - 1. Material: Malleable ferrous metal, with gaskets.
 - 2. Screw: Oval-head stainless steel.

- C. Weatherproof:
 - 1. Receptacle, Weatherproof:
 - a. UL listed for wet location while in use.
 - b. Die cast metal cover.
 - c. Locking type.
 - d. Manufacturer and Product:
 - 1) TayMac; Type Multi-Mac.
 - 2) Or approved equal.
 - 2. Switch:
 - a. Gasketed, cast-metal or cast-aluminum, incorporating external operator for internal switch.
 - b. Mounting Screw: Stainless steel.
 - c. Manufacturers and Products:
 - 1) Crouse-Hinds; DS-181 or DS-185.
 - 2) Appleton; FSK-1VTS or FSK-1VS.
 - 3) Or approved equal.
- D. Sheet Steel: Formed sheet steel or Feraloy designed for installation on cast-metal box.

2.04 FINISHES

- A. Wiring device catalog numbers specified in this section do not designate device color. Unless otherwise indicated, or required by code, provide colors as specified below.
- B. Wiring Device:
 - 1. All Areas: Gray.
- C. Special purpose devices may be manufacturer's standard color (black).
- D. Corrosion-resistant receptacle may be manufacturer's standard color (yellow).

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Comply with NECA 1.

B. Coordination with Other Trades:

1. Ensure device and its box are protected. Do not place wall finish materials over device box and do not cut holes for box with router that is guided by riding against outside of box.
2. Keep outlet box free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate raceway system, conductors, and cables.
3. Install device box in brick or block wall such that cover plate does not cross a joint, unless otherwise indicated. Where indicated or directed to cross joint, trowel joint flush with face of wall.
4. Install wiring device after wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. 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 damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailling existing conductors is permitted provided outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction or that show signs they 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 last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (150 mm) in length.
5. Use torque screwdriver when a torque is recommended or required by manufacturer.
6. When conductors larger than 12 AWG are installed on 15-amp or 20-amp circuits, splice 12 AWG pigtails for device connections.

7. Tighten unused terminal screws on device.
8. Device Plates:
 - a. Do not use oversized or extra deep plate.
 - b. Repair wall finishes and remount outlet box when standard device plate does not fit flush or does not cover rough wall opening.

3.02 SWITCH INSTALLATION

A. Switch, General Purpose:

1. Mounting Height: See Section 26 05 33, Raceway and Boxes.
2. Install with switch operation in vertical position.
3. Install single-pole, two-way switch such that toggle is in up position when switch is on.

B. Switch, Motor Rated:

1. Mounting Height: See Section 26 05 33, Raceway and Boxes.
2. Install with switch operation in vertical position such that toggle is in up position when ON.
3. Install within sight of motor when used as disconnect switch.

C. Occupancy Sensor, Wall Switch: Install in accordance with manufacturer's instructions.

3.03 RECEPTACLE INSTALLATION

A. Duplex Receptacle:

1. Install with grounding slot down, except where horizontal mounting is shown, in which case install with neutral slot up.
2. All 120-volt outdoor receptacles shall be provided with weatherproof enclosures per CEC 406.9 requirements.
 - a. Weatherproof Receptacle:
 - 1) Install in cast metal box.
 - 2) Install such that hinge for protective cover is above receptacle opening.
3. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for "downstream" conventional receptacles.
4. Special-Purpose Receptacle: Install in accordance with manufacturer's instructions.

3.04 DEVICE PLATE INSTALLATION

- A. Securely fasten to wiring device; ensure tight fit to box.
- B. Surface Mounted: Plate shall not extend beyond sides of box, unless plate has no sharp corners or edges.
- C. Install with alignment tolerance to box of 1/16 inch.
- D. Exterior:
 - 1. Switch: Weatherproof.
 - 2. Receptacle: Weatherproof.
- E. Interior:
 - 1. Surface Mounted, Metal Box: Cast.
 - 2. Receptacle Shown as Weatherproof on Drawings: Weatherproof.

3.05 IDENTIFICATION

- A. Use tape labels for identification of individual receptacles in dry indoor locations.
 - 1. Degrease and clean device plate surface to receive tape labels.
 - 2. Use 3/16-inch Kroy black letters on white background, unless otherwise indicated.
 - 3. Identify panelboard and circuit number from which item is served on face of plate.
- B. Identify conductors with durable wire markers or tags inside outlet boxes where more than one circuit is present.

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections, and prepare test reports.
- B. Test Instrument for 125-Volt 20-Amp Receptacle: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- C. Using test plug, verify device and its outlet box are securely mounted.
- D. Line Voltage Range: 105 volts to 132 volts.
- E. Percent Voltage Drop under 15-Amp Load: Less than 6 percent; 6 percent or higher is not acceptable.

- F. Ground Impedance: 2 ohms, maximum.
- G. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
- H. Tests shall be diagnostic, indicating damaged conductors, high resistance at 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.

END OF SECTION

SECTION 26 36 23
AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Electrical and Electronics Engineers (IEEE): C37.90.1, Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.
2. National Electrical Manufacturers Association (NEMA):
 - a. ICS (Industrial Control and Systems) 1, General Standards for Industrial Control and Systems: General Requirements.
 - b. ICS (Industrial Control and Systems) 2, Industrial Control and Systems Controllers, Contactors, and Overload Relays not more than 2000 volts ac or 750 volts ac.
 - c. ICS (Industrial Control and Systems) 6, Industrial Control And Systems: Enclosures 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
3. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
4. UL: 1008, Transfer Switch Equipment.

1.02 SUBMITTALS

A. Action Submittals:

1. Descriptive product information.
2. Dimensional drawings.
3. Control diagrams.
4. Conduit entrance locations.
5. Equipment ratings.
6. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
2. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
3. Factory test reports.

4. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
5. Operation and Maintenance Data: As specified in Section 01 78 23, Operation and Maintenance Data.

1.03 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
2. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton.
- B. ASCO.
- C. Russelectric.
- D. Or approved equal.

2.02 GENERAL

- A. Transfer switch to be product of a single manufacturer in order to achieve standardization for appearance, operation, maintenance, spare parts, and manufacturer's service.
- B. In accordance with applicable standards of NFPA 70, NEMA ICS 1, NEMA ICS 2, NEMA ICS 6, IEEE C37.90.1, and UL 1008.
- C. Transfer switch consisting of inherently double-throw power switch unit with interconnected control module. Transfer switches consisting of molded cases switches with an interconnect control module shall also be acceptable.
- D. Rated 100 percent, in amperes, for total system transfer of motor, electric heating, and other loads.

- E. Where applicable, main and arcing contacts visible for inspection with cabinet door and barrier covers removed.
- F. Suitable for 480 volts, three-phase, three-wire, electrical service having an available short circuit current at line terminals of 65,000 amperes rms symmetrical.
- G. Switch Rating: Continuous ampere rating as indicated on Drawings, assuming a nonventilated enclosure.
- H. Current carrying capacity of arcing contacts or switches shall not be used to determine the transfer switch rating.
- I. Provide full maintenance bypass capability.
- J. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- K. Operating Conditions:
 - 1. Ambient Temperature: Maximum 40 degrees C.
 - 2. Equipment to be fully rated without any derating for operating conditions listed above.

2.03 ENCLOSURE

- A. Type: NEMA 250, Type 4X, Type 316 stainless steel with enclosure grounding terminal.
- B. Dead front, front accessible wall mounted cabinet with steel construction.
- C. Continuously hinged single door, with handle and lock cylinder.

2.04 TRANSFER SWITCH

- A. Type: Electrically operated, mechanically held, double-throw.
- B. Momentarily energized, single-electrically operated mechanism energized from source to which load is to be transferred.
- C. Locking mechanism to maintain constant contact pressure.
- D. Mechanical interlock switch to ensure only one of two possible switch positions time delay in neutral position.
- E. Silver alloy contacts protected by arcing contacts.

- F. Main and arcing contacts visible when door is open and barrier covers removed.
- G. Manual operating handle for transfer in either direction under either loaded or unloaded conditions.
- H. Internal control wire connections made with ring or spade type terminals, lock washers, and sleeve type marking labels.
- I. Bypass feature shall not disrupt loads when activated or de-activated. Bypass shall be achieved by manual means only. Include interlocking features to ensure safe operations and no paralleling of incoming sources.

2.05 CONTROL MODULE

- A. Completely enclosed and mounted separately from the transfer switch unit.
- B. Microprocessor for sensing and logic control with inherent digital communications capability.
- C. Plug-in, industrial grade interfacing relays with dust covers.
- D. Connected to transfer switch by wiring harness having keyed disconnect plug.
- E. Plug-in printed circuit boards for sensing and control logic.
- F. Adjustable solid state undervoltage sensors for all three phases of preferred utility and for all three phases of standby source:
 - 1. Pickup 85 percent to 100 percent nominal.
 - 2. Dropout 75 percent to 98 percent of pickup setting.
- G. Control Module with Adjustable Time Delays:
 - 1. 0-minute to 5-minute load transfer to emergency delay.
 - 2. 0-minute to 30-minute retransfer to normal delay.
 - 3. Switch to bypass any of the above time delays during testing.

2.06 INDICATORS

- A. Type: Manufacturer's standard.
- B. Indicating light to indicate switch position for preferred utility power source.
- C. Indicating light to indicate switch position for standby power source.

- D. Indicating light to indicate preferred utility power source is available within parameters established by pickup and dropout settings.
- E. Indicating light to indicate standby power source is available within parameters established by pickup and dropout settings.
- F. Provide one normally open and one normally closed, 5 amperes, 120-volt contact for remote indication when transfer switch is in either position.

2.07 FACTORY TESTS

- A. Test to Ensure Correct:
 - 1. Operation of individual components.
 - 2. Sequence of operation.
 - 3. Transfer time, voltage, frequency, and time delay settings.
- B. Dielectric strength test per NEMA ICS 1.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure enclosure to structural steel channels attached to wall surface.

END OF SECTION

SECTION 26 42 00
GALVANIC ANODE CATHODIC PROTECTION SYSTEM

PART 1 GENERAL

1.01 WORK OF THIS SECTION

- A. The Contractor shall provide all labor, materials, tools, and incidentals to install a cathodic protection system for the new buried metallic piping associated with the NCWRF Package 1 Flow Equalization Basin, including all electrical connections, anodes, test stations, insulators, enclosures, and all accessories required for a complete and operable system.
- B. The Contractor shall retain a qualified Corrosion Engineer to direct the construction of facilities specified herein. The Corrosion Engineer shall test and certify that the corrosion control facilities for this Project are constructed properly and as specified, and are fully functional.

1.02 REFERENCES

- A. Commercial Standards:
 - 1. American Water Works Association (AWWA): C217, Wax Coating Systems for Underground Piping Systems.
 - 2. ASTM International (ASTM):
 - a. A497, Steel Welded Wire Reinforcement.
 - b. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 3. Green Book - Standard Specifications for Public Works Construction, 2012 Edition.
 - 4. Mil-C-18480-B, Coating Compound, Bituminous, Solvent, Coal Tar Base.
 - 5. NACE International (NACE):
 - a. SP0169, Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
 - b. SP0286, Electrical Isolation of Cathodically Protected Pipelines.
 - 6. National Electrical Manufacturers Association:
 - a. CE, Canvas Phenolic Resin – General Purpose Grade.
 - b. G10, Glass Reinforced Epoxy.
 - c. LE, Cotton Phenolic Resin – Electrical Grade.
 - 7. National Fire Protection Association (NFPA): NEC 70, National Electrical Code.
 - 8. Standard Drawings for Public Works Construction latest edition.

9. Standard Specifications of Public Works Construction City Supplement (White Book) latest edition.
10. UL: 514, Metallic Outlet Boxes.

1.03 DEFINITIONS

- A. Contractor: The licensed prime installer selected by the City.
- B. Owner: The City of San Diego.
- C. Corrosion Engineer: A qualified Corrosion Engineer retained by the Contractor who is either a Registered Professional Corrosion Engineer or NACE-International Certified Cathodic Protection Specialist or Corrosion Specialist.
- D. Construction Manager: The City of San Diego's designated representative.
- E. City's Corrosion Engineer: The City's appointed representative from the City's Corrosion Section.

1.04 CONTRACTOR QUALIFICATIONS

- A. All work must be conducted by qualified, experienced personnel working under continuous, competent supervision. Qualified Contractors must demonstrate through projects and references with cathodic protection installations. Cathodic protection installation and testing shall be done under the direct supervision of a Corrosion Engineer. The Contractor doing the electrical installations shall have proper valid State of California licenses.

1.05 CONTRACTOR SUBMITTALS

- A. The Contractor shall furnish the following documents (Submittals) as one submittal package:
 1. Catalog cuts and other information for products to be used including:
 - a. Conduit and Fittings.
 - b. Wire, Leads, and Cable.
 - c. Anode Shunts.
 - d. Ready Mix Concrete.
 - e. Plastic Warning Tape.
 - f. Exothermic Weld Kits.
 - g. Elastomeric Weld Caps.
 - h. Exothermic Weld Coating.
 - i. At-grade Concrete Test Box.
 - j. Phenolic Test Board.

- k. Flange Isolation Kits.
 - l. Wax Tape Coating System.
 - m. Standard Potential Galvanic Anode.
 - 2. As-Built Drawings: The Contractor shall maintain as-built drawings showing the exact locations of anodes, test stations, insulators, and wire trenching runs. Location changes shall be clearly indicated in red on a copy of design drawings. These Drawings shall be submitted to the Design Engineer before the work is considered complete. Provide sub-foot GPS coordinates for all test stations.
 - 3. Certifications: The Contractor shall submit a notarized affidavit of compliance that all Work, materials and equipment required according to this section were properly constructed and manufactured in full conformance with these Contract Documents. The Contractor shall submit the Manufacturers' Certificate of Compliance.
- B. Test and Inspection Reports: The Contractor shall submit field test and inspection reports. Testing reports shall include at a minimum, native or baseline pipe-to-soil potentials; electrical isolation testing, insulating flange kit testing, electrical continuity for all metallic pipe sections containing nonwelded joints or inline specials not intentionally electrically isolated, cathodic protection system activation, any deficiencies; and conclusions and recommendations. The final testing report issued for this Project shall include all previous testing results, approved material submittals, and as-built drawings. The reports shall be submitted in an electronic PDF format. In addition, all tabulated calculated data shall be submitted as a Microsoft Excel file format.
- C. Qualifications: The Contractor shall submit documentation of the qualifications of the Corrosion Engineer.

1.06 PACKAGING AND SHIPPING

- A. The Contractor shall coil wires, secure and package anodes as required to prevent damage during shipment.

1.07 NOTIFICATION FOR TESTING AND INSPECTION

- A. The Contractor shall notify the Construction Manager at least 7 days in advance of the installation of anodes, insulators, wiring, and test stations. The Construction Manager or the Owner's Representative shall witness all corrosion control installations at their discretion.

1.08 CORROSION ENGINEER QUALIFICATIONS SUBMITTAL

- A. Services of Corrosion Engineer: Obtain the services of a Corrosion Engineer to inspect, activate, adjust, and evaluate the effectiveness of the cathodic protection system. The Corrosion Engineer is herein defined as a registered Professional Engineer with certification or licensing that includes education and experience in cathodic protection of buried or submerged metal structures, or a person accredited or certified by NACE International at the level of Corrosion Specialist or Cathodic Protection Specialist (i.e., NACE International CP Level 4). Such a person shall have adequate experience inspecting pipeline cathodic protection systems. The Corrosion Engineer shall directly oversee the Cathodic Protection Technician, review all cathodic protection specification sections related inspections and field measurements, and certify the accuracy and completeness of all cathodic protection submittals and reports.
- B. Services of Cathodic Protection Technician: Obtain the services of a Cathodic Protection Technician to inspect, activate, adjust, and evaluate the effectiveness of the cathodic protection system. The Cathodic Protection Technician is herein defined as a person accredited or certified by NACE International as a Cathodic Protection Level 2 Technician. Such a person shall provide projects and references for experience requirement.

PART 2 PRODUCTS**2.01 CONDUIT, FITTINGS, AND ACCESSORIES**

- A. All belowgrade wire shall be run in Schedule 40 PVC conduit. All abovegrade conduit shall be rigid galvanized steel.
- B. Fittings: Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal, with gasket covers. Rigid metallic conduit fittings shall be galvanized conforming to UL 514. Fittings for use with either rigid nonmetallic conduit shall be PVC and shall have solvent weld-type conduit connections.
- C. Elbows: All buried conduit elbows shall be long radius ell type.

2.02 WIRES

- A. General: Conform to applicable requirements of NEMA WC 70. All wires shall be single conductor, unless otherwise specified. All wires shall be single conductor, stranded copper wire with 600-volt HMWPE insulation, unless otherwise specified.

- B. Joint Bond: Two No. 4 AWG HMWPE.
- C. Test Station Pipeline Leads: No. 8 AWG HMWPE.
- D. Galvanic Anode Leads: No. 12 AWG THWN (WHITE).
- E. Casing Test Leads: No. 10 AWG HMWPE.

2.03 SHUNTS

- A. Galvanic Anode Test Stations: The shunt resistance shall be such that 2-amp shunts and 0.1 ohm resistance and shall be flat manganin ribbon style as manufactured by Cott, or approved equal.

2.04 CONCRETE

- A. Reinforcing Steel: ASTM A615, Grade 60 deformed bars and welded wire fabric.
- B. Welded Wire Fabric: ASTM A497.
- C. Formwork: Plywood, earth cuts may be used.
- D. Concrete with minimum 3,000 psi compressive strength at 28 days.

2.05 ANCILLARY MATERIALS

- A. Electrical Tape: Linerless rubber high-voltage splicing tape and vinyl electrical tape suitable for moist and wet environments. Use Scotch 130C and Scotch 88 as manufactured by 3M Products.
- B. Wire Connectors: One-piece, tin-plated crimp-on lug connector as manufactured by Burndy Co., Thomas and Betts.
- C. Insulating Resin: At Contractor's option, bitumastic coating (Koppers 50, or approved equal) may be used if allowed to dry completely before covering.

2.06 MARKING TAPE

- A. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
- B. Thickness: Minimum 4 mils.
- C. Width: 6 inches.

- D. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
- E. Color:
 - 1. Red with black lettering as follows:
 - a. “CAUTION CATHODIC PROTECTION CABLES BURIED BELOW.”

2.07 EXOTHERMIC WELDS

- A. General: Wire sleeves, welders, and weld cartridges according to the weld manufacturer’s recommendations for each wire size and pipe or fitting size and material. Welding materials and equipment shall be the product of a single manufacturer. Interchanging materials of different manufacturers will not be accepted.
- B. Weld Caps: Exothermic welds shall be sealed with a prefabricated plastic cap filled with formable mastic compound on a base of elastomeric tape. Use Royston Handy Cap, or approved equal. Primer for weld caps shall be Royston Roybond Primer 747, or approved equal.
- C. Weld Coating: All bare metal shall be coated. Exothermic welds and weld caps shall be coated with a cold-applied, fast-drying mastic consisting of bituminous resin and solvents per MIL-C-18480B. Use Royston R28, Royston R28 Zero VOC, Royston A51 Plus, Royston A51 Low VOC, Tapecoat TC Mastic, or approved equal.

2.08 ABOVEGRADE TEST STATIONS

- A. Post Mounted:
 - 1. Test Box: Makrolon polycarbonate cap, terminal board, and collect nut. Use Big Fink, or approved equal.

2.09 WAX TAPE COATING FOR BURIED SURFACES AND BURIED ISOLATION FLANGES

- A. All buried pipe sections of pipe, specials, and fitting surfaces that are not tape wrapped or epoxy coated shall be wrapped with a petrolatum wax tape coating per AWWA C217 with plastic outer wrap. No bare metallic surfaces shall be buried, backfilled, or in contact with the soil.
- B. Apply a wax tape coating system which conforms to AWWA C217 and consists of three parts: Surface primer, wax-tape, and outer covering.

- C. The primer shall be a blend of petrolatum, plasticizer, and corrosion inhibitors having a paste like consistency. It shall have a pour point of 100 degrees F to 110 degrees F and a flash point of 350 degrees F. Use Trenton Wax-Tape Primer, or approved equal.
- D. The wax-tape shall consist of a synthetic-fiber felt, saturated with a blend of high melt microcrystalline wax, solvents, and corrosion inhibitors, forming a tape coating that is easily formable over irregular surfaces and which firms up after application. The tape shall have a saturant pour point between 125 degrees F and 130 degrees F and a dielectric strength equal to a minimum of 100 volts per mil. Tape thickness shall be 70 mils to 90 mils in 6-inch wide rolls. Use Trenton No. 1 wax-tape, or approved equal.
- E. The outer covering shall consist of two layers of a plastic wrapper. The plastic wrapper material shall consist of three 10-mil thick clear polyvinylidene chloride, high cling membranes wound together as a single sheet. Use Trenton Poly-Ply, or approved equal.

2.10 STANDARD POTENTIAL MAGNESIUM ANODES

- A. Capacity: Standard potential magnesium anodes shall have a theoretical energy content of 1,000 ampere-hours per pound and have a minimum useful output of 500 ampere-hours per pound.
- B. Chemical Composition (Standard Potential Magnesium) ASTM B843:
 - 1. Aluminum: 5.30 percent to 6.70 percent.
 - 2. Manganese: 0.15 percent to 0.70 percent.
 - 3. Zinc: 2.50 percent to 3.50 percent.
 - 4. Copper: 0.02 percent maximum.
 - 5. Nickel: 0.002 percent maximum.
 - 6. Iron: 0.003 percent maximum.
 - 7. Silicon: 0.10 percent maximum.
 - 8. Others, Total: 0.30 percent maximum.
 - 9. Magnesium: Remainder.
- C. Open Circuit Potential: The open circuit potential of all anodes, buried in the soil, shall be between 1.45V dc and 1.55V dc versus a copper-copper sulfate reference electrode.
- D. Ingot Size and Weight: Anodes shall be 32-pound prepackaged, standard potential ingots with a trapezoidal cross section. Ingot length shall be 21 inches long. The total packaged weight shall be 70 pounds.

- E. Anode Construction: Anodes shall be cast magnesium with a galvanized steel core rod recessed on one end to provide access to the rod for connection of the lead wire. Silver braze the lead wire to the rod and make the connection mechanically secure. Insulate the connection to a 600-volt rating by filling the recess with epoxy and covering any exposed bare steel core or wire with heat shrinkable tubing. The insulating tubing shall extend over the lead wire insulation by not less than 1/2 inch. The anode lead wire shall be stranded copper and shall be connected directly to the anode steel core as described above. There shall be no wire splices between the anode steel core and the tag end at the test station.
- F. Anode Prepackaged Backfill Material:
1. The anodes shall be completely encased and centered within a permeable cloth bag in a special low resistivity backfill mix with the following composition:
 - a. Gypsum: 75 percent.
 - b. Powdered Bentonite: 20 percent.
 - c. Anhydrous Sodium Sulfate: 5 percent.
- G. Backfill grains shall be such that 100 percent is capable of passing through a screen of 100 mesh. Backfill shall be firmly packed around the anode such that the ingot is approximately in the center of the backfill. The resistivity of the backfill shall be no greater than 50-ohm-cm when tested wet in a soil box. Total prepackaged weight shall be approximately 45 pounds.

PART 3 EXECUTION

3.01 GENERAL

- A. Work not specifically described herein shall conform to NACE SP0169, NACE SP0572, NACE SP0286, the Standard Specifications for Public Works Construction 2018 (Greenbook), and City Supplement White Book and Standard Drawings.

3.02 WIRE CABLES AND CONDUCTORS

- A. Buried Wires, Cables, and Leads: Buried pipeline, test station, or anode leads and conduits shall be at a 36-inch deep, minimum, below finished grade. Wires shall be free of splices. The Contractor shall compact wire trenches and repave in accordance with the Greenbook/Whitebook Standards.
- B. Warning Tape: Bury warning tape in the trench 12 inches belowgrade and above underground conductors and conduits. Align parallel to and within 2 inches of the centerline of the conduit run.

3.03 CONDUITS

- A. Securing Conduits: Secure conduits entering abovegrade test station boxes with double locknuts, one on the outside and one on the inside.
- B. Insulation Fittings: Install insulated bushings and insulated throat connectors on the ends of rigid metallic conduit.
- C. Watertight Fittings: Use watertight couplings and connections. Install and equip boxes and fittings to prevent water from entering the conduit or box. Seal unused openings.

3.04 WIRE-TO-PIPE CONNECTIONS

- A. Exothermic Weld:
 - 1. Use exothermic weld method for electrical connection of copper wire to steel surfaces. Observe proper safety precautions, welding procedures, weld charge selection, and surface preparation recommended by the welder manufacturer. Assure that the pipe or fitting wall thickness is of sufficient thickness that the exothermic weld process will not damage the integrity of the pipe or fitting wall or protective lining. One exothermic weld shall be used for one wire only.
 - 2. Preparation of Metal: Remove all coating, dirt, grime, and grease from the metal surface by wire brushing and/or use of suitable safe solvents. Clean the surface to a bright, shiny surface free of all pits and flaws. The surface must be completely dry.
 - 3. Testing: After the weld connection has cooled, remove slag, visually inspect, and physically test wire connection by striking the weld with a 2-pound hammer while pulling firmly on the wire. All unsound welds shall be completely removed, the surface prepared again, and rewelded. All weld slag shall be removed from the weld before applying coating and weld cap.
- B. Protective Coating: The Contractor shall furnish all materials, clean surfaces and repair any damage to protective coatings and linings damaged as a result of the welding. A coating shall be applied to all exothermic weld locations. The coating for dielectrically coated steel shall be as described in Article Standard Potential Magnesium Anodes, above. All surfaces must be clean and dry and free of oil, dirt, loose particles and all other foreign materials before application of the coating. The coating must cure per the manufacturer's recommendations prior to backfill. The mortar rockshield shall be repaired per the manufacturer's recommendations.

3.05 MAGNESIUM ANODES

- A. Inspection: All lead wires shall be inspected to ensure that the lead wire is securely connected to the anode core and that no damage has occurred to the lead wire. Lead wire failures shall require replacement of the complete anode and lead wire.
- B. Prepackaged Anode Inspection: Each anode shall be inspected to ensure that the backfill material completely surrounds the anode and that the cloth bag containing the anode and backfill material is intact. If the prepackaged anodes are supplied in a waterproof container or covering, that container or covering shall be removed before installation. The Contractor shall notify the Construction Manager at least 7 days in advance of installing the anodes.
- C. Location: Anodes are to be installed in augured holes as shown on Drawings. Anode positions can be adjusted slightly to avoid interference with existing structures. Alternate anode positions must be approved by the Design Engineer.
- D. Handling: Care shall be taken to ensure that the anode is never lifted, supported, transported, or handled by the lead wire. All anodes shall be lowered into the hole using a sling or a rope.
- E. Anode Hole Size and Depth: Anodes shall be placed vertically at the bottom of a 12 feet deep augured hole, 12 inches in diameter (minimum).
- F. Soaking Requirements, Prepackaged Anodes: Once the prepackaged anodes are in the hole, water shall be poured into the hole so that the anodes are completely covered with water. Allow the anodes to soak for a minimum of 30 minutes before any soil backfill is added.
- G. Soil Backfill: After the prepackaged anodes are soaked, the hole is backfilled with stone-free, native soil. No voids shall exist around the anode bags and the anode lead wire shall not be damaged. The backfill shall be tamped and compacted in 18-inch lifts above the anode taking care not to damage the anode lead wire.

3.06 POST-MOUNTED TEST STATIONS

- A. Location: Test boxes shall be located over the pipe where possible. Do not install in sidewalks, driveways, traffic lanes, or gutters. All test box locations shall be approved by the Design Engineer.

- B. Test Lead Attachment: Test leads shall be attached to the pipe using the exothermic weld process. An 18-inch length of slack wire shall be coiled at each weld.
- C. Concrete Pad: A 24-inch square by 4-inch-thick reinforced concrete pad is required around each test station. Concrete pad shall extend 2 inches abovegrade.

3.07 EXTERNAL COATING

- A. All insulating couplings shall be covered with a three-layer wax tape coating system per AWWA C217 with plastic outer wrap. Additionally, all in-line valves, flanges couplings, and adapters that are not coated with a bonded dielectric coating shall be wax tape coated per AWWA C217 with plastic outer wrap.
- B. Primer: Surfaces must be cleaned of all dirt, grime, and dust by using a wire brush and clean cloth. The surface shall be dry. Apply the primer by hand or brush. A thin coating of primer shall be applied to all surfaces and worked into all crevices. The primer shall be applied generously around bolts, nuts, and threads, and shall fully cover all exposed areas. The primer should overlap the pipe coating by a minimum of 3 inches.
- C. Petrolatum Saturated Tape: The wax tape can be applied immediately after the primer. Short lengths of tape shall be cut and carefully molded around each individual bolt, nut, and stud end. For long bolts (such as in couplings), short lengths of tape shall be cut and circumferentially wrapped around each individual bolt. After the bolts are covered, the tape shall be circumferentially wrapped around the flange with sufficient tension to provide continuous adhesion without stretching the tape. The tape shall be formed, by hand, into all voids and spaces. There shall be no voids or gaps under the tape. The tape shall be applied with a 1-inch minimum overlap. Minimum thickness of 70-mils over flat surfaces. Minimum thickness of 140 mils over edges.
- D. Outer Covering: A plastic outer cover shall be applied over the petrolatum-saturated tape. The plastic shall be a minimum of 50-gauge (10 mils) and shall have two layers applied.

3.08 REBAR GROUND CABLE AT CONCRETE STRUCTURES

- A. Minimum size No. 2 AWG, bare copper stranded grounding cable. The quantity of cable required should be sufficient to run two ground cables from a flush-to-grade concrete ground box down to two separate exothermic connections made to rebar inside each concrete encasement or major

reinforced concrete structure. Locate the rebar ground text boxes adjacent to cathodic protection test boxes.

3.09 TESTING AND INSPECTION

- A. General: The CP system shall be activated and adjusted by the Contractor's Corrosion Engineer. The Contractor is required to contact the City's Corrosion Section (telephone number (619) 527-5439) at least 5 days in advance of all corrosion control/cathodic protection facility installations. The Construction Manager, City's Corrosion Engineer, or the Owner's Representative shall witness all testing and installations at their discretion. All test data shall be submitted to the City's Corrosion Engineer within 7 days of the completion of the testing. All testing shall be conducted under the supervision of a qualified Corrosion Engineer who is retained by the Contractor. All deficiencies found to be due to faulty materials or workmanship shall be repaired or replaced by the Contractor and at their expense.

3.10 TEST LEADS AND BOND WIRES

- A. Responsibility: The Contractor shall be responsible for testing and inspecting all test leads, bond wires, and exothermic welds.
- B. Test Method: All completed wire connections shall be tested by striking the weld with a 2-pound hammer while pulling firmly on the wire. Failed welds shall be completely removed, the surface reprepared, and rewelded. Welds shall be spot tested by the Construction Manager. After backfilling, all test leads shall be tested using a standard ohmmeter.
- C. Acceptance: The resistance between each pair of test leads shall not exceed 120 percent of the total wire resistance as determined from published wire data.

3.11 ANODE LEAD WIRE INSPECTION

- A. Responsibility: The City's Corrosion Engineer will inspect each anode lead wire at the anode site. The Contractor shall assist the City's Corrosion Engineer and is responsible for inspecting/testing the anode lead wire insulation prior to storing and shipping.
- B. Test Method: Inspection shall be visual and by feel, or by using a Holiday Tester. The Construction Manager shall inspect and run their hand along the full length of each anode lead wire cable just prior to installation in the well.

- C. Acceptance: All anode lead wires shall be free of cuts, nicks, and abrasions. Cables with damage shall be rejected.

3.12 TEST LEAD TRENCHING AND BACKFILL

- A. Responsibility: The Construction Manager, at their discretion, shall inspect wire trenches and backfill material and methods.
- B. Test Method: The depth, trench bottom padding, and backfill material shall be visually inspected before backfilling.
- C. Acceptance: Conformance with specifications.

3.13 ELECTRICAL CONTINUITY TESTING OF PIPE WITH BONDED JOINTS

- A. Conduct electrical continuity testing to demonstrate that all buried pipe joints (except insulated flanges) are either welded joints or have been electrically bonded across with bond cables. This testing shall be performed by the Contractor's Cathodic Protection Technician and witnessed by the Construction Manager. The Contractor shall demonstrate to the Construction Manager's satisfaction that full electrical continuity has been achieved and shall make all required bond cable connections in the event that electrical continuity of the pipeline is not achieved.
- B. Perform electrical continuity tests between test stations. Circulate a 12-volt electrical direct current (dc) through the pipeline. Use two pairs of test wires, one for current flow, one for voltage measurement. Measure the voltage difference developed by the dc current flow. Calculate the electrical resistance of the pipeline section in Ohms using Ohm's Law.
- C. The resistance acceptance criterion for each pipeline section tested is less than 120 percent of the calculated resistance value. The resistance value shall be calculated using the steel cross section area of the pipe, its length, and consideration for the joint bond cables at each bonded joint.
- D. If other electrical continuity test methods are proposed, the Contractor shall prepare a written test procedure specifying the alternate method and equipment that will be used. A standard handheld digital multi-test meter's ohmmeter circuit (e.g., Fluke 87) is not suitable for properly making these electrical resistance measurements. Submit in writing the alternate proposed test method to the City's Corrosion Engineer for approval a minimum of 30 days before the pipe laying begins.

3.14 CP TEST STATION WIRE INTEGRITY TESTING

- A. Testing of Completed Welds: Exothermically welded wire-to-pipeline connections shall be inspected by the Construction Manager prior to backfilling the pipeline. At the Construction Manager's direction, tests to verify the soundness of the welds shall be conducted by the Contractor. Tests for this purpose shall consist of striking the weld nugget with a 2-pound hammer while steadily pulling on the wire. Note that the wire near the weld shall not be unnecessarily cold worked during installation or testing. Remove and reweld any welds that break loose or show signs of separating, as determined by the Construction Manager.
- B. Wire Identification: The Construction Manager shall be given a 2-day advance notice to verify that buried pipe lead wires and anode lead wires are properly identified prior to backfilling the wires.
- C. CP Test Wire Resistance Tests:
 - 1. After the pipeline is backfilled and the CP test wires are trenched to the CP Test Box or CP Monitoring Station, each pair of CP test wires shall be tested for integrity. The CP Technician shall measure the electrical resistance of one CP test wire to the pipeline and back on the second CP test wire. If more than twice the theoretical resistance of the total wire length installed is measured, the Contractor shall re-excavate the pipeline and replace or re-weld the CP test wires to the pipeline. Use the following copper wire unit resistance values to calculate the theoretical resistance of each pair of CP test wires:
 - a. No. 2 AWG Wire: 0.162 ohms per 1,000 feet.
 - b. No. 4 AWG Wire: 0.258 ohms per 1,000 feet.
 - c. No. 6 AWG Wire: 0.411 ohms per 1,000 feet.
 - d. No. 8 AWG Wire: 0.653 ohms per 1,000 feet.
 - e. No. 10 AWG Wire: 1.038 ohms per 1,000 feet.
 - f. No. 12 AWG Wire: 1.650 ohms per 1,000 feet.
 - g. No. 14 AWG Wire: 2.624 ohms per 1,000 feet.

3.15 ELECTRICAL ISOLATION TESTING BETWEEN PIPE AND STEEL
REINFORCEMENT

- A. Prior to placing concrete, all pipe/wall/slab penetrations must be inspected by the City's Corrosion Engineer. Testing shall be performed and deemed acceptable as described herein. A 7-day notice is required before placing concrete.

- B. Conduct visual and electrical testing at all steel pipe penetrations through reinforced concrete structures before and after the concrete is placed. This testing is required to demonstrate that all buried steel pipe is not in contact with any metallic objects embedded in the concrete wall or concrete slab including all of the following:
1. Rebar.
 2. Rebar tie wire.
 3. Snap ties.
 4. She bolts.
 5. Tie rods.
 6. Taper ties.
 7. Dowels.
- C. Perform this testing no more than 1 day before each concrete placement and no more than 1 day after each concrete placement. Correct all direct contacts detected between sections of pipe to be buried and concrete reinforcing components by trimming or repositioning the reinforcement components. If pipe to reinforcement contacts are detected after concrete is in place, use chipping hammers and other concrete demolition tools to remove as much concrete as is necessary to eliminate all metallic points of contact with the steel pipe. A representative from the City of San Diego, Water System Operations, Corrosion Section shall be notified a minimum of 7 days before the first pipe-vault penetration concrete is placed in order to witness and ensure proper electrical isolation. The failure for a new buried steel pipeline to pass this electrical isolation test may require concrete and reinforcing steel to be incrementally demolished by the Contractor at no cost to the City of San Diego until the new pipeline passes the electrical isolation test.
- D. Perform all electrical resistance measurements for this test using a 97-Hz square wave null balancing ohmmeter, such as the Nilsson Model 400 Soil Resistance Meter or the MC Miller Model 400A, and the four-wire resistance technique to compensate for the test wire and connection resistances. A standard handheld digital multi-test meter's ohmmeter circuit (e.g., Fluke 87) is not suitable for properly making these resistance measurements. Perform this test by connecting the meter's P1 and C1 terminals to the pipe, using two different wires and two different connections, and then connecting the meter's P2 and C2 terminals to the rebar, using two additional wires and connections. Use vise grips or temporary exothermic welds to make the wire connections to the pipe and rebar.

- E. Rebar Ground Cable Connections at Pipe Encasements and Vault Penetrations: Select two exposed pieces of rebar separated by at least 2 feet that are wire tied to a minimum of six other perpendicular pieces of rebar for use as electrical ground reference test points. Using temporary connections, such as vice grips or other compression clamps, measure the electrical resistance between the two different pieces of rebar to ensure that the rebar test points are electrically continuous with the bulk of the rebar in the concrete structure. If either piece of rebar is not securely wire tied to all the other rebar in the encasement or vault, then the electrical resistance measurement will yield erroneous or misleading data. A maximum resistance of 0.10 ohm between the two rebar test points is required before continuing with the electrical isolation test. Connect two unspliced lengths of minimum size No. 6 AWG bare copper stranded grounding cable to two different pieces of rebar. Each ground cable connection to the rebar shall be made with a separate exothermic weld or a separate mechanical compression ground clamp.
- F. Direct Resistance Isolation Test: Testing shall first be performed using the Direct Resistance Test. Attach one pair of the resistance test leads to the pipe and one pair of resistance test leads to the rebar then measure the pipe to rebar resistance. If the resistance is 10 ohms or more, the pipe is sufficiently electrically isolated from the rebar. If the test reading is less than 10 ohms, proceed with the Steel Polarization Isolation Test described below.
- G. Steel Polarization Isolation Test:
1. Step 1: Measure the baseline CP potentials of the buried pipeline and of the rebar using a stationary location for a copper sulfate reference electrode. Place the reference electrode in soil at an offset distance from the pipeline equal to approximately the length or width (whichever is greater) of the concrete structure under construction. If the difference between the readings of the pipe and rebar is 500 millivolts dc or more, that indicates sufficient electrical isolation. This test must be done with all nearby sources of cathodic protection electrical current turned off or disconnected, and with all welding equipment turned off. If the difference is less than 500 millivolts dc, record the baseline CP Potentials and proceed to the next step.
 2. Step 2: Set up a temporary dc power source such as a truck battery, a minimum 300-watt, 2-ohm to 4-ohm, power rheostat, a calibrated electrical shunt, and two minimum No. 6 AWG test cables. Set up the dc power source with the positive cable connected to the rebar and the negative cable connected to the pipe. Initially adjust the rheostat for the largest resistance/smallest current and measure the current flow. Adjust the electrical power to a minimum current of 1 dc amp, maximum of

- 10 dc amps. Allow the dc current to flow for a minimum of 5 minutes then shut off the test current.
3. Step 3: Re-measure CP Potentials of the pipe and rebar using the same reference electrode in the same location with the test current off. These are called polarized CP potentials.
 4. Step 4: Compare the polarized CP Potentials with the previously measured baseline CP Potentials. If the pipe is electrically isolated from the rebar, the test current will polarize the buried pipeline's steel cathodically (i.e., a more negative CP Potential) and shift the rebar anodically (i.e., a more positive CP Potential). If the difference between the polarized potentials of the pipeline and rebar is less than 300 millivolts dc, there are one or more metallic contacts between the buried pipeline and the rebar. If the difference is 300 millivolts dc or greater, the steel pipeline is sufficiently electrically isolated from the rebar.
- H. In no case shall an electrical resistance measurement made with a hand held volt-ohm multimeter be accepted as an accurate isolation test procedure. In the event of a question regarding the electrical isolation of the pipeline, the Design Engineer shall make the final determination.
- I. Electrical isolation tests shall be conducted for each pipeline encasement, each pipe to vault penetration, and any other reinforced concrete structure that a pipeline passes through. The electrical isolation tests must be performed by the City's Corrosion Engineer one day before concrete is placed, and the day after concrete is placed. The Construction Manager will witness the electrical isolation test conducted before the concrete is placed.
- J. After the pipeline passes the rebar isolation test, direct bury the two bare copper ground cables connected to the rebar to a flush-to-grade concrete ground box near the pipe-vault penetration. Provide a cover for the test box marked GROUND. Provide a minimum of 2 feet of extra ground cable inside the rebar ground test box. If there is a nearby cathodic protection test box, the rebar ground wires can be run into that box. If the rebar test wires are not long enough to reach the permanent test box, splice additional wire to them using two brass split bolts for each splice. No coating is required for the connections.

3.16 PIPELINE CONTINUITY THROUGH IN-LINE APPURTENANCES AND PIPE JOINTS

- A. The Contractor's Corrosion Engineer shall measure the linear resistance of sections of pipe in which in-line valves, nonwelded pipe joints, or other flanged mechanical joints have been installed. All testing shall be done by the Corrosion Engineer in the presence of the Construction Manager.
- B. Test Method: Resistance shall be measured by the linear resistance method. A direct current shall be impressed from one end of the test section to the other (test station to test station). A voltage drop is measured for a given current level. The measured resistance (R) is calculated using the equation $R=dV/I$, where dV is the voltage drop between the test span and I is the corresponding current. The resistance shall be measured at least three times for accuracy.
- C. Alternative Methods: If other electrical continuity test methods are proposed, the Contractor shall prepare a written test procedure specifying the alternate method and equipment that will be used. A standard handheld digital multi-test meter's ohmmeter circuit (e.g., Fluke 87) is not suitable for properly making these electrical resistance measurements. Submit in writing the alternate proposed test method to the Construction Manager for approval a minimum of 30 days before the pipe laying begins. The alternative method must be acceptable to the City's Corrosion Engineer with written approval before being conducted by the Contractor.
- D. Acceptance: Acceptance is a comparison between the measured resistance (from the field test data) and the theoretical resistance. The theoretical resistance must consider the pipe (length and wall thickness) and the resistance of the bond wires. The measured resistance shall not exceed the theoretical resistance by more than 120 percent to determine electrical continuity. The Contractor's Corrosion Engineer shall submit, within 7 days of the completion of the testing, and in a report format, to the Construction Manager and Design Engineer, all calculations of the theoretical resistance and measured pipe resistance for each section tested.

3.17 CATHODIC PROTECTION PERFORMANCE

- A. Responsibility: The cathodic protection system shall be activated and tested by the Corrosion Engineer in the presence of the City's Corrosion Engineer. Upon completion of the performance testing, the Contractor shall adjust the level of protection in accordance with NACE SP0169 to a structure-to-electrolyte potential of minus 850 mV or more negative as measured with respect to a saturated copper/copper sulfate (CSE) reference electrode. This potential may be either a direct measurement of the polarized potential or a

current-applied potential. Interpretation of a current-applied measurement requires consideration of the significance of voltage drops in the earth and metallic paths.

- B. Test Method: Achievement of cathodic protection shall be accomplished by a pipe-to-soil potential survey at each test station of the pipeline. In the event that the full length of the pipeline has not been installed, then the extent of the survey shall be determined by the Construction Manager. Potential survey data shall include native pipe-to-soil potentials and instant-off pipe-to-soil potentials.
- C. Acceptance Criterion for Steel Pipe With Dielectric Coating:
 - 1. The operation of the cathodic protection system for steel pipelines with a dielectric coating shall be tested to ensure that all portions of the buried pipeline are provided a full level of corrosion protection. The standard used to evaluate the CP potential measurements shall be as follows:
 - a. Minus 0.850-Volt CP Instant Off Potential: A negative voltage of at least minus 0.850-volt as measured between the buried pipeline and a copper sulfate reference electrode contacting the soil immediately over or adjacent to the pipeline in accordance with NACE SP0169. Determination of this voltage is to be made with the cathodic protection current momentarily interrupted. Voltage drops must be considered for valid interpretation of this voltage measurement.

3.18 COMPLIANCE WITH SPECIFICATIONS

- A. Deficiencies:
 - 1. Any deficiencies or omission in materials or workmanship shall be rectified by the Contractor and at their expense. Deficiencies shall include, but not limited to:
 - a. Anode failures, electrical discontinuities, lack of electrical isolation, broken or missing test leads or test boxes, improper or unclean trench backfill, and other deficiencies associated with the workmanship, installation, and nonfunctioning equipment.

END OF SECTION

SECTION 26 43 00
SURGE PROTECTION DEVICES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product data on each suppressor type, indicating component values, part numbers, and conductor sizes. Include dimensional drawing for each, showing mounting arrangements.
- B. Manufacturer's UL certified test data and nameplate data for each SPD.

1.02 QUALITY ASSURANCE

- A. UL Compliance and Labeling: For power and signal circuits, SPD devices shall comply with UL 1449 and complimentary listed to UL 1283 as an electromagnetic interference filter. Provide units that are listed and labeled by UL.
- B. ANSI Compliance: Use SPD devices in compliance with the recommendations of IEEE C62.41.1, IEEE C62.41.2, and IEEE C62.45.

PART 2 PRODUCTS

2.01 GENERAL

- A. SPD devices shall be capable of performance at ambient temperatures between minus 40 degrees C and 60 degrees C, at relative humidity ranging from 0 percent to 95 percent, and at altitudes ranging from sea level to 12,000 feet.
- B. SPD devices shall be fused to disconnect the suppressor from the electrical source should the suppressor fail. The fusing shall allow full surge handling capabilities and to afford safety protection from thermal overloads and short circuits.
- C. Design SPD devices for the specific type and voltage of the electrical service. Single-phase and three-phase wye-configured systems shall have L-N, L-G, and N-G protection. Grounded delta-configured systems shall have L-L and L-G protection.
- D. Power Filter: The SPD shall include a high frequency extended range power filter complimentary listed to UL 1283 as an electromagnetic interference filter.

2.02 MANUFACTURERS

- A. Innovative Technology; VanGuard Series.
- B. Advanced Protection Technologies, Inc.
- C. General Electric.
- D. Eaton.
- E. Or approved equal.

2.03 MAIN DISTRIBUTION SPD

- A. Provide SPD meeting IEEE C62.41.1 and IEEE C62.41.2 location in accordance with Category C.
- B. Surge current capacity shall be not less than the following:
 - 1. L-N Capacity: 200 kA.
 - 2. L-G Capacity: 120 kA.
 - 3. N-G Capacity: 120 kA.
- C. Suppressor housing shall be in an enclosure that has the same NEMA rating as the equipment it protects and painted to match.
- D. UL 1449 maximum suppression voltage shall not be more than:

System Voltage	Phase	L-L or L-N Suppression Voltage
120	1	400
208Y/120	3	400
240	3	800
480Y/277	3	800

2.04 PANELBOARD SPD

- A. Provide SPD meeting IEEE C62.41.1 and IEEE C62.41.2 location Category B.
- B. Surge current capacity shall be not less than the following:
 - 1. L-L Capacity: 80 kA.
 - 2. L-N Capacity: 80 kA.

- 3. L-G Capacity: 80 kA.
 - 4. N-G Capacity: 80 kA.
- C. Suppressor shall be in an enclosure that has the same NEMA rating as the panel it protects or the SPD may be integral to a panelboard.
- D. UL 1449 maximum clamp voltage shall not be more than:

System Voltage	Phase	L-L or L-N Clamp Voltage
120	1	400
208Y/120	3	400
240	3	800
480Y/277	3	800

2.05 ANNUNCIATION

- A. Provide unit or separately mounted LED-type indication lights to show the normal and failed status of each module. Provide one normally open and one normally closed contacts which operate when the unit fails.

2.06 SURGE COUNTER

- A. Provide each SPD rated above 100 kA with a counter displaying the number of voltage transients that have occurred on the unit input. The counter shall be battery backed and retain the count through system power outages.

PART 3 EXECUTION

3.01 APPLICATION REQUIREMENTS

- A. Install SPD when indicated on Drawings and:
 - 1. Main distribution SPD in or near each low-voltage switchgear, switchboard, or other major load center.
 - 2. Main distribution SPD in or near each motor control center.
 - 3. Panelboard SPD In or near each 480V distribution panelboard unless otherwise indicated.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Install suppressors according to manufacturer's recommendations.
- B. Install suppressors directly to the cabinet which houses the circuit to be protected so that the suppressor leads are straight and short, with all conductors laced, running directly to the point of connection within the panel, without loops or bends. If bends are unavoidable, no bend may exceed 90 degrees and bending radius may not be less than 6 inches.
- C. Connecting wires shall be as short as possible with gently twisted conductors, tied together, to prevent separation. Connecting wires shall not exceed 24 inches in length at any point.
- D. Field installed conductors shall be the same as specified for building wire, not smaller than No. 8 AWG and not larger than No. 4 AWG. Device leads shall not be longer than the length recommended by the manufacturer, unless specifically reviewed and approved by the manufacturer.
- E. Provide dedicated disconnecting means for SPD devices installed at main service entrance location, switchgear, and motor control centers. Provide dedicated 30-amp to 60-amp circuit breakers (size dependent upon wire size used) with number of poles as required, as disconnecting means for SPD devices installed at panelboards. The interrupting capacity of the circuit breakers shall be that specified for the other breakers at that location.

END OF SECTION

**SECTION 31 10 00
SITE CLEARING**

PART 1 GENERAL

1.01 DEFINITIONS

- A. Interfering or Objectionable Material: Trash, rubbish, and junk; vegetation and other organic matter, whether alive, dead, or decaying; topsoil.
- B. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots greater than 2-inch caliper to a depth of 6 inches below subgrade.
- D. Scalping: Removal of sod without removing more than upper 3 inches of topsoil.
- E. Stripping: Removal of topsoil remaining after applicable scalping is completed.
- F. Project Limits: Areas, as shown or specified, within which Work is to be performed.

1.02 SUBMITTALS

- A. Action Submittals: Drawings clearly showing clearing, grubbing, and stripping limits.

1.03 QUALITY ASSURANCE

- A. Obtain Design Engineer's approval of staked clearing, grubbing, and stripping limits, prior to commencing clearing, grubbing, and stripping.

1.04 SCHEDULING AND SEQUENCING

- A. Prepare Site only after adequate erosion and sediment controls are in place. Limit areas exposed uncontrolled to erosion during installation of temporary erosion and sediment controls.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 GENERAL

- A. Clear, grub, and strip areas actually needed for Site improvements within limits shown or specified.
- B. Do not injure or deface vegetation that is not designated for removal.

3.02 LIMITS

- A. As follows, but not to extend beyond Project limits.
 - 1. Excavation Excluding Trenches: 5 feet beyond top of cut slopes.
 - 2. Trench Excavation: 10 feet from trench centerline, regardless of actual trench width.
 - 3. Fill:
 - a. Clearing and Grubbing: 5 feet beyond toe of permanent fill.
 - b. Stripping and Scalping: 5 feet beyond toe of permanent fill.
 - 4. Structures: 15 feet outside of new structures.
 - 5. Roadways: Clearing, grubbing, scalping, and stripping 5 feet from roadway shoulders.
 - 6. Other Areas: As shown.
- B. Remove rubbish, trash, and junk from entire area within Project limits.

3.03 CLEARING

- A. Clear areas within limits shown or specified.
- B. Fell trees so that they fall away from facilities and vegetation not designated for removal.
- C. Cut stumps not designated for grubbing flush with ground surface.
- D. Cut off shrubs, brush, weeds, and grasses to within 2 inches of ground surface.

3.04 GRUBBING

- A. Grub areas within limits shown or specified.

3.05 SCALPING

- A. Do not remove sod until after clearing and grubbing is completed and resulting debris is removed.

- B. Scalp areas within limits shown or specified.

3.06 STRIPPING

- A. Do not remove topsoil until after scalping is completed.
- B. Strip areas within limits to minimum depths shown or specified. Do not remove subsoil with topsoil.
- C. Stockpile strippings for topsoil, separately from other excavated material.

3.07 TREE REMOVAL OUTSIDE CLEARING LIMITS

- A. Remove Within Project Limits: Dead, dying, leaning, or otherwise unsound trees that may strike and damage Project facilities in falling.
- B. Cut stumps off flush with ground, remove debris, and if disturbed, restore surrounding area to its original condition.

3.08 DISPOSAL

- A. Clearing and Grubbing Debris:
 - 1. Dispose of debris offsite.
 - 2. Burning of debris onsite will not be allowed.
 - 3. Woody debris may be chipped. Chips cannot be used anywhere for landscaping in this Project, and they may be sold to Contractor's benefit. Dispose of chips that are unsaleable with unchipped debris.
 - 4. Limit offsite disposal of clearing and grubbing debris to locations that are approved by federal, state, and local authorities, and that will not be visible from Project.
- B. Scalpings: As specified for clearing and grubbing debris.
- C. Strippings:
 - 1. Dispose of strippings that are unsuitable for topsoil or that exceed quantity required for topsoil offsite or in waste disposal areas shown or approved by Design Engineer.
 - 2. Stockpile topsoil in sufficient quantity to meet Project needs. Dispose of excess strippings as specified for clearing and grubbing.

END OF SECTION

SECTION 31 23 13
SUBGRADE PREPARATION

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
 - b. D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.02 DEFINITIONS

- A. Optimum Moisture Content: As defined in Section 31 23 23, Fill and Backfill.
- B. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.
- C. Relative Compaction: As defined in Section 31 23 23, Fill and Backfill.
- D. Relative Density: As defined in Section 31 23 23, Fill and Backfill.
- E. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil or excavating prior to placement of fill, backfill, roadway structure or base for floor slab.
- F. Proof-Rolling: Testing of subgrade by compactive effort to identify areas that will not support the future loading without excessive settlement. Proof-rolling can be completed with a fully loaded ten-wheel dump truck or water truck making a minimum of two complete passes.
- G. Unsuitable Material: As defined in Section 31 23 23.15, Trench Backfill.

1.03 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Section 02 41 00, Demolition; Section 31 10 00, Site Clearing; and Section 31 23 16, Excavation, prior to subgrade preparation.

1.04 QUALITY ASSURANCE

- A. Notify Construction Manager when subgrade is ready for compaction or proof-rolling or whenever compaction or proof-rolling is resumed after a period of extended inactivity.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 GENERAL

- A. Keep subgrade free of water, debris, and foreign matter during compaction or proof-rolling.
- B. Bring subgrade to proper grade and cross-section and uniformly compact surface.
- C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.
- D. Maintain prepared ground surface in finished condition until next course is placed.

3.02 COMPACTION

- A. Under Earthfill: Scarify and compact upper 6 inches to minimum of 90 percent relative compaction as determined in accordance with ASTM D1557.
- B. Under Pavement Structure, Floor Slabs-on-Grade, or Granular Fill Under Structures: Compact the upper 6 inches to minimum of 95 percent relative compaction as determined in accordance with ASTM D1557.
- C. Pipe Trench Subgrade: Make three complete passes using hand guided vibratory plate compactors, under observation by Construction Manager. Operate at a slow walking pace as coordinated with the Construction Manager.

3.03 MOISTURE CONDITIONING

- A. Dry Subgrade: Add water, then mix to make moisture content uniform throughout.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

3.04 TESTING

- A. Proof-roll subgrade (except in pipe trenches) to detect soft or loose subgrade or unsuitable material, as determined by Construction Manager.
- B. Detect soft or loose pipe trench subgrade by observation of the vibratory plate compactors in Article Compaction, above.
- C. In-Place Density Tests: Owner will perform compaction testing in accordance with ASTM D6938. A minimum of one density test for every 50-foot by 50-foot subgrade area is required. See Section 01 31 13, Project Coordination for additional requirements.

3.05 CORRECTION

- A. Soft or Loose Subgrade:
 - 1. Adjust moisture content and recompact.
 - 2. Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.
- B. Unsuitable Material: Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.

END OF SECTION

**SECTION 31 23 16
EXCAVATION**

PART 1 GENERAL

1.01 DEFINITIONS

- A. Common Excavation: Removal of material not classified as rock excavation.
- B. Rock Excavation:
 - 1. General: Removal of solid material which by actual demonstration cannot, in Construction Manager's opinion, be reasonably loosened or ripped by single-tooth, hydraulically operated ripper mounted on crawler tractor in good condition and rated at minimum 300 flywheel horsepower; and which must be systematically drilled or broken by power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means prior to removal.
 - 2. Trench: Removal of solid material which by actual demonstration cannot, in Construction Manager's opinion, be reasonably excavated with minimum 135 hp backhoe in good condition and equipped with manufacturer's standard boom, two rippers, and rock points or similar approved equipment; and which must be systematically drilled or broken by power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means prior to removal.
 - 3. Term "rock excavation" indicates removal of solid material, as specified above, and does not necessarily correspond to "rock" as implied by names of geologic formations. Material that for convenience or economy is loosened by drilling or the use of pneumatic tools is not considered rock excavation.
 - 4. Removal of boulders larger than 1/2 cubic yard will be classified as rock excavation, if drilling or breaking them apart with power-operated hammer, hydraulic rock breaker, expansive compounds, or other similar means is both necessary and actually used for their removal.
- C. Influence Area:
 - 1. Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
 - a. 1 foot outside outermost edge at base of foundation or slabs.
 - b. 1 foot outside outermost edge at surface of roadways or shoulder.
 - c. 0.5 foot outside exterior at spring line of pipes or culverts.
- D. Unsuitable Material: Excavated material that is unsuitable for use as backfill material as specified in Section 31 23 23.15, Trench Backfill.

1.02 SUBMITTALS

A. Informational Submittals:

1. Excavation Plan, Detailing:
 - a. Methods and sequencing of excavation.
 - b. Proposed locations of stockpiled excavated material.
 - c. Proposed onsite and offsite spoil disposal sites.
 - d. Numbers, types, and sizes of equipment proposed to perform excavations.
 - e. Anticipated difficulties and proposed resolutions.
2. Required excavation permits from applicable governing agencies.

1.03 QUALITY ASSURANCE

- A. Provide adequate survey control to avoid unauthorized overexcavation.

1.04 WEATHER LIMITATIONS

- A. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.05 SEQUENCING AND SCHEDULING

- A. Demolition: Complete applicable Work specified in Section 02 41 00, Demolition, prior to excavating.
- B. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 31 10 00, Site Clearing, prior to excavating.
- C. Dewatering: Conform to applicable requirements of Section 31 23 19.01, Dewatering, prior to initiating excavation.
- D. Excavation Support: Install and maintain, as specified in Section 31 41 00, Shoring, as necessary to support sides of excavations and prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 GENERAL

- A. Comply with applicable excavation permits.

- B. Prior to excavating, install erosion and sediment control measures as specified with required permits.
- C. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth. Furnish, place, and maintain supports and shoring that may be required for the sides of the excavations.
- D. Use of Excess Excavated Materials:
 - 1. Use of excess excavated materials to complete fills or produce granular rock products required for the Work is permitted under following conditions:
 - a. Process excavated materials to meet specified material requirements.
 - b. In the event that excavated materials or processed materials do not meet the specified material requirements, import the specified material.
 - c. Only use excavated materials from excavations actually required for the Work for generating fills or other granular rock products required for the Work. No borrow excavations intended solely to generate materials for processing are allowed.
- E. Removal and Exclusion of Water: Remove and exclude water, if encountered, from open excavations, including stormwater, groundwater, irrigation water and wastewater as specified in Section 31 23 19.01, Dewatering.
- F. Do not overexcavate without written authorization of Construction Manager.
- G. Remove or protect obstructions as shown and as specified in Section 01 50 00, Temporary Facilities and Controls, Article Protection of Work and Property.
- H. Use of explosives for blasting to assist rock excavation is not allowed.

3.02 CLASSIFIED EXCAVATION

- A. Excavation is classified; see Article Definitions for classifications of common excavation and rock excavation. Notify Construction Manager whenever rock is encountered.

- B. Before beginning rock excavation, comply with following requirements:
1. Remove overlying material as common excavation and expose rock surface for examination by Construction Manager.
 2. Demonstrate that removal of remaining material classifies as rock excavation unless waived by Construction Manager.
 3. Assist Construction Manager with measurement and documentation of rock excavation.
- C. Predrilling may be allowed prior to removal of overburden if, in Construction Manager's opinion, top-of-rock line can be clearly defined after excavation. Acceptance of this method will be based on the following demonstration:
1. Predrill and excavate initial 100-foot long test section.
 2. Excavate minimum of two 20-foot long trenches to apparent rock line immediately adjacent to predrilled section for comparison.
- D. In event of disputed quantities, excavate additional correlation trenches to apparent rock as considered necessary by Construction Manager to resolve dispute. Construction Manager reserves right to stop predrilling if, in Construction Manager's opinion, experience indicates that accurate determination of rock quantities is not possible by this method.

3.03 TRENCH WIDTH

- A. Minimum Width of Trenches:
1. For sewers, potable water mains, irrigation, recycled water mains, and storm drains, refer to Drawing No. SDS-110, SDW-110, SDI-110, SDRW-101, and SDD-110, respectively, of the City of San Diego Standard Drawings.
 2. For other Single Pipe, Conduit, Direct-Buried Cable, and Duct Bank:
 - a. Less than 4-inch Outside Diameter or Width: 18 inches.
 - b. Greater than 4-inch Outside Diameter or Width: 24 inches greater than outside diameter or width of pipe, conduit, direct-buried cable, or duct bank.
 3. For other Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 24 inches greater than aggregate width of pipes, conduits, cables, duct banks, plus space between.
 4. Increase trench widths by thicknesses of shoring.

- B. Maximum Trench Width:
 - 1. For sewers, potable water mains, irrigation, recycled water mains, and storm drains, refer to Drawing Nos. SDS-110, SDW-110, SDI-110, SDRW-101, and SDD-110, respectively, of the City of San Diego Standard Drawings.
 - 2. For Other Pipes: Unlimited, unless otherwise shown or specified, or unless excess width will cause damage to existing facilities, adjacent property, or completed Work.

3.04 PIPE AND UTILITY TRENCH EXCAVATION

- A. Perform in accordance with the safety requirements of the California Occupational Safety and Health Administration, latest edition.
- B. General: Unless otherwise indicated or ordered, open-cut trenches with widths as indicated for excavation for pipelines and utilities.
- C. Open Trench Length: Unlimited.
- D. Trench Bottom: Uniformly excavate and smooth the bottom of the trench to the grade of the bottom of the pipe bedding. Remove loose or disturbed material from the bottom of the trench, including excavator ridges.
- E. Overexcavation: Overexcavate where required by Design Engineer. Backfill excavation below the grade ordered with the indicated material and compaction specified in Section 31 23 23.15, Trench Backfill.
- F. Trench Overexcavation: Where trenches are indicated to be overexcavated, excavate to the depth indicated, and install backfill to the grade of the bottom of the pipe bedding.
- G. Where pipelines are to be installed in embankments, fills, or structure backfills, construct the fill in accordance with Section 31 23 23, Fill and Backfill, to a level at least 2 feet above the top of the proposed pipe elevation before the trench is excavated.
- H. If a moveable trench shield is used during excavation operations, construct the trench width wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls. Remove the trench shield and stabilize the trench if the trench walls cave in or slough.

3.05 STRUCTURE, EMBANKMENT, AND CUT SLOPE EXCAVATION

- A. Foundation Preparation Beneath Structure and Embankments:
1. Except where otherwise ordered by Construction Manager, clear, grub, and strip areas beneath structure and embankment in accordance with Section 31 10 00, Site Clearing. After clearing is completed, scarify entire areas that underlie fill sections to a depth of 6 inches and until surface is free of ruts, excessive water, and other features which would prevent uniform compaction by equipment to be used. Recompact areas to specified density before placing of fill material as specified in Section 31 23 13, Subgrade Preparation. Where cemented rock, cobbles, or boulders compose a large portion of foundation material underlying structures, it may not be advisable to scarify the top 6 inches prior to compaction. If Construction Manager deems it advisable not to scarify existing natural ground, then moisten the native soil and compact it as indicated.
 2. Overexcavate 2 feet within the influence area under the perimeter footing and interior column footings below the Equalization Basin and backfill with compacted granular fill over undisturbed earth or prepared subgrade as specified in Section 31 23 23, Fill and Backfill.
- B. Surveying of Excavation Slopes: Place survey stakes or other identification at vertical intervals of 5 feet from the top of the excavation to the bottom of cut slope. Set stakes at 50-foot maximum intervals around the excavation perimeter. Stakes shall indicate the deviation from the grade indicated on Drawings. Maintain the specified cut slope at points along the slope.
- C. Excavated Materials: Place excavated material within Work Limits at designated locations identified by the Construction Manager and as further specified in Article Stockpiling Excavated Material. Separate materials that are usable as backfill or fill from unsuitable material and as further specified in Part 3, Article General.
- D. Notification: Notify Construction Manager at least 3 working days in advance of placing any embankment on prepared subgrade or as backfill in an excavation and allow Construction Manager a review period of at least 1 day before the exposed foundation is scarified and compacted or is covered with backfill or with any other materials.
- E. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.
- F. Remove stones and rock that exceed 3-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.

- G. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite, or adversely impacts existing facilities, adjacent property, or completed Work.

3.06 STOCKPILING EXCAVATED MATERIAL

- A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- B. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable by equipment operators from their normal seated position.
- C. Confine stockpiles to within approved work areas. Do not obstruct roads or streets.
- D. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- E. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.
- F. Stockpile excavated material on the downhill side of the excavation where practicable.

3.07 INSPECTION AND TESTING

- A. Grading and excavation will be performed under the observation and testing of the Construction Manager. The Construction Manager must be notified at the following stages:
 - 1. Upon completion of site clearing.
 - 2. During excavation and backfill placement and compaction.
 - 3. After completion of foundation excavations and prior to placement of concrete.
 - 4. When any unusual or unexpected geotechnical conditions are encountered.

3.08 DISPOSAL OF SPOIL

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.

- B. Dispose of debris resulting from removal of underground facilities as specified in Section 02 41 00, Demolition, for demolition debris.
- C. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 31 10 00, Site Clearing, for clearing and grubbing debris.

END OF SECTION

**SECTION 31 23 19.01
DEWATERING**

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Water control plan.
2. Well permits.
3. Discharge permits.

1.02 WATER CONTROL PLAN

A. As a minimum, include:

1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment; methods; standby equipment and power supply, means of measuring inflow to excavations, pollution control facilities, discharge locations to be utilized, and provisions for immediate temporary water supply as required by this section.
2. Drawings showing locations, dimensions, and relationships of elements of each system.
3. Design calculations demonstrating adequacy of proposed dewatering systems and components.

B. Water Control Plan and Dewatering Systems shall be prepared by a Groundwater Control Specialist: A licensed professional engineer currently registered in the State of California, with a list of projects and references designing dewatering plans and systems. Construction Manager's review and acceptance of submittal does not imply approval by Construction Manager of the associated Water Control Plan and Dewatering Systems. Contractor shall be solely responsible for designing, installing, operating and maintaining the system(s) required to satisfactorily perform all necessary dewatering.

C. If system is modified during installation or operation, revise or amend and resubmit Water Control Plan.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 GENERAL

- A. If groundwater is encountered at or above the base of any excavation, groundwater control will be required to limit disturbance of the subgrade soil and instability of the excavation bottom, sides, and face.
- B. Continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.

3.02 SURFACE WATER CONTROL

- A. See Section 01 50 00, Temporary Facilities and Controls, Article Temporary Controls.
- B. Remove surface runoff controls when no longer needed.

3.03 SITE CONDITIONS

- A. Subsurface Information: The Contract Documents indicate information available relative to subsurface conditions at the Site. Such information and data is not intended as a representation or warranty of continuity of conditions between soil borings, nor of groundwater levels at dates and times other than date and time when measured, nor that purpose of obtaining the information and data were appropriate for use by Contractor. Engineer will not be responsible for interpretations or conclusions drawn therefore by Contractor. Refer to Special Provisions for additional information.

3.04 DEWATERING SYSTEMS

- A. Evaluate groundwater data, design, and implement most efficient dewatering methods while meeting Project requirements.
- B. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in dry and to lower and maintain groundwater level a minimum of 2 feet below the lowest point of excavation. Continuously maintain excavations free of water, regardless of source, and until backfilled to final grade.

- C. Dewatering systems shall include wells or well points, and other equipment and appurtenances installed outside limits of excavations and sufficiently below lowest point of excavation, or to maintain specified groundwater elevation.
- D. Design and Operate Dewatering Systems:
 - 1. To prevent loss of ground as water is removed.
 - 2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
 - 3. To relieve artesian pressures and resultant uplift of excavation bottom.
 - 4. To prevent instability of faces of excavation.
- E. Provide sufficient redundancy in each system to keep excavation free of water in event of component failure.
- F. Provide 100 percent emergency power backup with automatic startup and switchover in event of electrical power failure.
- G. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering.
- H. Stormwater Control:
 - 1. Use diversion berms, ditches, or other means to reduce stormwater flow into excavations or other construction areas.
 - 2. Implement best management practices to reduce erosion and sedimentation during construction.

3.05 DISPOSAL OF WATER

- A. Obtain discharge permit for water disposal from authorities having jurisdiction.
- B. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.
- C. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
- D. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

3.06 PROTECTION OF PROPERTY

- A. Make assessment of potential for dewatering induced settlement. Provide and operate devices or systems, including but not limited to reinjection wells, infiltration trenches and cutoff walls, necessary to prevent damage to existing facilities, completed Work, and adjacent property.
- B. Securely support existing facilities, completed Work, and adjacent property vulnerable to settlement due to dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

3.07 REMEDIATION OF GROUNDWATER DEPLETION

- A. If dewatering reduces quantity or quality of water produced by existing wells, temporarily supply water to affected well owners from other sources. Furnish water of a quality and quantity equal to or exceeding the quality and quantity available to well owner prior to beginning the Work or as satisfactory to each well owner.

END OF SECTION

**SECTION 31 23 23
FILL AND BACKFILL**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C117, Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - c. D422, Standard Test Method for Particle-Size Analysis of Soils.
 - d. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
 - e. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - f. D4254, Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - g. D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 2. 2018 “Greenbook” Standard Specifications for Public Works Construction.
 3. 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

1.02 DEFINITIONS

- A. Relative Compaction:
1. Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.
 2. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by Construction Manager.

- B. Optimum Moisture Content:
1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
 2. Determine field moisture content on basis of fraction passing 3/4-inch sieve.
- C. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
- D. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.
- E. Prepared Subgrade: Subgrade preparation in accordance with Section 31 23 13, Subgrade Preparation.
- F. Completed Course: A course or layer that is ready for next layer or next phase of Work.
- G. Lift: Loose (uncompacted) layer of material.
- H. Geosynthetics: Geotextiles.
- I. Well-Graded:
1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
 2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
 3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
- J. Influence Area:
1. Area within planes sloped downward and outward at 60-degree angle from horizontal measured from:
 - a. 1 foot outside outermost edge at base of foundations or slabs.
 - b. 1 foot outside outermost edge at surface of roadways or shoulder.
 - c. 0.5 foot outside exterior at spring line of pipes or culverts.
- K. Borrow Material: Material from required excavations on or near Site.

- L. Selected Backfill Material: Materials available onsite that Design Engineer determines to be suitable for specific use.
- M. Imported Material: Materials obtained from sources offsite, suitable for specified use.
- N. Structural Fill: Fill materials as required under structures, pavements, and other facilities.
- O. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.
- P. Standard Specifications: When referenced in this section, shall mean the latest editions of the “Greenbook” Standard Specifications for Public Works Construction and the City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. Manufacturer’s data sheets for compaction equipment.
 - 2. Certified test results from independent testing agency.

1.04 QUALITY ASSURANCE

- A. Notify Construction Manager when:
 - 1. Structure or tank is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
 - 2. Soft or loose subgrade materials are encountered wherever site fill is to be placed.
 - 3. Fill material appears to be deviating from Specifications.
- B. Quality Control and Acceptance for Biofiltration Soil Media (BSM): Close adherence to the material quality controls herein are necessary in order to assure sufficient permeability to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and to support healthy vegetation. Amendments may be included to adjust agronomic properties. Acceptance of the material will be based on test results conducted no more than 120 days prior to delivery of the blended BSM to the Project Site and certified to be representative. For projects installing more than 100 cubic yards of BSM, batch-specific tests of components and blended mix are required and locations of material batches shall be provided to the Construction Manager.

1.05 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Section 02 41 00, Demolition; Section 31 10 00, Site Clearing; Section 31 23 16, Excavation; and Section 31 23 13, Subgrade Preparation, prior to placing fill or backfill.
- B. Backfill against concrete structures only after concrete has attained compressive strength, specified in Section 03 30 00, Cast-in-Place Concrete. Obtain Construction Manager's acceptance of concrete work and attained strength prior to placing backfill.
- C. Backfill around water-holding structures only after completion of satisfactory leakage tests as specified in Section 03 30 00, Cast-in-Place Concrete.
- D. Do not place granular base, subbase, or surfacing until after subgrade has been prepared as specified in Section 31 23 13, Subgrade Preparation.
- E. Delivery, Storage, and Handling of Biofiltration Soil Media (BSM):
 - 1. The Contractor shall not deliver or place soils in frozen, wet, or muddy conditions.
 - 2. The Contractor shall protect soils and mixes from absorbing excess water and from erosion at all times. The Contractor shall not store materials unprotected from large rainfall events. The Contractor shall not allow excess water to enter site prior to compaction. If water is introduced into the material after grading, the Contractor shall allow material to drain or aerate to optimum compaction moisture content.

PART 2 PRODUCTS**2.01 SOURCE QUALITY CONTROL**

- A. Gradation Tests:
 - 1. As necessary to locate acceptable sources of imported material.
 - 2. During production of imported material, test per ASTM D422 or ASTM C136 as follows:
 - a. Granular Fill: Minimum one test per day or every 2,000 cubic yards.
 - b. Sand: Minimum one test per day or every 2,000 cubic yards.
 - c. Granular Drain Material: Minimum one test per day or every 1,000 cubic yards.
 - d. Gravel Surfacing and Base Course Rock: Minimum one test per day or every 1,000 cubic yards.
 - e. Foundation Stabilization Rock: Minimum one test per day or every 1,000 cubic yards.

- f. Soil Cover Over Geotextiles: Minimum one test per day or every 2,000 cubic yards.

2.02 EARTHFILL

- A. Excavated material from required excavations and designated borrow sites, free from rocks larger than 6 inches, from roots and other organic matter, trash, debris, and other deleterious materials.
- B. Provide imported material of equivalent quality, if required to accomplish Work.

2.03 GRANULAR FILL

- A. 1-inch minus crushed gravel or crushed rock.
- B. Free from dirt, clay balls, and organic material.
- C. Well-graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 8 percent by weight passing No. 200 sieve.

2.04 SAND

- A. Free from clay, organic matter, or other deleterious material.
- B. Gradation as determined in accordance with ASTM C117 and ASTM C136:

Sieve Size	Percent Passing by Weight
1/4-inch	100
No. 4	95 - 100
No. 200	0 - 8

- C. See Section 200-1.5 of 2018 “Greenbook” Standard Specifications for Public Works Construction.
- D. See Table 200-1.5.5 and Section 200-1.5.7 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

2.05 GRANULAR DRAIN MATERIAL

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.06 WATER FOR MOISTURE CONDITIONING

- A. Free of hazardous or toxic contaminants, or contaminants deleterious to proper compaction.

2.07 GRAVEL SURFACING AND BASE COURSE ROCK

- A. As specified in Section 32 11 23, Aggregate Base Courses.

2.08 FOUNDATION STABILIZATION ROCK

- A. Crushed rock or pit run rock.
- B. Uniformly graded from coarse to fine.
- C. Free from excessive dirt and other organic material.
- D. Maximum 2-1/2-inch particle size.

2.09 SOIL COVER OVER GEOTEXTILES

- A. Particle Size: Maximum 1 inch.
- B. Free of sharp angular pieces that may damage geotextile.

2.10 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.11 BIORETENTION SOIL MEDIA (BSM) MIX

- A. Bioretention Soil Media (BSM) shall conform to the City of San Diego BMP Handbook with the following modifications:
 - 1. BSM shall conform to the following Saturation Extract or SPLP criteria:
 - a. Nitrate less than 0.68 mg/L.
 - b. Phosphorous less than 1 mg/L.
 - c. Zinc less than 0.1 mg/L.
 - d. Copper less than 0.025 mg/L.
 - 2. Instead of typical sand/compost mix, refer to Appendix F.4.1.3 of the 2016 City of San Diego BMP Handbook, a mix of 40 percent sand, 20 percent granular activated carbon (GAC), and 40 percent zeolite.
 - 3. The GAC shall meet the following criteria:
 - a. VCC 8x30 Virgin Coconut Shell Activated.
 - b. Carbon; Double Acid Washed.
 - c. 29 pounds per square foot (1.8 g/cm³ to 2.1 g/cm³).

4. The zeolite shall meet the following criteria:
 - a. Zeolite shall be naturally occurring granular zeolite that has a minimum 75 percent clinoptilolite purity by weight.
 - b. Zeolite shall be washed.
 - c. Zeolite shall be free of organic material, debris and other similar foreign objects and free of particles larger than the maximum specified mesh size.
 - d. Zeolite shall have a minimum cation exchange capacity of 1.0 meg/g.
 - e. Zeolite shall have an 8 by 14 mesh gradation, or alternative gradation approved by the Design Engineer.

2.12 GRADED AGGREGATE CHOKER STONE

- A. See Section 1002-8.3 of the 2018 City of San Diego “Whitebook” Standard Specifications for Public Works Constructions.

2.13 STONE FOR RIPRAP

- A. See Section 200-1.6 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 200-1.7 of the 2018 City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

2.14 VEGETATIVE SUPPORT MATERIAL (VSM)

- A. The VSM shall consist of 75 percent sand and 25 percent well-aged coconut coir pith (if coconut coir pith is not available, compost may be substituted at low amounts and if included, according to City of San Diego BMP Manual Appendix E.14 BF-2 Nutrient Sensitive Media Design).
 1. Coconut coir pith shall conform to the following requirements:
 - a. Be aged a minimum of 6 months.
 - b. Be rinsed and washed during production.
 - c. Shall be sieved to remove coarse coconut husk fibers and other debris materials.
 - d. Shall be delivered to the site in loose decompressed form and not in compressed bricks but must be delivered to the Site as loose, prewetted material.
 - e. Achieve the following laboratory results:
 - 1) Electrical conductivity less than 1 milliequivalent per liter.
 - 2) Organic matter content greater than 70 percent.
 2. Sand shall conform to the specification for sand within Article Bioretention Soil Media (BSM) Mix.
 3. No topsoil shall be allowed within the VSM.
 4. VSM shall have a pH range between 5.5 to 7.0.

5. VSM shall have a hydraulic conductivity of at least 20 inches per hour at a relative compaction of 85 percent standard proctor as defined in ASTM D698.

PART 3 EXECUTION

3.01 GENERAL

- A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
- B. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation, and compact each lift to specified densities prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water.
- C. During filling and backfilling, keep level of fill and backfill around each structure even.
- D. If pipe, conduit, duct bank, or cable is to be laid within fill or backfill:
 1. Fill or backfill to an elevation 2 feet above top of item to be laid.
 2. Excavate trench for installation of item.
 3. Install bedding, if applicable, as specified in Section 31 23 23.15, Trench Backfill.
 4. Install item.
 5. Backfill envelope zone and remaining trench, as specified in Section 31 23 23.15, Trench Backfill, before resuming filling or backfilling specified in this section.
- E. Tolerances:
 1. Final Lines and Grades: Within a tolerance of 0.1 foot unless dimensions or grades are shown or specified otherwise.
 2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.
- F. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

3.02 BACKFILL UNDER AND AROUND STRUCTURES

- A. Under Facilities: Within influence area beneath structures, slabs, pavements, footings, curbs, piping, conduits, duct banks, and other facilities, backfill with granular fill, unless otherwise shown. Place a 6-inch minimum thickness of granular fill unless otherwise shown in lifts of 6-inch maximum thickness and compact each lift to minimum of 95 percent relative compaction as determined in accordance with ASTM D1557.
- B. Use granular fill or CLSM where shown or specified and for wall backfill below the influence area of overlying structures, slabs, and footings.
- C. Subsurface Drainage: Backfill with granular drain material, where shown. Place granular drain material in lifts of 6-inch maximum thickness and compact each lift to minimum of 90 percent relative density.
- D. Other Areas: Backfill with earthfill to lines and grades shown, with proper allowance for topsoil thickness where shown. Place in lifts of 8-inch maximum thickness and compact each lift to minimum 90 percent relative compaction as determined in accordance with ASTM D1557.

3.03 FILL

- A. Outside Influence Areas beneath Structures, Tanks, Pavements, Curbs, Slabs, Piping, and Other Facilities:
 - 1. Unless otherwise shown, place earthfill as follows:
 - a. Allow for 6-inch thickness of topsoil where required.
 - b. Maximum 8-inch thick lifts.
 - c. Place and compact fill across full width of embankment.
 - d. Compact to minimum 90 percent relative compaction as determined in accordance with ASTM D1557.
 - e. Dress completed embankment with allowance for topsoil, crest surfacing, slope protection, and lining, where applicable.

3.04 SITE TESTING

- A. Gradation:
 - 1. One sample from each 1,500 tons of finished product or more often as determined by Construction Manager, if variation in gradation is occurring, or if material appears to depart from Specifications.
 - 2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.

3. Remove material placed in Work that does not meet Specification requirements.

B. In-Place Density Tests:

1. Owner will perform compaction testing in accordance with the requirements of this section. See Section 01 31 13, Project Coordination for additional requirements.
2. In accordance with ASTM D6938. During placement of materials, test as follows:
 - a. Granular Fill: Minimum one test per location or every 200 cubic yards.
 - b. Sand: Minimum one test per location or every 200 cubic yards.
 - c. Granular Drain Material: Minimum one test per location or every 100 cubic yards.
 - d. Gravel Surfacing and Base Course Rock: Minimum one test per location or every 100 cubic yards.
 - e. Foundation Stabilization Rock: Minimum one test per location or every 200 cubic yards.
 - f. Soil Cover Over Geotextiles: Minimum one test per location or every 200 cubic yards.
 - g. Earthfill: Minimum one test per location or every 200 cubic yards.
 - h. Bedding and Pipe Zone Material: Minimum one test per lift every 50 linear feet of trench.

3.05 SAND BLANKET OVER VAPOR RETARDER

- A. Place sand in manner that avoids damage to underlying vapor retarder.
- B. Moisten sand and thoroughly compact it with a vibratory plate compactor.

3.06 GRANULAR BASE, SUBBASE, AND SURFACING

- A. Place and compact as specified in Section 32 11 23, Aggregate Base Courses.

3.07 REPLACING OVEREXCAVATED MATERIAL

- A. Replace excavation carried belowgrade lines shown or established by Construction Manager as follows:
 1. Beneath Footings: Granular fill.
 2. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.
 3. Beneath Slabs-On-Grade: Granular fill.

4. Trenches:
 - a. Unauthorized Overexcavation: Either trench stabilization material or granular pipe base material, as specified in Section 31 23 23.15, Trench Backfill.
 - b. Authorized Overexcavation: Trench stabilization material, as specified in Section 31 23 23.15, Trench Backfill.

3.08 PLACING FILL OVER GEOSYNTHETICS

A. General:

1. Place fill over geosynthetics with sufficient care so as not to damage them.
2. Place fill only by back dumping and spreading only.
3. Dump fill only on previously placed fill.
4. While operating equipment, avoid sharp turns, sudden starts or stops that could damage geosynthetics.

B. Hauling: Operate hauling equipment on minimum of 3 feet of covering.

C. Spreading:

1. Spreading equipment shall be track mounted low ground pressure, D-6 or lighter.
2. Operate spreading equipment on minimum of 12 inches of fill over geosynthetics.
3. Spread fill in same direction as unseamed overlaps to avoid separation of seams and joints.
4. Never push fill downslope. Spread fill over side slopes by pushing up from slope bottom.
5. Maintain proper overlap of unseamed geosynthetics.
6. Avoid overstressing geosynthetics and seams.

D. Compaction: Compact fill only after uniformly spread to full thickness shown.

E. Geosynthetic Damage:

1. Mark punctures, tears, or other damage to geosynthetics, so repairs may be made.
2. Clear overlying fill as necessary to repair damage.
3. Repairs to geosynthetics shall be made by respective installers as specified in respective specification section for each geosynthetic.

3.09 ACCESS ROAD SURFACING

- A. Place and compact as specified in Section 32 11 23, Aggregate Base Courses.

3.10 BIOFILTRATION SOIL MEDIA (BSM)

- A. Biofiltration Soil Media (BSM) shall conform to Appendix F.4 of the City of San Diego Storm Water Standards, Part 1 BMP Design Manual.
- B. Payment: BSM shall be measured and paid per cubic yard installed. The installation of the pervious backfill material as specified in the Contract Documents and as directed by the Construction Manager shall be included in the payment.

3.11 GRADED AGGREGATE CHOKER STONE

- A. See Section 1002-8.3 of the City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

END OF SECTION

SECTION 31 23 23.15
TRENCH BACKFILL

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Public Works Association (APWA): Uniform Color Code.
 2. ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. C94, Standard Specification for Ready-Mixed Concrete.
 - c. C117, Standard Test Method for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
 - d. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - e. C150, Standard Specification for Portland Cement.
 - f. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - g. C1012, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - h. D1140, Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve.
 - i. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³).
 - j. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - k. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - l. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - m. D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - n. D4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 3. National Electrical Manufacturers Association (NEMA): Z535.1, Safety Colors.

1.02 DEFINITIONS

- A. Base Rock: Granular material upon which manhole bases and other structures are placed.
- B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.
- C. Imported Material: Material obtained by Contractor from source(s) offsite.
- D. Lift: Loose (uncompacted) layer of material.
- E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.
- F. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.
- G. Relative Compaction: As defined in Section 31 23 23, Fill and Backfill.
- H. Relative Density: As defined by ASTM D4253 and ASTM D4254.
- I. Selected Backfill Material: Material available onsite that Design Engineer determines to be suitable for a specific use.
- J. Unsuitable Materials: Soil containing peat, organics compost, other compressible materials or highly plastic clays that cannot be placed and compacted to an unyielding condition when proof rolled.
- K. Standard Specifications: When referenced in this section, shall mean the latest editions of the “Greenbook” Standard Specifications for Public Works Construction and the City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction. This Specification shall take precedence if there is a conflict between this Specification and the Greenbook/Whitebook.

L. Well-Graded:

1. A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Satisfying both of the following requirements, as defined in ASTM D2487:
 - a. Coefficient of Curvature: Greater than or equal to 1, and less than or equal to 3.
 - b. Coefficient of Uniformity: Greater than or equal to 4 for materials classified as gravel, and greater than or equal to 6 for materials classified as sand.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Manufacturer's descriptive literature for marking tapes and tracer wire.

B. Informational Submittals:

1. Catalog and manufacturer's data sheets for compaction equipment.
2. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to Site.
3. Controlled Low Strength Material: Certified mix design and test results to demonstrate that the CLSM mix meets the requirement. Include material types and weight per cubic yard for each component of mix.
4. Description and location of proposed sources of imported material. Include documentation that imported materials are free of hazardous substances.
5. Certification and test records of processed materials showing that they meet the applicable requirements prior to commencing permanent placement of the materials for the Work.
6. Certification from each geotextile manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for geotextiles furnished.

PART 2 PRODUCTS

2.01 MARKING TAPE

A. Detectable:

1. Solid aluminum foil, visible on unprinted side, encased in protective high visibility, inert polyethylene plastic jacket.
2. Foil Thickness: Minimum 0.35 mils.
3. Laminate Thickness: Minimum 5 mils.
4. Width: 6 inches.
5. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
6. Joining Clips: Tin or nickel-coated furnished by tape manufacturer.
7. Manufacturers and Products:
 - a. Reef Industries; Terra Tape, Sentry Line Detectable.
 - b. Mutual Industries; Detectable Tape.
 - c. Presco; Detectable Tape.
 - d. Or approved equal.

B. Color: In accordance with APWA Uniform Color Code.

Color*	Facility
Red	Electric power lines, cables, conduit, and lightning cables
Orange	Communicating alarm or signal lines, cables, or conduit
Yellow	Gas, oil, steam, petroleum, or gaseous materials
Green	Sewers and drain lines
Blue	Potable water
Purple	Reclaimed water, irrigation, and slurry lines
*As specified in NEMA Z535.1, Safety Color Code.	

2.02 TRACER WIRE

- A. Material: Minimum 12-gauge solid copper or copper jacket with a steel core, with high-density polyethylene (HDPE) or high-molecular weight polyethylene (HMWPE) insulation suitable for direct bury.
- B. Splices: Use wire nut or lug suitable for direct burial as recommended by tracer wire manufacturer.

C. Manufacturers:

1. Copperhead Industries, LLC.
2. Performance Wire & Cable Inc.
3. Pro-line Safety Products Company.
4. Or approved equal.

2.03 TRENCH STABILIZATION MATERIAL

- A. Foundation Stabilization Rock: As defined in Section 31 23 23, Fill and Backfill.

2.04 BEDDING MATERIAL AND PIPE ZONE MATERIAL

- A. For sewers, potable water mains, irrigation, recycled water mains, and storm drains, refer to Drawing Nos. SDS-110, SDW-110, SDI-110, SDRW-101, and SDD-110, respectively, of the City of San Diego Standard Drawings.
- B. For other type of pipelines, use clean or gravelly sand with less than 5 percent passing No. 200 sieve, as determined in accordance with ASTM D1140, or gravel or crushed rock within maximum particle size and other requirements as follows unless otherwise specified.
1. Duct Banks: 3/4-inch maximum particle size.
 2. PVC Irrigation System Piping: 3/8-inch maximum particle size.
 3. Pipe Under 18-Inch Diameter: 3/4-inch maximum particle size, except 1/4 inch for stainless steel pipe, copper pipe, tubing, and plastic pipe under 3-inch diameter.
 4. Pipe 18-Inch Diameter and Greater: 1-1/4-inch maximum particle size for FRP pipe, concrete pipe, and pretensioned or prestressed concrete cylinder pipe.
 5. Welded steel pipe, ductile iron pipe, and other pipe with tape wrapping, liquid epoxy, polyurethane coating, and other corrosion protection coatings: 3/4-inch maximum particle size.
 6. Perforated Pipe: Granular drain material.
 7. Conduit and Direct-Buried Cable:
 - a. Sand, clean or clean to silty, less than 12 percent passing No. 200 sieve.
 - b. Individual Particles: Free of sharp edges.
 - c. Maximum Size Particle: Pass a No. 4 sieve.
 - d. If more than 5 percent passes No. 200 sieve, the fraction that passes No. 40 sieve shall be nonplastic as determined in accordance with ASTM D4318.

2.05 GRANULAR DRAIN MATERIAL

- A. Furnish rounded, hard, durable pit run (uncrushed) gravel free of clay balls or other organic or deleterious matter that meets the gradation specified.
- B. Gradation: ASTM C117 and ASTM C136.

Sieve Size	Percent Passing by Weight
1-1/2 inches	100
1 inch	95 - 100
1/2 inch	25 - 60
No. 4	0 - 10
No. 8	0 - 5

2.06 GRANULAR FILL

- A. As specified in Section 31 23 23, Fill and Backfill.

2.07 EARTHFILL

- A. As specified in Section 31 23 23, Fill and Backfill.

2.08 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Select and proportion ingredients to obtain compressive strength between 50 psi at 4 days and 150 psi at 28 days in accordance with ASTM D4832.
- B. Materials:
 - 1. Cement: ASTM C150, Type I or Type II.
 - 2. Aggregate: ASTM C33, Size 7.
 - 3. Fly Ash (Pozzolan):
 - a. Class F fly ash in accordance with ASTM C618, except as modified herein:
 - 1) ASTM C618, Table 1, Loss on Ignition: Unless permitted otherwise, maximum 3 percent.
 - 2) Test in accordance with ASTM C1012 to verify sulfate resistance is acceptable.
 - 4. Water: Clean, potable, containing less than 500 ppm of chlorides.

2.09 GRAVEL SURFACING ROCK

- A. As specified in Section 32 11 23, Aggregate Base Courses.

2.10 SOURCE QUALITY CONTROL

- A. Perform gradation analysis in accordance with ASTM C136 for:
 - 1. Earthfill.
 - 2. Trench stabilization material.
 - 3. Bedding and pipe zone material.
- B. Certify Laboratory Performance of Mix Designs: Controlled low strength material.

PART 3 EXECUTION

3.01 TRENCH PREPARATION

- A. Water Control:
 - 1. Promptly remove and dispose of water entering trench as necessary to grade trench bottom and to compact backfill and install manholes, pipe, conduit, direct-buried cable, or duct bank. Do not place concrete, lay pipe, conduit, direct-buried cable, or duct bank in water.
 - 2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.
 - 3. Provide continuous water control until trench backfill is complete.
- B. Remove foreign material and backfill contaminated with foreign material that falls into trench.

3.02 TRENCH BOTTOM

- A. Prepare subgrade in accordance with the requirements of Section 31 23 13, Subgrade Preparation.
- B. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.
- C. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify Construction Manager. Construction Manager will consult with Design Engineer to determine depth of overexcavation, if any required.

3.03 GEOTEXTILE INSTALLATION

- A. Where shown and as specified in Section 31 32 19.16, Geotextile, except as follows:
1. Extend geotextile for full width of trench bottom and up the trench wall to the top of the pipe zone, or base material for manholes and miscellaneous structures.
 2. Anchor geotextile trench walls prior to placing trench stabilization or bedding material.
 3. Provide 24-inch minimum overlap at joints.

3.04 TRENCH STABILIZATION MATERIAL INSTALLATION

- A. When, in judgment of Construction Manager, the existing material at the bottom of the trench is unsuitable for supporting the pipe, excavate belowgrade, as directed. Rebuild trench bottom with trench stabilization material.
- B. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.
- C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.05 BEDDING

- A. Furnish imported bedding material where, in the opinion of Construction Manager, excavated material is unsuitable for bedding or insufficient in quantity.
- B. Place over full width of prepared trench bottom in two equal lifts when required depth exceeds 8 inches.
- C. Hand grade and compact each lift to provide a firm, unyielding surface.
- D. Minimum Thickness:
1. For sewers, potable water mains, irrigation, recycled water mains, and storm drains, refer to Drawing Nos. SDS-110, SDW-110, SDI-110, SDRW-101, and SDD-110, respectively, of the City of San Diego Standard Drawings.
 2. For other type of pipelines, refer to the following, except increase depths listed by 2 inches in areas of rock excavation:
 - a. Pipe 15 Inches and Smaller: 4 inches.
 - b. Pipe 18 Inches to 36 Inches: 6 inches.

- c. Pipe 42 Inches and Larger: 8 inches.
 - d. Conduit: 3 inches.
 - e. Direct-Buried Cable: 3 inches.
 - f. Duct Banks: 3 inches.
- E. Check grade and correct irregularities in bedding material. Loosen top 1 inch to 2 inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe, conduit, direct-buried cable, or duct bank.
- F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.
- G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.06 BACKFILL PIPE ZONE

- A. Upper limit of pipe zone shall not be less than following:
- 1. Pipe: 12 inches, unless shown otherwise.
 - 2. Conduit: 3 inches, unless shown otherwise.
 - 3. Direct-Buried Cable: 3 inches, unless shown otherwise.
 - 4. Duct Bank: 3 inches, unless shown otherwise.
- B. Restrain pipe, conduit, cables, and duct banks as necessary to prevent their movement during backfill operations.
- C. Place material simultaneously in lifts on both sides of pipe and, if applicable, between pipes, conduit, cables, and duct banks installed in same trench.
- 1. Pipe 10-Inch and Smaller Diameter: First lift less than or equal to 1/2 pipe diameter.
 - 2. Pipe Over 10-Inch Diameter: Maximum 6-inch lifts.
- D. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by “walking in” and slicing material under haunches with a shovel to ensure voids are completely filled before placing each succeeding lift.

- E. Compact pipe zone material to at least 90 percent relative compaction and within 2 percent of the optimum moisture content as determined in accordance with ASTM D1557.
- F. Do not use power-driven impact compactors to compact pipe zone material. After full depth of pipe zone material has been placed as specified, compact material by a minimum of three passes with a vibratory plate compactor only over area between sides of pipe and trench walls. Take care to avoid damaging pipe and pipe coating.

3.07 MARKING TAPE INSTALLATION

- A. Continuously install detectable marking tape along centerline of buried piping on top of last lift of pipe zone material. Coordinate with piping installation drawings.

3.08 TRACER WIRE INSTALLATION AND TESTING

- A. Install tracer wire continuously along centerline of nonmetallic buried piping.
- B. Attach wire to top of pipe using tape at maximum of 10-foot intervals. In areas where depth of cover is excessive for allowing detection of tracer wire with electronic pipe locator, install tracer wire within pipe backfill directly above pipe centerline at a minimum depth of 3 feet.
- C. Install splices in accordance with manufacturer's instructions for direct bury applications. Tie ends of wire to be joined in a knot as required to reduce tension on splice.
- D. Bring tracer wire to surface at each valve box, curb box, vault, air valve, blowoff valve, hydrant, and pipeline marker. Tracer wire shall be brought to surface at least every 1,000 feet. If distance between pipe appurtenances exceeds 1,000 feet, install valve box to allow access to tracer wire. Mark valve box cover with the word "TRACER." Coil enough excess tracer wire at each appurtenance to extend wire 12 inches aboveground.
- E. Test continuity of tracer wire using electronic pipe locator in presence of Construction Manager.

3.09 BACKFILL ABOVE PIPE ZONE

- A. For sewers, potable water mains, irrigation, recycled water mains, and storm drains, refer to Drawing No. SDS-110, SDW-110, SDI-110, SDRW-101, and SDD-110, respectively, of the City of San Diego Standard Drawings, for backfill material and compaction requirement.

B. For other type of pipelines, refer to the following:

1. Use earthfill as specified in Section 31 23 23, Fill and Backfill.
2. Adjust moisture content as necessary to obtain specified compaction.
3. Do not allow backfill to free fall into trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over top of pipe.
4. Do not use power driven impact type compactors for compaction until at least 4 feet of backfill is placed over top of pipe.
5. Backfill to grade with proper allowances for gravel surfacing rock and pavement thicknesses, wherever applicable.
6. Backfill around structures with same type backfill as specified for adjacent trench, unless otherwise shown or specified.

C. Earthfill:

1. Place in lifts not exceeding thickness of 8 inches.
2. For areas outside of structure influence zone or roadway, use earthfill and compact each lift to a minimum of 90 percent relative compaction as determined in accordance with ASTM D1557.

D. Granular Fill:

1. Place in lifts not exceeding thickness of 8 inches.
2. For areas under structure influence zone or roadway, use granular fill and compact each lift to a minimum of 95 percent relative compaction as determined in accordance with ASTM D1557.

E. Controlled Low Strength Material:

1. Discharge from truck mounted drum type mixer into trench.
2. Place in lifts as necessary to prevent uplift (flotation) of new and existing facilities.
3. In traveled areas, fill entire trench section to pavement finish grade for a temporary driving surface, and screed off excess and finish with a float.
4. In other areas, fill trench section as shown.

3.10 SITE TESTING

A. As specified in Section 31 23 23, Fill and Backfill.

3.11 MAINTENANCE OF TRENCH BACKFILL

- A. After each section of trench is backfilled, maintain surface of backfilled trench even with adjacent ground surface until final surface restoration is completed.
- B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep surface of backfilled trench even with adjacent ground surface, and grade and compact as necessary to keep surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.
- C. Topsoil: Add topsoil where applicable and as necessary to maintain surface of backfilled trench level with adjacent ground surface.
- D. Other Areas: Add excavated material where applicable and keep surface of backfilled trench level with adjacent ground surface.

3.12 SETTLEMENT OF BACKFILL

- A. Settlement of trench backfill, or of fill, or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

END OF SECTION

**SECTION 31 32 19.16
GEOTEXTILE**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. ASTM International (ASTM):
 - a. D3786, Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
 - b. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - c. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - d. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - e. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - f. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - g. D4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - h. D4884, Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles.
 - i. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - j. D6193, Standard Practice for Stitches and Seams.
 - k. D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Products.

1.02 DEFINITIONS

- A. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.
- B. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile furnished.
- C. Minimum Average Roll Value (MinARV): Minimum of series of average roll values representative of geotextile furnished.
- D. Nondestructive Sample: Sample representative of finished Work, prepared for testing without destruction of Work.

- E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.
- F. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D4884.
- G. MD: Machine Direction; CD: Cross Machine Direction.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Manufacturer material specifications and product literature.
 - b. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.
 - c. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.
- 2. Samples:
 - a. Geotextile: One-piece, minimum 18 inches long, taken across full width of roll of each type and weight of geotextile furnished for Project. Label each with brand name and furnish documentation of lot and roll number from which each Sample was obtained.
 - b. Field Sewn Seam: 5-foot length of seam, 12 inches wide with seam along center, for each type and weight of geotextile.
 - c. Securing Pin and Washer: One each.

B. Informational Submittals:

- 1. Certifications from each geotextile manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for geotextiles furnished.
- 2. Field seam efficiency test results.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.

- C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

1.05 SCHEDULING AND SEQUENCING

- A. Where geotextile is to be laid directly upon ground surface, prepare subgrade as specified in Section 31 23 13, Subgrade Preparation, first.
- B. Notify Construction Manager whenever geotextiles are to be placed. Do not place geotextile without Construction Manager’s approval of underlying materials.

PART 2 PRODUCTS

2.01 NONWOVEN GEOTEXTILE

- A. Pervious sheet of polyester, polypropylene, or polyethylene fabricated into stable network of fibers that retain their relative position with respect to each other. Nonwoven geotextile shall be composed of continuous or discontinuous (staple) fibers held together through needle-punching, spun-bonding, thermal-bonding, or resin-bonding.
- B. Geotextile Edges: Selvaged or otherwise finished to prevent outer material from pulling away from geotextile.
- C. Unseamed Sheet Width: Minimum 12 feet.
- D. Nominal Weight per Square Yard: 10 ounces per ASTM D5261.
- E. Physical Properties: Conform to requirements in Table No. 1.

Table No. 1 Physical Property Requirements for Nonwoven Geotextile		
Property	Requirement	Test Method
Water Permittivity	1.2 sec. ⁻¹ , MinARV	ASTM D4491 (Falling Head)
Water Flow Rate	80 gal/min/sq ft, MinARV	ASTM D4491
Apparent Opening Size (AOS)	100 U.S. Standard Sieve Size	ASTM D4751
Grab Tensile Strength	250 lb/in (MD), MinARV	ASTM D4632

Table No. 1 Physical Property Requirements for Nonwoven Geotextile		
Property	Requirement	Test Method
Grab Tensile Elongation	50 percent (MD), MaxARV	ASTM D4632
Puncture Strength	155 lb, MinARV	ASTM D4833
CBR Puncture	700 lb, MinARV	ASTM D6241
Trapezoid Tear Strength	100 lb, MinARV	ASTM D4533
Mullen Burst Strength	500 psi, MinARV	ASTM D3786
Ultraviolet Radiation Resistance	70 percent strength retention, MinARV after 500 hours	ASTM D4355

2.02 SEWING THREAD

- A. Polypropylene, polyester, or Kevlar thread.
- B. Durability: Equal to or greater than durability of geotextile sewn.

2.03 SECURING PINS

- A. Steel Rods or Bars:
 - 1. 3/16-inch diameter.
 - 2. Pointed at one end.
 - 3. With head on other end sufficiently large to retain washer.
 - 4. Minimum Length: 12 inches.
- B. Steel Washers for Securing Pins:
 - 1. Outside Diameter: Not less than 1.5 inches.
 - 2. Inside Diameter: 1/4 inch.
 - 3. Thickness: 1/8 inch.
- C. Steel Wire Staples:
 - 1. U-shaped.
 - 2. 10-gauge.
 - 3. Minimum Length: 6 inches.

2.04 IMPERMEABLE LINER

- A. See Section 1002-3 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

PART 3 EXECUTION

3.01 LAYING GEOTEXTILE

- A. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.02 SHEET ORIENTATION ON SLOPES

- A. Orient geotextile with long dimension of each sheet parallel to direction of slope.

3.03 JOINTS

- A. Unseamed Joints:
 - 1. Overlapped.
 - 2. Overlap, unless otherwise shown:
 - a. Foundation/Subgrade Stabilization: Minimum 18 inches.
 - b. Riprap: Minimum 18 inches.
 - c. Drain Trenches: Minimum 18 inches, except overlap shall equal trench width if trench width is less than 18 inches.
 - d. Other Applications: Minimum 12 inches.
- B. Sewn Seams: Made wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by Construction Manager, also may be used instead of overlap at joints for applications that do not require stress transfer.
 - 1. Seam Efficiency:
 - a. Minimum 70 percent.
 - b. Verified by preparing and testing minimum of one set of nondestructive Samples per acre of each type and weight of geotextile installed.
 - c. Tested according to ASTM D4884.
 - 2. Types:
 - a. Preferred: “J” type seams.
 - b. Acceptable: Flat or butterfly seams.
 - 3. Stitch Count: Minimum three to maximum seven stitches per inch.
 - 4. Stitch Type: Double-thread chainstitch according to ASTM D6193.
 - 5. Sewing Machines: Capable of penetrating four layers of geotextile.

6. Stitch Location: 2 inches from geotextile sheet edges, or more, if necessary to develop required seam strength.

3.04 SECURING GEOTEXTILE

- A. Secure geotextile during installation as necessary with sandbags or other means approved by Construction Manager.
- B. Secure Geotextile with Securing Pins or Staples:
 1. Insert securing pins with washers through geotextile.
 2. Securing Pin Alignment:
 - a. Midway between edges of overlaps.
 - b. 6 inches from free edges.
 3. Spacing of Securing Pins:

Slope	Maximum Pin Spacing
Steeper than 3:1	2 feet
3:1 to 4:1	3 feet
Flatter than 4:1	5 feet

4. Install additional pins across each geotextile sheet as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.
5. Push each securing pin through geotextile until washer bears against geotextile and secures it firmly to subgrade.
6. Where staples are used instead of securing pins, install in accordance with alignment and spacing above. Push in to secure geotextile firmly to subgrade.

3.05 PLACING PRODUCTS OVER GEOTEXTILE

- A. Before placing material over geotextile, notify Construction Manager. Do not cover installed geotextile until after Construction Manager provides authorization to proceed.
- B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as specified in Article Repairing Geotextile.

3.06 INSTALLING GEOTEXTILE IN TRENCHES

- A. Place geotextile in a way to completely envelope granular drain material to be placed in trench and with specified overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.
- B. After granular drain material is placed to required grade, fold geotextile over top of granular drain material, unless otherwise shown. Maintain overlap until overlying fill or backfill is placed.

3.07 RIPRAP APPLICATIONS

- A. Overlap geotextile at each joint with upstream sheet of geotextile overlapping downstream sheet.
- B. Sew joints where water run-up may occur.
- C. Limit height of riprap fall onto geotextile to prevent damage.
 - 1. Drop Height: 0 foot for greater than 200-pound rock. 3 feet for less than 200-pound rock.

3.08 GEOTEXTILE-REINFORCED EARTH WALL APPLICATIONS

- A. Sew exposed joints; extend sewn seams minimum 3 feet behind face of wall.
- B. Protect exposed geotextile from damage, ultraviolet light exposure, and deterioration until permanent facing is applied.

3.09 SILT FENCE APPLICATIONS

- A. Install geotextile in one piece, or continuously sewn to make one piece, for full length and height of fence, including portion of geotextile buried in toe trench.
- B. Install bottom edge of sheet in toe trench and backfill in a way that securely anchors geotextile in trench.
- C. Securely fasten geotextile to each support post in a way that will not result in tearing of geotextile when fence is subjected to service loads.
- D. Promptly repair or replace silt fence that becomes damaged.

3.10 REPAIRING GEOTEXTILE

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile.
- B. Repair Procedure:
 - 1. Place patch of undamaged geotextile over damaged area and at least 18 inches in all directions beyond damaged area.
 - 2. Remove interfering material as necessary to expose damaged geotextile for repair.
 - 3. Sew patches or secure them with heat fusion tacking or with pins and washers, as specified above in Article Securing Geotextile, or by other means approved by Construction Manager.

3.11 REPLACING CONTAMINATED GEOTEXTILE

- A. Protect geotextile from contamination that would interfere, in Construction Manager's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile.

END OF SECTION

SECTION 31 41 00
SHORING

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Qualifications of:
 - a. Contractor's excavation support system designer.
 - b. Contractor's excavation support system installer.
2. Excavation support plan.
3. Movement monitoring plan.
4. Trench excavation plan.
5. Movement measurement and data and reduced results indicating movement trends.

1.02 QUALITY ASSURANCE

- A. Provide surveys to monitor movements of critical structures and facilities located within 100 feet of excavation.
- B. Conform to the requirements of the Cal OSHA Standards and Interpretations: "Subchapter 4, Construction Safety Orders, Article 6 - Excavations" and all other applicable laws, regulations, rules, and codes.
- C. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in the State of California and having the following qualifications:
 1. Provide a list of projects and references in the design of specific temporary excavation support systems to be used.
 2. Completed not less than five successful temporary excavation support system projects of equal type, size, and complexity.
- D. Temporary Excavation Support System Installer's Qualifications:
 1. Provide a list of projects and references in the installation of similar types and equal complexity as the proposed system.
 2. Completed not less than three successful excavation support systems of similar type and equal complexity as the proposed system.

- E. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:
 - 1. Provide a list of projects and references in installation of systems of similar type and equal complexity as the proposed system.
 - 2. Completed successful temporary excavation support systems of similar type and equal complexity as the proposed system.

PART 2 PRODUCTS (NOT USED)**PART 3 EXECUTION**

3.01 GENERAL

- A. Design, provide, and maintain shoring, sheeting, and bracing as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.
- B. Shoring system shall provide suitable room for installing pipe, structures, and appurtenances.

3.02 EXCAVATION SUPPORT PLAN AND TRENCH EXCAVATION PLAN

- A. Prepare and submit an excavation support plan and a trench excavation plan signed and sealed by a professional engineer registered in the State of California, for information only. The Contractor shall remain responsible for the adequacy and safety of the means, methods, and sequencing of construction. The plans shall include and address the following topics as a minimum:
 - 1. Proposed excavation support systems, details of shoring, bracing, sloping, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed and other provisions for worker protection from hazards of caving ground.
 - 2. Design assumptions and calculations.
 - 3. Methods and sequencing of installing excavation support.
 - 4. Proposed locations of stockpiled excavated material.
 - 5. Minimum lateral distance from the edge of the excavation support systems or the crest of slopes for vehicles, construction equipment, and stockpiled excavated materials.
 - 6. List of equipment used for installing the excavation support systems.
 - 7. Anticipated difficulties and proposed resolutions.

3.03 MOVEMENT MONITORING PLAN

- A. Prepare movement monitoring plan addressing following topics:
 - 1. Survey control.
 - 2. Location of monitoring points.
 - 3. Plots of data trends.
 - 4. Interval between surveys.

3.04 INSTALLATION

- A. Installation of excavation support systems shall not commence until the related submittals have been reviewed by the Design Engineer, and all comments are satisfactorily addressed.
- B. Install excavation support systems in accordance with the excavation support plan and the trench excavation plan.
- C. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

3.05 REMOVAL OF EXCAVATION SUPPORT

- A. Remove excavation support in a manner that will maintain support as excavation is backfilled.
- B. Do not begin to remove excavation support until support can be removed without damage to existing facilities, completed Work, or adjacent property.
- C. Remove excavation support in a manner that does not leave voids in the backfill.

3.06 TRENCHES

- A. For trench excavation exceeding 5 feet in depth, provide adequate safety system meeting requirements of California Labor Code Section 6707, applicable local construction safety orders, and federal requirements.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. T11, Standard Method of Test for Materials Finer Than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing.
 - b. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
 - c. T89, Standard Specification for Determining the Liquid Limit of Soils.
 - d. T90, Standard Specification for Determining the Plastic Limit and Plasticity Index of Soils.
 - e. T96, Standard Specification for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - f. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.
 - g. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.
 - h. T190, Standard Specification for Resistance R-Value and Expansion Pressure of Compacted Soils.
 - i. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
 - j. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 2. ASTM International (ASTM):
 - a. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - b. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - c. D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - d. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

3. The 2018 “Greenbook” Standard Specifications for Public Works Construction.
4. The 2018 City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

1.02 DEFINITIONS

- A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.
- B. Completed Lift: Compacted with uniform cross-section thickness.
- C. Standard Specifications: When referenced in this section, shall mean 2018 “Greenbook” Standard Specifications for Public Works Construction.

1.03 SUBMITTALS

- A. Action Submittals:
 1. Samples: Submit for specified materials 20 days prior to delivery to Site.
- B. Informational Submittals: See Section 3-7 and 3-8 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 3-8.1 through 3-8.6 of the City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

PART 2 PRODUCTS

2.01 BASE COURSE

- A. As specified in Section 200 of the Standard Specifications, and Section 200-2.9 of the 2018 City of San Diego Supplemental “Whitebook” Standard Specifications for Public Works Construction.

2.02 GRAVEL SURFACE

- A. As specified in Section 200-2.7 of the Standard Specifications.

2.03 SOURCE QUALITY CONTROL

- A. See Section 200-2 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 200-2.9.3 of the City of San Diego 2018 Supplement “Whitebook” Standard Specification for Public Works Construction for quality requirement tests.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. As specified in Section 31 23 13, Subgrade Preparation.

3.02 EQUIPMENT

- A. Compaction Equipment: Adequate in design and number to provide compaction and to obtain specified density for each layer as required by Section 301-1 of the Standard Specifications and Section 301 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

3.03 HAULING AND SPREADING

- A. In accordance with Section 301-2 of the Standard Specifications.

3.04 CONSTRUCTION OF COURSES

- A. Construction of Courses: In accordance with Section 301 of the Standard Specifications and Section 301 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.
- B. Gravel Surfacing: See Section 301 of the Standard Specifications.

3.05 ROLLING AND COMPACTION

- A. Subgrade and base material shall be compacted per Section 301-1 and Section 301-2 of the Standard Specifications and Section 301-1.3 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

3.06 SURFACE TOLERANCES

- A. See Section 301-2 of the Standard Specifications for compaction and surface tolerance of aggregate base.

3.07 CLEANING

- A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION

**SECTION 32 16 00
CURBS AND GUTTERS**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): T 99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in.) Drop.
 2. American Concrete Institute (ACI): 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 3. ASTM International (ASTM):
 - a. C94, Standard Specification for Ready-Mixed Concrete.
 - b. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - c. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 4. Standard Specification: 2018 “Greenbook” Standard Specifications for Public Works Construction Section, and 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction Section.

1.02 SUBMITTALS

- A. Action Submittals:
1. Form Material: Information on metal forms, if used, including type, condition, surface finish, and intended function.
 2. Complete data on concrete mix, including aggregate gradations and admixtures in accordance with requirements of ASTM C94.
- B. Informational Submittals: See Section 3-7 and 3-8 of the 2018 “Greenbook” Standard Specifications for Public Works Construction, and Section 3-8 of the City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to the State of California Standard Specifications for Highway Construction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. See Section 201-1 Portland Cement Concrete of 2018 “Greenbook” Standard Specifications for Public Works Construction, and 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

2.02 EXPANSION JOINT FILLER

- A. See Section 303-5.4 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

2.03 CONCRETE

- A. See Section 201-1 Portland Cement Concrete of 2018 “Greenbook” Standard Specifications for Public Works Construction, and 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

2.04 CURING COMPOUND

- A. See Section 201-4 of 2018 “Greenbook” Standard Specification for Public Works Construction.

PART 3 EXECUTION

3.01 INSTALLATION

- A. See Section 303-5 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

3.02 PLACING CONCRETE

- A. See Section 303-5 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

3.03 CURB AND GUTTER CONSTRUCTION

- A. See Section 303-5 of the 2018 “Greenbook” Standard Specifications of Public Works Construction, and 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

- B. Cleanup and Backfill per Section 303-5 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

END OF SECTION

SECTION 33 05 01
CONVEYANCE PIPING—GENERAL

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI): 301, Specifications for Structural Concrete.
 2. American Water Works Association (AWWA):
 - a. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
 - b. C115/A21.15, Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - c. C210, Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
 - d. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - e. C217, Petrolatum and Petroleum Wax Tape Coatings for the Exterior of Connections and Fittings for Steel Water Pipelines.
 - f. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe.
 - g. C221, Fabricated Steel Mechanical Slip-Type Expansion Joints.
 3. ASTM International (ASTM):
 - a. A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - b. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - c. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

1.02 SUBMITTALS

- A. Action Submittals:
1. Detailed pipe fabrication drawings showing pipe details, special fittings and bends, dimensions, coatings, and other pertinent information.
 2. Layout drawing showing location of each pipe section and each special length.
 3. Pipe pressure class.
 4. Wall thickness, reinforcing, and strength calculations.
 5. Product Data: Manufacturer's data for couplings, saddles, gaskets, and other pipe accessories. Indicate maximum rated working pressure and test pressure for each item.

6. Any relocation of piping or change of material, jointing methods, or supports from where it is detailed on Drawings or specified.
 7. Complete descriptive information regarding proposed thrust restraint methods, materials, and design calculations as required by the Contract Documents.
- B. Informational Submittals: Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with manufacturer's recommendations and as specified in Section 40 27 00, Process Piping—General, and accompanying data sheets.
- B. Marking at Plant: Mark each pipe and fitting at plant. Include date of manufacture, manufacturer's identification, specification standard, diameter of pipe dimension ratio, or pipe class, and pipe number for laying purposes when applicable, and other information required for type of pipe.
- C. Pipe, specials, and fittings received at Project Site in damaged condition will not be accepted.
- D. Gasket Storage: Store rubber gaskets in cool, well ventilated place, and do not expose to direct rays of sun. Do not allow contact with oils, fuels, petroleum, or solvents.
- E. Store and support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.
- F. Handling:
 1. Pipe shall be handled with proper equipment in a manner to prevent distortion or damage. Use of hooks, chains, wire ropes, or clamps that could damage pipe, damage coating or lining, or kink and bend pipe ends is not permitted.
 2. Use heavy canvas, or nylon slings of suitable strength for lifting and supporting materials.
 3. Lifting pipe during unloading or lifting into trench shall be done using two slings placed at quarter point of pipe section. Pipe may be lifted using one sling near center of pipe, provided pipe is guided to prevent uncontrolled swinging and no damage will result to pipe or harm to workers. Slings shall bear uniformly against pipe.
 4. Pipe and fittings shall not be stored on rocks or gravel, or other hard material that might damage pipe. This includes storage area and along pipe trench.

PART 2 PRODUCTS

2.01 PIPE AND JOINTS

- A. As specified in the sections listed in Piping Schedule as shown on Drawings.

2.02 SERVICE SADDLES

- A. Double strap design rated for 150 psi minimum working pressure.

2.03 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

A. Modular Mechanical Seal:

1. Type: Interconnected synthetic rubber links shaped and sized to continuously fill annular space between pipe and wall sleeve opening.
2. Assemble interconnected rubber links with Type 316 stainless steel bolts, nuts, and pressure plates.
3. Size modular mechanical seals according to manufacturer's instructions for the size of pipes shown to provide a watertight seal between pipe and wall sleeve opening.
4. Manufacturers and Products:
 - a. Thunderline/LinkSeal, Div. of PSI, Houston, TX; Link Seal.
 - b. Calpico, Inc., South San Francisco, California; Sealing Linx.
 - c. Advance Products and Systems, Lafayette, Louisiana; Innerlynx.
 - d. Or approved equal.

B. Wall Sleeves:

1. Diameter, ends, and length shall be as shown on Drawings.
2. Shall include integral seep ring to minimize seepage between metal sleeve and concrete.

C. Wall Couplings:

1. Diameter, ends, and length shall be as shown on Drawings.
2. Wall couplings shall provide flexible mechanical joint.
3. Body and end rings shall be coated with fusion bonded epoxy.
4. Body shall include integral seep ring.
5. Shall comply with AWWA C219.

- D. If core drilling is required for penetrations of existing concrete walls or slabs, locations of drilling shall be determined by radiograph to avoid damage to reinforcing steel and conduits.

2.04 CONCRETE FOR THRUST BLOCKS

- A. Thrust Block Concrete: As specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 deformed bars.
- C. Welded Wire Fabric: ASTM A497/A497M.
- D. Formwork: Plywood; earth cuts may be used as approved by Design Engineer.

2.05 PIPE LOCATING TAPE

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.06 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. Granular material or controlled low strength material as specified in Section 31 23 23.15, Trench Backfill.

2.07 TRENCH STABILIZATION MATERIAL

- A. As specified in Section 31 23 23.15, Trench Backfill.

PART 3 EXECUTION**3.01 GENERAL**

- A. Notify Construction Manager at least 2 weeks prior to field fabrication of pipe or fittings.
- B. Furnish feeler gauges of proper size, type, and shape for use during installation for each type of pipe furnished.
- C. Distributing Materials: Place materials along trench only as will be used each day, unless otherwise approved by Construction Manager. Placement of materials shall not be hazardous to traffic or to general public, obstruct access to adjacent property, or obstruct others working in area.

3.02 EXAMINATION

- A. Verify size, material, joint types, elevation, and horizontal location of existing pipeline to be connected to new pipeline or new equipment.
- B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.

- C. Damaged Coatings and Linings: Repair using coating and lining materials in accordance with manufacturer's instructions.

3.03 PREPARATION OF TRENCH

- A. Prepare trench as specified in Section 31 23 16, Excavation.

3.04 INSTALLATION

A. General:

1. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
2. Install individual pipe lengths in accordance with approved lay diagram. Misplaced pipe shall be removed and replaced.
3. Inspect pipe and fittings before installation, clean ends thoroughly, remove foreign matter and dirt from inside.
4. Flanged Joints:
 - a. Install perpendicular to pipe centerline.
 - b. Bolt Holes: Straddle vertical centerline, aligned with connecting equipment flanges or as shown on Drawings.
 - c. Use torque-limiting wrenches to provide uniform bearing and proper bolt tightness.
 - d. Flange Type: Use flat-faced flange when joining with flat-faced ductile or cast-iron flange.

B. Buried Pressure Pipe:

1. Concrete Encased or Embedded Pipe: Do not encase joints in concrete, unless specifically shown on Drawings.
2. Placement:
 - a. Keep trench dry until pipe laying and joining is completed.
 - b. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
 - c. Measure for grade at pipe invert, not at top of pipe.
 - d. Excavate trench bottom and sides of ample dimensions to permit proper joining, welding, visual inspection, and testing of entire joint.
 - e. Prevent foreign material from entering pipe during placement.
 - f. Close and block open end of last laid pipe section when placement operations are not in progress and at close of day's work.
 - g. In general, lay pipe upgrade with bell ends pointing in direction of laying.

- h. Deflect pipe at joints for pipelines laid on a curve using unsymmetrical closure of spigot into bell. If joint deflection of standard pipe lengths will not accommodate horizontal or vertical curves in alignment, provide:
 - 1) Shorter pipe lengths.
 - 2) Special mitered joints.
 - 3) Standard or special fabricated bends.
- i. Check gasket position with feeler gauge to assure proper seating.
- j. After joint has been made, check pipe alignment and grade.
- k. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.
- l. Prevent uplift and floating of pipe prior to backfilling.
- 3. Tolerances:
 - a. Deflection From Horizontal Line: Maximum 2 inches.
 - b. Deflection From Vertical Line: Maximum 1 inch.
 - c. Joint Deflection: Maximum of 75 percent of manufacturer's recommendation.
 - d. Horizontal position of pipe centerline on alignment around curves maximum variation of 1 foot from position shown.
- 4. Cover Over Top of Pipe: Minimum 3 feet, unless otherwise shown.
- 5. Disposal of Excess Excavated Material: As specified in Section 31 23 16, Excavation.

3.05 THRUST RESTRAINT

- A. Location: At pipeline tees, plugs, caps, bends, and locations where unbalanced forces exist.
- B. Thrust Blocking:
 - 1. Place only where shown on Drawings.
 - 2. Quantity of Concrete: Sufficient to cover bearing area of pipe and provide required soil bearing area as shown on Drawings.
 - 3. Place blocking so pipe and fitting joints are accessible for repairs.
 - 4. Place concrete in accordance with Section 03 30 00, Cast-in-Place Concrete.

3.06 CORROSION PROTECTION

- A. Buried Pipe: As specified in the individual specifications listed in Piping Schedule shown on Drawings.
- B. Buried Metallic Fittings and Specials: Wax tape coating as specified in Section 26 42 00, Galvanic Anode Cathodic Protection System.

- C. Notify Construction Manager at least 3 days prior to start of surface preparation, coating application, and corrosion protection work.

3.07 PLACEMENT OF PIPE LOCATING TAPE

- A. Place pipe locating tape in accordance with Section 31 23 23.15, Trench Backfill.

3.08 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. Place pipe bedding and pipe zone material in accordance with Section 31 23 23.15, Trench Backfill.

3.09 FIELD QUALITY CONTROL

- A. Pressure Leakage Testing: As specified in the specification(s) listed in Piping Schedule shown on Drawings.

3.10 CLEANING

- A. Following assembly and testing, and prior to final acceptance, flush pipelines with water at 2.5 fps minimum flushing velocity until foreign matter is removed. Dispose of water and flushed foreign matter.
- B. If impractical to flush large diameter pipe at 2.5 fps, clean pipe in-place from inside by brushing and sweeping, then flush or blow line at lower velocity.
- C. Remove accumulated debris through blowoffs 2 inches and larger or by removing spools and valves from piping.

END OF SECTION

SECTION 33 05 01.01
WELDED STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Mechanical Engineers (ASME):
 - a. B16.9, Factory-Made Wrought Butt welding Fittings.
 - b. B36.10M, Welded and Seamless Wrought Steel Pipe.
 - c. BPVC SEC VIII, Div. 1, Rules for Construction of Pressure Vessels.
 - d. BPVC SEC IX, Welding and Brazing Qualifications.
 2. American Society for Nondestructive Testing Inc. (ASNT):
SNT-TC-1A, Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing.
 3. American Water Works Association (AWWA):
 - a. C200, Steel Water Pipe - 6 In. (150 mm) and Larger.
 - b. C205, Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied.
 - c. C206, Field Welding of Steel Water Pipe.
 - d. C208, Dimensions for Fabricated Steel Water Pipe Fittings.
 - e. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - f. C217, Petrolatum and Petroleum Wax Tape Coatings for the Exterior of Connections and Fittings for Steel Water Pipelines.
 - g. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe.
 - h. C221, Fabricated Steel Mechanical Slip-Type Expansion Joints.
 - i. C602, Cement-Mortar Lining of Water Pipelines in Place - 4 In. (100 mm) and Larger.
 - j. M11, Steel Pipe - A Guide for Design and Installation.
 4. American Welding Society (AWS):
 - a. A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 - b. A3.0M/A3.0, Standard Welding Terms and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying.
 - c. D1.1/D1.1M, Structural Welding Code - Steel.
 - d. QC 1, Standard for AWS Certification of Welding Inspectors.
 5. ASTM International (ASTM):
 - a. A20/A20M, Standard Specification for General Requirements for Steel Plates for Pressure Vessels.

- b. A36/A36M-08 Standard Specification for Carbon Structural Steel.
- c. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- d. A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
- e. A234/A234M, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- f. A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
- g. A435/A435M, Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.
- h. A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service.
- i. A770/A770M, Standard Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications.
- j. A1018/A1018M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- k. D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- l. E23, Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.
- m. E329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- n. E1255, Standard Practice for Radioscopy.
- 6. International Organization for Standardization (ISO): 9001:2000, Quality Management Systems - Requirements.
- 7. Lloyd's Registry.
- 8. Steel Pipe Fabricators Association (SFPA).
- 9. The 2018 "Greenbook" Standard Specifications for Public Works Construction.
- 10. The 2018 City of San Diego Supplement "Whitebook" Standard Specifications for Public Works Construction.

1.02 DEFINITIONS

- A. Fittings and Specials: Including, but not limited to fittings, closure pieces, bends, elbows, reducers, tees, wyes, bifurcations, crosses, outlets, manifolds, nozzles, wall sleeves, bulkheads, vent pipes, and other piping and appurtenances fabricated from steel plate, sheet, or coils as required to provide the Work, complete. Also includes piping above ground or inside structures.

- B. Main Pipe Supplier: Manufacturer of the pipeline and as further defined in this Specification.

- C. Acronyms:
 - 1. BPVC: Boiler and Pressure Vessel Code.
 - 2. CJP: Complete Joint Penetration.
 - 3. CWI: Certified Welding Inspector.
 - 4. LHA: Lining Holdback Area.
 - 5. LT: Leak Testing.
 - 6. MPS: Main Pipe Supplier.
 - 7. MT: Magnetic Particle Testing.
 - 8. NDE: Nondestructive Examination.
 - 9. NDT: Nondestructive Testing.
 - 10. PJP: Partial Joint Penetration.
 - 11. PQR: Procedure Qualification Record.
 - 12. PT: Liquid Penetrant Testing.
 - 13. RT: Radiographic Testing.
 - 14. UT: Ultrasonic Testing.
 - 15. VT: Visual Testing.
 - 16. WPQ: Welder/Welding Operator Performance Qualification.
 - 17. WPS: Welding Procedure Specification.

1.03 DESIGN REQUIREMENTS

- A. Fittings:
 - 1. Design reinforcement, unless otherwise shown.
 - 2. Design in accordance with AWWA M11, AWWA C200, and AWWA C208 and this Specification, except for nozzles, dished heads, and test heads. Design nozzles, dished heads, and test heads in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
 - 3. Submit design calculations to the Design Engineer for review prior to manufacture of steel pipe fabricated specials.
 - 4. For the purposes of design calculations, the following are defined:
 - a. Maximum Design Pressure (psi): 100 psi.
 - b. Test Pressure (psi): As shown on Drawings.
 - c. Vacuum Pressure: Minus 14.4 psi.
 - 1) Design pipe and fittings for full vacuum pressure.
 - 5. Design elbows for working and test pressures using allowable stresses of 50 percent yield strength and 62.5 percent of yield strength, respectively.
 - 6. Design outlet reinforcing for working pressure using an allowable stress of 50 percent of yield strength.

7. Design based on E-values in accordance with the Geotechnical Design Report provided by the Owner.
- B. Pipe Layout: Design in accordance with AWWA M11.
1. General:
 - a. Horizontal and Vertical Alignment: See Drawings.
 - b. Base stationing and elevation convention as shown on Drawings.
 - c. Maximum Laying Lengths:
 - 1) Not limited, unless specifically shown on Drawings.
 - 2) Select lengths to accommodate installation operation.
 - d. Coordinate requirements of Section 26 42 00, Galvanic Anode Cathodic Protection System.
 2. Include, as minimum:
 - a. Specific number, location, and direction of each pipe, joint, and fitting. Number each pipe in installation sequence.
 - b. Station and centerline elevation at changes in grade or horizontal alignment.
 - c. Station and centerline elevation to which bell end of each pipe will be laid.
 - d. Elements of curves and bends, both in horizontal and vertical alignment.
 - e. Location of mitered pipe sections, beveled ends, and pulled joints for alignment conformance, butt straps, and deep bell lap joints for temperature stress control.
 - f. Location of closures, cutoff sections for length adjustment, temporary access manways, vents, and weld lead outlets for construction convenience.
 - 1) Provide for adjustment in pipe laying headings and to conform to indicated stationing.
 - 2) Changes in location or number will require Design Engineer approval.
 - g. Location of bulkheads, both those shown and as required, for hydrostatic testing of pipeline.
- C. Welding Procedure Specification (WPS):
1. Qualified by testing in accordance with ASME BPVC SEC IX for shop welds and AWS D1.1/D1.1M for field welds.
 2. PQRs conducted on unlisted base metal (most coil products are unlisted base metals) to be production welded as required in the referenced welding Code shall be traceable to heat lots.
 3. Written WPS required for welds, both shop and field.

4. Notch-tough welding procedures that require heat input control shall be required for welding of pipe and/or crotch plates with thickness equal to 7/16-inch or greater:
 - a. AWS D1.1/D1.1.M prequalified welding procedures are not allowed.
 - b. WPS used to shop fabricate pipe shall be qualified in accordance with ASME BPVC SEC IX and shall include Supplementary Essential Variables.
 - c. WPS used to field install pipe shall be qualified for heat input control in accordance with AWS D1.1/D1.1M.
 - d. PQRs:
 - 1) Qualified for notch tough welding with consideration for thickness of steel, test temperature, and Charpy V-notch CVN values.
 - 2) Refer to AWS D1.1/D1.1M, Table 4.6 PQR Supplementary Essential Variable Changes for CVN Testing Applications Requiring WPS Requalification for SMAW, SAW, GMAW, FCAW, and GTAW and Section 4, Part D Requirements for CVN Testing, Option A (three specimens).
 - 3) CVN test temperature and acceptance shall be same as pipe base metal specified herein.
- D. Stulling (Strutting): Design for pipe, specials, and fittings such that over-deflection and damage is avoided during handling, storage, and installation, including backfill and compaction.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Submit Shop Drawings of steel pipe, specials, and fittings in accordance with the requirements in Section 01 33 00, Submittal Procedures, and the following supplemental requirements as applicable. Prepare and submit submittals for steel pipe and steel pipe specials by a single pipe supplier. MPS is responsible for preparation of the material.
 - b. Show pipe layout as described in this section.
2. Material list and steel reinforcement schedules for materials specified.
3. Fabrication Information:
 - a. Pipe, specials, and fitting details for temporary and permanent facilities indicating:
 - 1) Cylinder thickness.
 - 2) The position, type, size, and area of reinforcement.
 - 3) Manufacturing tolerances.

- 4) Maximum angular deflection limitations of field joints.
 - 5) Closure sections and cutoffs for field length adjustment.
 - 6) Bulkheads, including details for removal of test bulkheads and repair of lining.
 - 7) Weld lead outlets and plugs.
 - 8) Stulling size, spacing, and layout.
 - 9) Other pertinent information required for the manufacturer and installation of the product.
- b. Welded joint details including:
- 1) Butt joints.
 - 2) Miter-cut ends for alignment conformance.
 - 3) Lap joints.
 - 4) Special thermal control joints required for control of temperature stresses.
 - 5) Butt strap joints.
4. Welding Data (Shop and Field Welding):
- a. Show on a weld map, complete information regarding base metal specification designation location, type, size, and extent of welds with reference called out for WPS and NDE numbers in tail of welding symbol.
 - b. Distinguish between shop and field welds.
 - c. Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for all welds.
 - d. Welding and NDE symbols shall be in accordance with AWS A2.4.
 - e. Welding terms and definitions shall be in accordance with AWS A3.0M/A3.0.
 - f. Submit welding data at the same time as Shop Drawings.
5. Product data for the following:
- a. Welded Steel Pipe and Fittings:
 - 1) Material data.
 - 2) Chemical and physical test reports showing data consistent with specified requirements for each heat of steel proposed for use with pipe, fitting, and special.
 - b. Coatings and Linings:
 - 1) Technical data sheets itemizing chemical composition, technical and performance information that indicates compliance with this Specification.
 - 2) Color chart, if applicable.
 - 3) Manufacturer's name, product number or name, and thickness.

- c. Flanged Joints:
 - 1) For Each Flanged Connection: Reference standard, dimensional data, bolt hole number, pattern and diameter, bolt diameter and length, face condition (raised or flat).
 - 2) Gaskets and Bolting: Technical data sheets itemizing chemical composition, technical and performance information that indicates compliance with this Specification.
 6. Coordinated flange submittal showing the type of flange at each flange connection.
 7. Pipe handling equipment and methods for loading and unloading pipe.
 8. Stulling Plan: Size, number, location of stulls to be placed in pipe. For pipe that is 30-inch diameter or greater, maximum stull spacing is 15 feet.
- B. Informational Submittals:
1. Certificates: Manufacturer's Certificate of Compliance that products furnished meet requirements of this Specification and in accordance with Section 01 61 00, Common Product Requirements.
 2. Steel Pipe Installation: Certificate that training has been provided to Contractor's installation crews regarding proper pipe handling, storage, and installation procedures in accordance with Section 01 43 33, Manufactures' Field Services.
 3. MPS's written Quality Assurance/Control (QA/QC) Plan.
 4. Statements of Qualification:
 - a. Pipe manufacturer.
 - b. Fittings and specials fabricator.
 - c. Welders or Welding Operators (Welder Log):
 - 1) Name of welder.
 - 2) Welding procedures/positions for which welder is qualified to weld.
 - 3) Assigned certification stamp number.
 - 4) Certification date.
 - 5) Current certification status.
 - d. Contractor's Certified Welding Inspector (CWI) for shop welding.
 - e. Owner's CWI for field welding.
 - f. NDT Personnel Certifications.
 5. Procedures:
 - a. Shop and field welding information: At a minimum include complete welding code paper trail with linkage to Shop Drawings.
 - b. Written WPS, WPQ, and PQR:
 - 1) Provide complete joint dimensions and details showing bevels, groove angles, root face, and root openings for welds.

- 2) Provide notch-tough welding procedures when steel thickness exceeds 7/16-inch. For shop welding, address supplementary essential variables in addition to essential variables as indicated in ASME Section IX, QW-251.2. For field welding, heat-input, include control PQR essential variables as indicated in AWS D1.1/D1.1M, Table 4.6. For shop and field welding, provide heat-input table on WPSs for welder guidance.
- 3) Document in PQRs for notch-tough welding heat-input control by monitoring volts, amps, and travel speed or time-rate of change of weld metal volume as calculated by measuring change in electrode length over a period of time. Conduct Charpy V-notch tests on weld metal and heat affected zone. Orient test coupons transverse to final direction of rolling. Full size Charpy specimen test acceptance shall be same as base metal specified herein.
- 4) Written NDT procedures.
- 5) Current WPQ.
- c. Written description of proposed sequencing of events or special techniques such as:
 - 1) Controlling pipe wall temperature stress during installation.
 - 2) Minimizing distortion of steel.
 - 3) Shop-Applied Cement-Mortar Lining: Include description of machine to be used and list of similar projects where machine was used. Identify pipe size and total footage. Identify pipe size and total footage.
 - 4) Monitoring pipeline temperatures during installation.
 - 5) Field coating application and repair.
 - 6) Field lining application, repair, and moisture control in accordance with AWWA C602 or AWWA C222.
- d. Written weld repair procedures for the Work.
- e. Field coating application and repair.
- f. Field lining application and repair.
6. Safety Plan for Working Near High Voltage AC Powerlines: Include monitoring and mitigation of electrostatic and electromagnetic coupling during installation of the pipeline and safe work practices associated with construction activities near high voltage AC powerlines in accordance with OSHA 1926.550(a)(15).
7. Reports:
 - a. Source Quality Control Test Reports:
 - 1) Hydrostatic testing.
 - 2) Nondestructive weld testing.
 - 3) Steel impact testing using Charpy V-notch method.
 - 4) Letter certifying pipe furnished meets requirements of this Specification.

- b. Final Inspection Reports.
 - c. Field Quality Control Test Reports:
 - 1) Weld tests, including re-examination of repaired welds, on each weld joint for the following tests, as applicable:
 - a) VT.
 - b) RT.
 - c) UT.
 - d) MT.
 - e) PT.
 - 2) Coating and lining site visit letter by qualified technical representative certifying Contractor is meeting the requirements of the Contract.
 - 3) Applicator's quality control records, including environmental conditions, dry film thickness, and adhesion tests.
 - d. Cement-mortar coating absorption tests in accordance with AWWA C205.
 - e. Field-applied cement mortar lining moisture control in accordance with AWWA C602.
8. Field Testing Plan:
- a. Submit at least 15 days prior to testing and include following information at a minimum:
 - 1) Testing dates.
 - 2) Piping system and sections to be tested.
 - 3) Method of isolation.
 - 4) Method of conveying water from source to system being tested.
 - 5) Calculation of maximum allowable leakage for piping sections to be tested.
9. Design Calculations:
- a. Prepared by a licensed professional engineer in the State of California for fittings and specials, including opening reinforcement details of collars, nozzles, wrappers, crotch plates, and harnessed joint assemblies.
 - b. Submit design calculations at the same time as Shop Drawings.
10. Temperature Stress Control Plan:
- a. Submit at least 45 days prior to installing pipe and include at least the following information:
 - 1) Step by step installation procedures and sequencing to demonstrate compliance with temperature control requirements, including:
 - a) Pipe installation.
 - b) Joint welding of standard joints and temperature control joints.
 - c) Pipe bedding and backfill.

- b. Methods to ensure compliance with procedures by installation personnel.
- c. Equipment to be used to monitor pipe wall temperature.
- 11. Time of day, climatic, or seasonal installation limits to be used to achieve compliance with temperature.
- 12. Pipe manufacturer's design engineer's certification of training of Contractor's pipe installation crews.

1.05 QUALITY ASSURANCE

A. Qualifications:

- 1. Pipe Manufacturer:
 - a. Experienced in fabricating pipe of similar diameters, lengths, and wall thickness required for the Work.
 - b. Steel Pipe Fabricators Association (SPFA), Lloyd's Registry Certification, or ISO 9001:2000 Certification.
 - c. Demonstrate current production capability for volume of work required for Project.
 - d. Experience shall include successful fabrication to AWWA C200 standards of at least 25,000 linear feet of 42-inch diameter or larger pipe, with wall thickness of 0.25 inch or greater.
 - e. Experience shall be applicable to fabrication plant facilities and personnel, not company or corporation that currently owns fabrication facility or employs personnel.
- 2. Fittings and Specials Fabricator:
 - a. Experienced in fabricating fittings of similar diameters and wall thickness required for the Work.
 - b. Steel Pipe Fabricators Association (SPFA), Lloyd's Registry Certification, or ISO 9001:2000 Certification.
 - c. Demonstrate current production capability for volume of work required for this Project.
 - d. Experience shall include successful fabrication to AWWA C200 and AWWA C208 standards of at least 25 fittings of 42-inch or larger pipe, with wall thickness 0.25-inch or greater, within past 5-year period.
 - e. Experience shall include successful fabrication of at least five crotch plate fittings requiring post weld heat treatment, if crotch plates are required for the Project.
 - f. Experience shall be applicable to fabrication shop facilities and personnel, not company or corporation that currently owns fabrication facility or employs personnel.
- 3. Welders and Welding Operators:
 - a. Shop Welders: In accordance with ASME BPVC SEC IX.
 - b. Field Welders: In accordance with AWS D1.1/D1.1M.

4. Contractor's Certified Welding Inspector for Shop and Field Welding:
 - a. In accordance with AWS QC 1, with knowledge of welding code for the Work.
 - b. At least one Shop CWI and one Field CWI must have a list of projects and references related to welding inspection similar to the Work. Other CWIs may work under the supervision of lead CWI, provided they have related professional experience after receiving CWI qualification.
5. NDT Quality Control Personnel:
 - a. In accordance with requirements of ASNT SNT-TC-1A, NDT Level II.
 - b. At least one NDT person must have a list of projects and references related to NDT inspection similar to the Work. Other NDT Level II personnel may work under the supervision of lead NDT, provided they have related professional experience after receiving NDT qualification.

B. CWI for Shop Welding:

1. Provide full-time CWI during shop welding.
2. In accordance with AWWA C200.
3. Responsibilities:
 - a. Verify conformance to use of specified materials and their proper storage.
 - b. Monitor conformance to approved WPS.
 - c. Monitor conformance to approved NDT procedure specifications.
 - d. Monitor conformance of WPQ.
 - e. Provide 100 percent visual inspection before, during, and after shop welding.
 - f. Coordinate NDT work and review test results.
 - g. Maintain records and prepare report confirming results of inspection and testing.

C. Field Welder Qualifications:

1. Field Welding Procedures, Welders, and Welding Operators: Qualified in accordance with AWS D1.1/D1.1M.
2. Welder performance qualifications must have been conducted by or on behalf of the Contractor (portable welder certifications are not acceptable).

D. CWI for Field Welding:

1. In accordance with AWWA C206 and AWS D1.1/D1.1M.
2. The presence of Owner's testing agency and/or welding inspectors does not relieve the Contractor from these code required quality control duties for welding inspection.
3. Responsibilities:
 - a. Verify conformance to use of specified materials and their proper storage.
 - b. Monitor conformance to approved WPS.
 - c. Monitor conformance to approved NDT procedure specifications.
 - d. Monitor conformance of WPQ.
 - e. Provide 100 percent VT before, during, and after field welding.
 - f. Coordinate NDT work and review test results.
 - g. Maintain records and prepare report confirming results of inspection and testing.

E. Prefabrication Meeting:

1. Hold prior to fabrication of pipe and fittings between representatives of Owner, Contractor, Construction Manager, Design Engineer, and MPS to review following:
 - a. Project scope.
 - b. Submittal requirements.
 - c. Testing.
 - d. Inspection responsibilities.
 - e. Shop welding requirements.
 - f. Field welding requirements.
 - g. Shop and field coating and lining requirements.
 - h. Production and delivery schedule.
 - i. Other issues pertinent to the Work.

F. Inspection of Coating and Lining Application: Inspection requirements for pipeline coatings and lining shall be in accordance with the applicable pipeline coating system specification section.

G. Retain services of a qualified technical representative to:

1. Test coating and lining system in shop and field in accordance with applicable pipeline coating system specification as selected.
2. Visit the MPS facility and Site at the beginning of the application process to verify proper workmanship associated with coating and lining application and as may be required to resolve shop or field problems.
3. Provide certification letter that lining and coating meet specifications and include results of specified tests.

H. Onsite Observation of MPS Field Service Representative:

1. Make available an experienced MPS staff member to be onsite when requested by Contractor, Construction Manager and/or Design Engineer.
2. MPS field services: Minimum of 15 person-days.
3. Contractor to provide notification for MPS field services a minimum of 48-hour prior to field services.
4. The MPS staff member's duties include, but not limited to the following:
 - a. Provide field services in accordance with Section 01 43 33, Manufacturers' Field Services.
 - b. Train Contractor's pipe installation crews as further specified in Section 01 43 33, Manufacturers' Field Services.
 - c. Inspect pipe upon delivery to Site.
 - d. Observe pipe handling, moving, storage, and hoisting operations.
 - e. Report any concerns to the Construction Manager.
 - f. Answer questions and provide assistance to the Construction Manager, Owner, Design Engineer, and the Contractor.
 - g. Inspection and certification of field mortar lining repair and dielectric coating repair of pipe, fittings, or specials when requested.
 - h. MPS's written Quality Assurance/Control (QA/QC) Plan.

I. MPS QA/QC Plan Minimum Requirements:

1. Ensure the achievement of adequate quality throughout applicable areas of the Contract.
2. Describe the program and include procedures, work instructions, and records.
3. Describe methods relating to areas which require special testing and procedures as noted in the Specifications.
4. Identification and Control of Items and Materials: Procedures to ensure that items or materials that have been accepted at the manufacturing site are properly used and installed. Provide for proper identification and storage, and prevent the use of incorrect or defective materials.
5. Inspection and Tests:
 - a. Written procedures and description of defining a program for control of inspections performed.
 - b. Perform and document inspections and tests by qualified individuals. At a minimum, "qualified" means having performed similar QA/QC functions on similar type projects. Maintain records of personnel experience, training and qualifications and make available for review by the Design Engineer upon request.
 - c. Maintain adequate records of such inspections and tests. Submit inspection and test results.

- d. Include in Procedures:
 - 1) Specific instructions defining procedures for observing work in process and comparing this Work with the Contract requirements (organized by specification section).
 - 2) Specific instructions for noting deficiencies and steps to be taken to have the deficiency corrected, repaired, or replaced.
 - 3) Specific instructions for recording observations and requirements for demonstrating through the reports that the Work observed was in compliance or a deficiency was noted and action to be taken.
 - 4) Procedures to preclude the covering of deficient or rejected Work.
 - 5) Procedures for halting or rejecting Work.
 - 6) Procedures for resolution of differences between the QA/QC representative(s) and the production representative(s).
- e. Identify contractual hold/inspection points, as well as any MPS imposed hold/inspections points.
- f. Include procedures to provide verification and control of testing including:
 - 1) Verifying and noting on Daily Report required testing was performed and documenting results if available (Include a sample of the MPS's Daily Report).
 - 2) Provide location maps for tests performed or location of Work covered by the tests.
 - 3) Maintaining copies of test results.
 - 4) Submitting tests.
 - 5) Ensuring Design Engineer receives independent copy of tests.
 - 6) Ensuring testing lab(s) are functioning independently and in accordance with the Specifications.
 - 7) Ensuring re-tests are properly taken and documented.
- 6. Control of Measuring and Test Equipment: Include procedures to adequately maintain, calibrate, and adjust measuring and/or testing instruments to maintain accuracy within prescribed limits. Include procedures to perform calibration at specified periods against valid standards traceable to nationally recognized standards and documented.
- 7. Supplier Quality Assurance: Include procedures to ensure that procured products and services conform to the requirements of the Specifications. Apply requirements of these procedures, as appropriate, to lower-tier suppliers and/or Subcontractors.

8. Nonconformances and Corrective Action: Include procedures for handling of nonconformances. Nonconformances are defined as documentation, drawings, material, and equipment or Work not conforming to the specified requirements or procedures. Include procedures for prevention of the use of nonconformances by identification, documentation, evaluation, separation, disposition and corrective action to prevent recurrence. Promptly identify conditions having adverse effects on quality and report to the senior level management. Document and measure cause of conditions adverse to quality. Implement measures to prevent recurrence.
9. Special Processes and Personnel Qualifications:
 - a. Include detailed procedures for the performance and control of special process (e.g., welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).
 - b. Provide personnel performing special process tasks that have the experience, training, and certifications commensurate with the scope, complexity, or nature of the activity.
10. Audits: Provide for documented audits to verify that QA/QC procedures are being fully implemented by the MPS as well as its subtiers. Make audit records available to the Design Engineer upon request.
11. Documented Control/Quality Records:
 - a. Establish methods for control of Contract Documents, which describe how Drawings and Specifications are received and distributed to assure the correct issue of the document being used.
 - b. Maintain evidence of activities affecting quality, including operating logs, records of inspections and tests, audit reports, material analyses, personnel qualification and certification records, procedures, and document review records.
 - c. Maintain quality records in a manner that provides for timely retrieval, and traceability. Protect quality records from deterioration, damage, and destruction.
 - d. Provide a list with specific records as specified in the Contract Documents for submittal at the completion of activities.
 - e. Provide electronic file(s) in PDF format of the Final Inspection Report for each pipe segment, fitting, and special. Final Inspection Report will include detailed record of the source material, fabrication, observations, welding, destructive and nondestructive tests, coating, and lining for each pipe segment, fitting, and special.

12. Acceptance of QA/QC Plan:
 - a. Design Engineer's review and acceptance of the MPS's QA/QC Plan does not relieve the MPS from any of its obligations for the performance of the Work. The MPS's QA/QC staffing is subject to the Design Engineer's review and continued acceptance. Owner or Design Engineer, at its sole option, without cause, may direct the MPS to remove and replace the QA/QC representative. Do not start Work covered by the QA/QC Plan until Design Engineer's acceptance of MPS's QA/QC plan has been obtained.
 - b. At Owner's discretion, an independent testing agency may perform quality assurance audits to verify that actions specified in MPS's QA/QC Plan have been implemented. Audit findings or reports by an Owner's testing agency do not relieve MPS from any requirements of this Contract.

1.06 DELIVERY, HANDLING, AND STORAGE

A. Pipe Marking:

1. Legibly mark installation sequence number on pipe and fittings in accordance with piping layout.
2. Mark special pipe sections and fittings at each end with notation "TOP FIELD CENTERLINE."
3. Paint or mark the word "TOP" on outside top spigot of each fitting.
4. Mark "TOP MATCH POINT" for compound bends per AWWA C208 so end rotations can be easily oriented in field.
5. Precisely paint 3/4-inch insertion band circumferentially around spigot end of each pipe to indicate location of maximum insertion into the bell.

B. Delivery:

1. Securely bulkhead or otherwise seal ends of pipe and fittings prior to loading at manufacturing site.
2. Keep pipe ends sealed until installation.
3. Unload pipe using equipment and methods as approved by MPS and in accordance with MPS pipe handling submittal.
4. Inspect each pipe and fitting for damage. Remove or smooth out any burrs, gouges, weld splatter or other small defects prior to laying the pipe.
5. Repair damage to pipe and fittings, including linings and coatings, found upon delivery to Site, or remove from Site and replace.

C. Storage:

1. Support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.
2. Support on sand or earth berms free of rock exceeding 3 inches in diameter.
3. Carefully handle and protect pipe, fittings, and specials against damage to lining and coating/interior and exterior surfaces, impact shocks, and free fall. Submit pipe handling equipment for acceptance by Design Engineer. Do not place pipe directly on rough ground but support at the 1/3 and 2/3 points along the length of the pipe section in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere.
4. Repair damage to pipe, fittings, or specials, including linings and coatings, found in stored pipe in accordance with manufacturer's instructions or remove from site and replace.
5. Gasket Storage: Store rubber gaskets in cool, well ventilated place, and do not expose to direct rays of sun. Do not allow contact with oils, fuels, petroleum, or solvents.
6. Pipe and Specials Protection: Protect with suitable bulkheads the openings of pipe and specials where the pipe and specials have been cement-mortar lined in the shop to maintain a moist atmosphere and to prevent unauthorized access by persons, animals, water or any undesirable substance. Maintain bulkheads, fix tears or replace bulkheads damaged. Introduce water into the pipe to keep the mortar moist where moisture has been lost due to damaged bulkheads.

1.07 SEQUENCING AND SCHEDULING

A. Notify Construction Manager in writing of the following:

1. Pipe Manufacturing: Not less than 14 days prior to starting.
2. Not less than 5 days prior to start of each of the following:
 - a. Welding.
 - b. Welding of fittings and specials.
 - c. Coating application.
 - d. Lining application.
 - e. Shop hydrostatic testing.

PART 2 PRODUCTS

2.01 GENERAL

A. Pipe Manufacturer:

1. Manufacturing of steel pipe and fittings shall be under direction and management of one pipe steel pipe supplier only. This does not prevent a separate supplier from manufacturing specials or fittings; however, MPS will direct the Work.
2. Responsibility of MPS includes, at minimum:
 - a. Ensure pipe, fittings, and specials are being manufactured in full accordance with Drawings and Specifications.
 - b. Manage the design and fabrication of the pipe and specials.
 - c. Prepare and submit submittal information and Shop Drawings.
 - d. Make corrections that may be required to the submittal information and Shop Drawings.
 - e. Certify that the pipe and specials have been manufactured in accordance with Specifications and Drawings.

B. Pipe Size:

1. Pipes Larger than 24 Inches in Diameter: Unless shown otherwise, the finished inside diameter after lining is the diameter shown in these Contract Documents.

C. Manufacture, test, and inspect steel pipe, fittings, and specials to comply with AWWA C200, C208, and additional requirements of these Contract Documents. Provide the pipe diameter and wall thickness as indicated in these Contract Documents.

D. In lieu of collar reinforcement, pipe, fittings, and specials with outlets may be fabricated in their entirety of steel plate having thickness equal to sum of pipe wall plus required reinforcement.

2.02 PIPE BARREL

A. Steel:

1. Provide steel coils for spiral welded steel pipe or steel plate for straight seam welded steel pipe per AWWA C200 and as follows:
 - a. Steel quality as follows:
 - 1) Coils: Continuous cast process, fully-killed, fine grained practice conforming to physical, manufacturing, and testing requirements of ASTM A1018/A1018M, Structural (SS) Grade 36, Type 2 (modified).

- 2) Plate:
 - a) Fully-killed, conforming to ASTM A20/A20M, fine grained practice conforming to physical, manufacturing and testing requirements of ASTM A516/A516M, Grade 70.
 - b) Steel Chemistry: Conform to ASTM A516/A516M, Grade 70. Steel plates that are 3/4-inch thick or greater shall be normalized.
- 3) Toughness:
 - a) Charpy V-notch Acceptance Criteria (Steel Mill):
Wall thickness equal to or greater than 7/16 inches.
Transverse specimen orientation, full size specimens,
25 foot-pounds energy at test temperature of
30 degrees F.
 - b) Frequency: See Paragraph Steel Toughness Testing
for Thickness Equal to or Greater than 7/16 Inches.
- b. Wall Thickness:
 - 1) Base metal thickness supplied is to meet or exceed the minimum wall thickness as shown on Drawings. No variation or under-tolerance less than the specified minimum wall thickness will be allowed or accepted.
 - 2) When not shown on Drawings, use standard weight in accordance with ANSI/ASME B36.10M.

2.03 FITTINGS AND SPECIALS

A. Fabrication:

1. Shop Fabricate: No field fabrication will be allowed, unless approved by Design Engineer.
2. Fabricate from materials or straight pipe in conformance with specified requirements and dimensions of AWWA C208, unless otherwise indicated.

B. Crotch Plate:

1. Fabricate from fully-killed, fine grain, pressure vessel steel conforming to ASTM A516/A516M, Grade 70, and as follows:
 - a. Plates shall be normalized.
 - b. Chemistry:
 - 1) Sulphur: 0.005 percent maximum.
 - 2) Carbon: 0.20 percent maximum.
 - 3) Manganese: 1.20 percent maximum.
 - c. Strength in the thru-thickness direction (Z direction): Same as the X and Y direction.

- d. Perform Charpy V-notch tests per ASTM A370 in direction transverse to final rolling on full size specimens of coupons taken from each plate. Acceptance: 25 foot-pounds at 30 degrees F.
- e. Carbon Equivalent: 0.45 percent maximum.

C. Wall Thickness:

- 1. General:
 - a. Refer to ASME B36.10M for definitions of wall thickness for standard weight pipe and nominal pipe size (NPS).
 - b. Reinforce to withstand either internal pressures, both circumferential and longitudinal, or external loading conditions, whichever is greater.
 - c. Minimum Thickness: The greater of adjacent mainline pipe, thickness shown on Drawings, thickness calculated as hereinafter specified, or as shown in Table 1.

Table 1		
Nominal Pipe Diameter (inches)	Pipe Manifolds Piping Above Ground Piping in Structures	Bends Reducers
30 and Under	Standard Weight	Standard Weight

D. Elbows, Unless Otherwise Indicated:

- 1. Design in accordance with AWWA C208 and AWWA M11.
- 2. Minimum Radius: 2.5 times pipe diameter unless specifically indicated on Drawings.
- 3. Minimum Bend Wall Thickness: Greater of Table 1 above, wall thickness of adjoining pipe, or, if radius shown on Drawings is less than 2.5 times pipe diameter, as calculated using equations 9-1 or 9-3 in Chapter 9 of AWWA M11, Fourth Edition.
- 4. Maximum Miter Angle: 11-1/4 degrees on each section resulting in a maximum deflection angle of 22.5 degrees per miter weld as recommended in AWWA C208.
- 5. Minimum Length at End of Miter Joint: Sufficient length of straight pipe at the ends of mitered joints to allow application for field joint coating is required. A minimum of 12 inches is required.
- 6. Bevels: Vary bevels on miters to provide a constant weld groove angle. For 11-1/4-degree miter, (22.5-degree miter weld) bevels must vary from 18.75 degrees on OD of bend to 41.25 degrees on ID of bend to provide a constant 60-degree groove angle for CJP welding.
- 7. Complete joint penetration (CJP) welds on miter welds.

E. Outlets and Nozzles:

1. Design and reinforcement per AWWA M11.
2. 24 Inches and Smaller:
 - a. Collar Reinforcement: Steel material to be fabricated from standard weight steel pipe or as shown on Drawings.
 - b. Nozzle: Steel material to be fabricated from ASTM A53/A53M, Type E or Type S, Grade B.
3. Larger than 24 Inches: Steel material to conform to the requirements of Article Pipe Barrel, in this section.
4. ASTM A139/A139M is not approved for use on the Project.
5. Collar or Wrapper Reinforcement: Steel material to conform to the requirements of Article Pipe Barrel, in this section.
6. Tangential Nozzle for Blowoffs: Design in accordance with ASME Boiler and Pressure Vessel Code Section VIII, Division I, Rules for Construction of Pressure Vessels by increasing adjacent pipe wall thickness to provide adequate reinforcement.

F. Steel Butt-Weld Fittings:

1. 24 Inches and Smaller: In accordance with ANSI/ASME B16.9 conforming to ASTM A234/A234M.
2. Larger than 24 Inches: Per AWWA C208 and AWWA M11.
3. Standard weight.
4. Taper pipe wall at welds at 4:1 for connection to pipe of different wall thickness.
5. Coordinate difference in diameter convention between specials and AWWA C200 and AWWA C208 pipe and fittings to provide complete piping system as shown.

2.04 WELDED JOINTS

A. Shop Welded:

1. Fabricate in accordance with AWWA C200 as modified herein.
2. Use complete joint penetration (CJP) butt joints for longitudinal, girth, and spiral welds, unless otherwise indicated.
3. Do not shop-join lengths of pipe using lap joints.

B. Preparation of Joints for Field Welding:

1. Butt Joints:
 - a. Plain ends beveled as required by AWWA C200 and Contractor's field WPS.
 - 1) Tolerances on CJP butt joint beveled ends are to permit field assembly of pipe ends within workmanship assembly tolerances per AWS D1.1/D1.1M.
 - 2) Provide protection for factory beveled pipe ends so that ends are not damaged during transport.
 - b. Taper pipe wall at welds at 4:1 for connection to pipe of different wall thickness.
2. Lap Joints:
 - a. Double fillet lap joint is the standard, unless otherwise shown on Drawings.
 - b. For pipe 30 inches in diameter and larger, precisely paint a circumferential 3/4-inch insertion band (leading edge of band indicating minimum insertion; trailing edge of band indicating maximum insertion; pulled joints to occur within band around entire circumference) around the outside of spigot end to indicate location at which spigot end has reached required penetration into bell.
 - c. Tap and drill double fillet lap and butt-strap welded lap joints for testing from the outside in accordance with AWWA C206 and Drawings.
 - d. Preparation for Field Welding: In accordance with Drawings and AWWA C200.

C. Miter-End Cuts:

1. As shown on Drawings.
2. Welded Lap Joints:
 - a. Moderate deflections and long radius curves may be made using miter-end cuts.
 - b. Use only with lap welded joints, unless specifically approved in writing by Design Engineer.
 - c. Maximum Total Allowable Angle: 3 degrees per pipe joint.
 - d. Mitering allowed on bell end only; mitering of spigot ends will not be permitted.
 - e. Cold expand miter cut square with face of miter-cut on bell ends.
3. Welded Butt Joints:
 - a. Maximum Total Allowable Angle: 2.5 degrees per pipe joint.
 - b. Minimum Pipe Wall Thickness: 3/8-inch.
 - c. Welded butt joints shall be CJP.

D. Special Temperature Control Joint:

1. Provide a special longer bell end (Special Temperature Control Joint) at a maximum spacing of 300 feet to account for movement on installed pipe as a result of temperature changes.
2. Pipe manufacturer shall determine length required for the longer bell but shall be no less than dimensions shown on Drawings.

2.05 FLANGES

- A. In accordance with AWWA C207 Class D, unless otherwise indicated in the Contract Documents.
- B. Coordinate flange mating to adjoining pipe, appurtenance, or flange prior to material submittal.
- C. Flange gaskets shall conform to AWWA C207 and flange pressure rating.
- D. Field coating for access manways, flanges, blind flanges, and couplings to be in accordance with Section 09 90 00, Painting and Coating, System No. 8. For buried flanges, blind flanges, and couplings, also apply in the field (after joint assembly) a wax tape coating in accordance with Greenbook Section 212-2.9. Use manufacturer's filler to eliminate voids and provide smooth surface for tape.
- E. Over-drill bolt holes for insulating flanges, per Section 26 42 00, Galvanic Anode Cathodic Protection System, in accordance with AWWA C207.
- F. Blind Flanges:
 1. In accordance with the appropriate standard determined by the maximum operating pressure.
 2. Blind flanges for pipe sizes 12 inches and greater shall be provided with lifting handle or lifting eyes welded to the flange as shown on Drawings.

2.06 RUBBER GASKET

- A. In accordance with AWWA C200.
- B. Clearance between bell and spigot shall, when combined with gasket groove configuration and gasket itself, provide watertight joints under operating conditions.

2.07 BOLTS AND NUTS FOR FLANGES

- A. Bolts per ASTM A193, Grade B7 and nuts per ASTM A194, Grade B7.
- B. Provide bolt length not less than 1/4 inch and not more than 1/2 inch projecting in a nut tightened position. Provide hexagonal bolt heads and nuts. Provide washers for each nut. Provide washers and nuts of the same material.
- C. Lubricant for Bolt and Nut Threads: Chloride free and TRX-Synlube by Ramco, Anti-Seize by Ramco, Husk-It Husky Lube O-Seal, or approved equal.
- D. Threaded Caps for Nuts and Bolts: Provide threaded grease caps for flange bolts and threaded rods and dismantling joints. Match grease cap threads to bolt threads. Fill caps with anticorrosive lubricant to prevent threads from corroding. Caps shall be suitable to use in exposed and submerged service at from minus 40 degrees F to 200 degrees F.
 - 1. Bolts 1-1/4-Inch Diameter and Less: Use silicone rubber caps to match bolt and nut dimensions.
 - a. 50 durometer Shore A hard, ASTM D2240.
 - b. 800 psi minimum tensile strength, ASTM D412.
 - c. 200 percent minimum elongation per ASTM D412.
 - d. 75 psi minimum tear strength per ASTM D624.
 - e. Manufacturer and Product:
 - 1) MOCAP; Silicone Rubber Caps.
 - 2) Or approved equal.
 - 2. Bolts Over 1-1/4-Inch Diameter:
 - a. Use black high density polyethylene caps by either:
 - 1) Sap-Seal Products, Inc.
 - 2) Advance Products and Systems, Inc., "Radolid."
 - 3) Or approved equal.

2.08 COUPLINGS

- A. General:
 - 1. In accordance with AWWA C219.
 - 2. Rated for appropriate operating pressure as indicated on Drawings.
 - 3. As specified in Section 40 27 00, Process Piping—General.
- B. Coatings and Lining for Couplings: Fusion bonded epoxy-lined and coated in accordance with AWWA C213, and Section 09 90 00, Painting and Coating, System No. 29. Also apply in the field (after installation) a wax tape coating in accordance with Greenbook 212-2.9.

2.09 WELD LEAD OUTLETS

- A. Show outlets for welding leads, if used, on Shop Drawings. Number and location of outlets to be determined at the Contractor's option.
- B. Provide plugs used for closing weld lead outlets suitable for the internal pressure and allow zero leakage. Close weld plugs after completion of Work.

2.10 SLAB, FLOOR, WALL AND ROOF PENETRATIONS

- A. As specified in Section 40 27 01, Process Piping Specialties.

2.11 VENTS

- A. Vents: Standard weight welded steel pipe and epoxy lined per AWWA C213. Coat in accordance with Section 09 90 00, Painting and Coating, System No. 4.

2.12 PIPE MARKING TAPE

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.13 PIPE BEDDING AND PIPE ZONE MATERIAL

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.14 TRENCH STABILIZATION MATERIAL

- A. As specified in Section 31 23 23.15, Trench Backfill.

2.15 ELECTRICAL GROUNDING SYSTEM

- A. Provide as shown on Electrical Drawings per the Contract Documents.

2.16 TEMPERATURE MEASURING INSTRUMENTS

- A. Provide industrial thermocouple thermometer gauges or digital, infrared thermometers, aka, "heat guns" for field measurement of pipe temperatures.
- B. Minimum Thermocouple Thermometer Gauge Requirements:
 - 1. Type K, wide probe, calibration in degrees F, maximum, minimum, hold, store and recall, clear.
 - 2. Accuracy to plus or minus 2 degrees F.
 - 3. Rugged and waterproof for field conditions.

C. Minimum Digital Infrared Thermometer Requirements:

1. Temperature Range: No less than minus 20 degrees F to 200 degrees F.
2. Accuracy to plus or minus 1 percent.
3. Distance to spot ratio of no less than 20:1.
4. Rugged and waterproof for field conditions.

2.17 STULLING (STRUTTING)

A. Materials:

1. Shop-Lined Pipe: Wood stulls and wedges.
2. Unlined Pipe: Steel or wood.

B. Install stulling for pipe, specials, and fittings in accordance with approved submittal and as soon as practical after pipe is fabricated or, for shop-lined pipe, after lining has been applied.

C. Install stulling in manner that will not harm lining.

2.18 COATING

A. According to the 2018 "Greenbook" Standard Specifications for Public Works Construction Section 209-2.2.1 and the City of San Diego Whitebook Section 209-2.2.1.

2.19 CEMENT-MORTAR LINING

A. According to the 2018 "Greenbook" Standard Specifications for Public Works Construction Section 209-2.2.1 and the City of San Diego Whitebook Section 209-2.2.1.

2.20 SOURCE QUALITY CONTROL

A. Steel Toughness Testing for Thickness Equal to or Greater than 7/16 Inches:

1. Include three impact specimens; conduct test in direction transverse to final direction of the coil rolling.
2. Coils:
 - a. Conduct Charpy Testing per ASTM A370 on an initial coil of each heat to establish uniformity of steel.
 - b. Take test coupons from an initial coil of each heat at locations of outer and inner wrap of coil.
 - c. For each coil that fails to meet acceptance criteria, conduct Charpy Testing on next two coils in that heat.
 - d. Do not use coils that do not qualify in production of pipe.

3. Plate:
 - a. Conduct Charpy Tests on each plate in accordance with ASTM A20/A20M.
 - b. Conduct on full-size (10 mm by 10 mm) specimens from each plate in accordance with ASTM A20/A20M.
 - c. Do not use plates that do not qualify in production of pipe.
- B. Crotch Plate:
 1. Perform through-thickness tension testing with acceptance criteria per Article 5 of ASTM A770/A770M on each plate.
 2. Conduct straight-beam ultrasonic examination with acceptance criteria per Article 6 of ASTM A435/A435M on each plate.
 3. Do not use plates that do not qualify.
- C. Shop Hydrostatic Pressure Test:
 1. In accordance with AWWA C200 Section 5.2, except as follows:
 - a. General: Unless specified otherwise, testing of pipe and fittings shall be performed before lining and coating is applied.
 - b. Pipe: Maintain test pressure for minimum of 5 minutes.
 - c. Fittings:
 - 1) If fabricated from untested straight pipe, test to minimum pressure equal to field test pressure.
 - 2) Hydrostatically test fittings and specials with crotch plates, regardless of whether or not straight pipe sections used were previously tested.
 - 3) Maintain test pressure for a length of time as required to perform a visual inspection of welds or a minimum of 5 minutes, whichever is greater.
 - 4) No leakage is allowed.
- D. Joints, Lap-Welded:
 1. Fit test minimum of five joints, selected by Construction Manager, of each pipe size used:
 - a. Join pipe ends with proposed adjacent pipe end.
 - b. Match-mark pipe ends.
 - c. Record Actual Annular Space:
 - 1) Maximum space at a point.
 - 2) Minimum space at a point.
 - 3) Space at 90-degree intervals; top, bottom, and spring line on both sides.

- E. Shop Nondestructive Testing:
1. Welds: 100 percent visually examined by Contractor's CWI to criteria in ASME BPVC SEC VIII, Division 1.
 2. Butt-Joint Groove Welds: Spot radiographically examine pipe in accordance with ASME BPVC SEC VIII, Division 1, Paragraph UW-52. 100 percent ultrasonically examine welds that, in opinion of Construction Manager, cannot be radiographically examined; acceptance criteria in accordance with ASME BPV Code, Section VIII, Division 1, Paragraph UW-53. All joints at outlets shall receive 100 percent RT or 100 percent UT inspection. Spot RT is not approved at these joints.
 3. Fillet Welds: 100 percent examine using magnetic particle inspection method in accordance with ASME BPVC SEC VIII, Division 1, Appendix 6.
 4. Air test collars and wrappers in accordance with AWWA C206.

PART 3 EXECUTION

3.01 GENERAL

- A. Install piping complete with jointing materials and accessories, anchors, and other appurtenances.
- B. Prepare trench as specified in Section 31 23 16, Excavation. Keep trench dry until pipe installation is complete.
- C. For Field-welded Joints, Pipe 30 Inches in Diameter and Larger:
- a. Ensure minimum penetration of spigot end into bell end is achieved through use of painted circumferential marking on outside of spigot end or through use of shop-welded tabs on inside circumference of bell end.
 - b. If welded metal tabs are used, remove tabs prior to welding inside of joint.
- D. Stulling:
- a. Maintain stulling in place until pipe is completely backfilled and compacted.
 - b. Reinstall stulls that were temporarily removed to facilitate interior welding prior to backfilling.
- E. Perform electrical coating inspection of each pipe segment and fabricated special prior to placing pipe in trench.

3.02 LAYING PIPE

- A. Trenching, Embedment, and Backfilling of Buried Piping: In accordance with Section 31 23 16, Excavation, Section 31 23 23.15, Trench Backfill, and Drawings. Do not install pipe when water is in the trench. Repair coating where required.
- B. Before placement of pipe in the trench, ensure each pipe, fitting, and specials are clean of any foreign substance. Keep clean thereafter. For this purpose, cover the openings of pipes, fittings, and specials in the trench during nonworking hours.
- C. Handle pipe with proper equipment in a manner to prevent distortion or damage. Use of hooks, chains, wire ropes, or clamps that could damage pipe, damage coating or lining, or kink and bend pipe ends is not permitted. Use heavy canvas, or nylon slings of suitable strength for lifting and supporting materials.
- D. Lift pipe during unloading or lifting into trench using one or more slings as required to prevent uncontrolled swinging, damage to pipe, or harm to workers. Slings shall bear uniformly against pipe.
- E. If pipe zone material is CLSM, lay pipe directly on moist sand bag supports in preparation for CLSM. Place sand bag supports to provide at least 6 inches of CLSM below bottom of pipe. Space supports at a maximum interval of 8 feet and one set within 3 feet on both sides of each joint. Provide additional sand bags as needed to support pipe on line and grade. Provide buoyancy calculations prior to CLSM placement to verify that the pipe will not float during CLSM placement.
- F. Form bell holes at the ends of pipe to prevent point loading at the bells or couplings. Make excavation outside normal trench section at field joints for field connections and application of coatings.
- G. Out-of-Round Pipe: Install straight pipe that deviates from a true circle by more than 1 percent with its larger diameter vertical, or by using struts on continuous head and sill timbers to correct the vertical diameter where acceptable to the Design Engineer. Perform final inspection, repair, and checking of interior lining after the struts have been removed.
- H. Lay each section of pipe in the order and position shown on Shop Drawings and pipe layout. Lay to the set line and grade. Confirm to installation tolerances as hereinafter specified.

- I. Install horizontal and vertical deflections and fabricated angles on alignment, as shown except as may be required for beveling a single end either side of a deflection.
- J. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Design Engineer may change the alignment and/or the grades. Make changes by the deflection of joints, by the use of beveled joints, or by the use of fittings. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint, including the strength and water tightness of the protective lining at the finished joint.
- K. Make minor field adjustments by pulling standard joints. The allowable deflection of field joints is as follows:
 1. Maximum Allowable Angle: 75 percent of manufacturer's recommended, or angle that result from 3/4-inch pull out from normal joint closure, whichever is less.
 2. Maximum Allowable Gap: 1/8 inch between bell and spigot at weld location.
 3. No minor deflections (pulls) are allowed at beveled ends.
- L. For grades exceeding 10 percent, lay pipe in an uphill direction except for short runs that may be permitted by the Design Engineer. Block pipe which is laid on a downhill grade and hold in place until sufficient support is furnished by the following pipe to prevent movement.
- M. Whenever pipe laying is stopped at the end of the day, seal the open end of the line and close access manholes to prevent entry by unauthorized personnel, animals, dirt, and debris. Maintain continuous dewatering when necessary to prevent water from entering the pipeline. Remove water from the trench in accordance with Section 31 23 16, Excavation, and Section 31 23 19.01, Dewatering, prior to resuming pipe laying operations.
- N. Alignment and Grade:
 1. Lay pipe to the lines and grades indicated on Drawings.
 2. Pipelines or runs intended to be straight are to be laid straight.
 3. Curves in push-on joint pipe may be formed by opening the joint.
 4. Maximum Joint Openings and Deflections: 75 percent of that recommended by the pipe manufacturer. In welded pipe, deflections up to 3.0 degrees at a single joint may be made by factory-mitering the bell end of one pipe.
 5. Use survey equipment to indicate alignment and grade. Take at least one elevation reading on each length of pipe. Make periodic elevation measurements with surveying instruments to verify accuracy of grades.

6. Verify survey set up at least daily using an independent benchmark or temporary benchmark.
- O. Tolerances:
1. Alignment and Grade Tolerances:
 - a. Plus or minus 0.20 foot in grade (elevation). High and low points will not be acceptable, except where indicated on Drawings.
 - b. Plus or minus 0.33 foot in alignment, except where indicated differently on Drawings.
 2. Observe stricter tolerances than specified above as necessary to maintain minimum cover, to maintain required clearances, to place carrier pipe inside the casing pipe, to make pipe connections to existing piping, to maintain the correct slope in the run to prevent high or low points along the pipeline other than those locations indicated on Drawings.
- P. Protection of Pipe: Take precautions to protect the pipe from damages at locations where the Contractor proposes to cross the installed pipeline with heavy equipment. Acceptable precautions include: backfilling the pipe trench as necessary to protect the pipe, concrete encasing the pipe, and placing steel plating over the pipe. Repair damage to the pipe.
- Q. Pipe Deflection: After completion of backfilling and before acceptance of the Work, test for excessive deflection on pipes larger than 30 inches in diameter. Determine diametral deflection by measuring the inside diameter along the horizontal axis (D_x) and the vertical axis (D_y). The deflection, Δx , is then calculated by the following equation.

$$\Delta x = \left(\frac{D_x - D_y}{D_x + D_y} \right) \times 100$$

Do not exceed 75 percent of the AWWA allowable pipe diametral deflection, Δx , at any point in the pipe in accordance with AWWA M11. Correct diametral deflection percent to less than the required percent.

- R. Cleaning: Remove stalling after the pipeline is completely backfilled and compacted, soil, loose mortar, and any other debris from inside the pipeline. Thoroughly sweep out and clean pipeline interior.

3.03 JOINTING

- A. General:
1. Perform welding only in presence of Contractor's CWI.
 2. Perform welding prior to backfilling.

3. Perform welding of joints in accordance with this section.
4. Final Lining Application at Joints:
 - a. Field-Applied Cement Mortar Lining: After the backfill has been completed to final grade and a successful joint test and NDT has been performed, where required, fill interior joint recess or LHA of cement-mortar-lined pipe with grout, tightly packed into the joint recess and troweled flush with the interior surface in accordance with AWWA C205. Remove excess grout. An indentation or projection of the grout exceeding 1/16 inch is not allowed.
 - B. Flanged Joints: Before the joint is assembled, thoroughly clean the flange faces of foreign material. Center the gasket in the connecting flanges and draw up watertight without unnecessarily stressing the flanges. Tighten bolts in a progressive diametrically opposite sequence with a suitable, approved, and calibrated torque wrench. Torque values as recommended by the pipe manufacturer. Apply clamping torque to the nuts only.
 - C. Mechanical Couplings: When installing couplings, take care that the connecting pipe ends, couplings and gaskets are clean and free of dirt and foreign matter. Install in conformity with the recommendation and instruction of the coupling manufacturer and as specified for flanges.
 - D. Use wrenches in bolting couplings of a type and size recommended by the coupling manufacturer. Tighten coupling bolts so as to secure a uniform annular space between the follower rings and the body of the pipe with bolts tightened approximately the same amount. Tighten diametrically opposite bolts progressively and evenly. For final tightening, use a suitable, approved and calibrated torque wrench set for the torque recommended by the coupling manufacturer. Apply clamping torque to the nut only.
 - E. Welded Joints:
 1. Perform welding only when the Contractor's CWI is present.
 2. Use butt welds for welded joints in pipe assemblies and in the fabrication of bends and other specials and as indicated.
 3. Field-welded joints to be either welded butt strap joints, welded butt joints, or welded lap joints as indicated on Drawings, and conform to AWS D1.1/D1.1M, AWWA C206, approved welding procedures, and referenced welding codes. AWS D1.1/D1.1M governs in case of conflict.
 4. Determine preheat and interpass temperature requirements for unlisted base metals according to AWS D1.1/D1.1M, Annex I Guideline on Alternative Methods for Determining Preheat.

5. Repair and retest rejectable welds until sound weld metal has been deposited in accordance with appropriate welding codes.
6. Where double lap joint welds are performed, provide adequate space for welding and inspection of the joints.
7. When fitting up the ends of pipe to be welded or fitting butt-strap pieces, minor jacking or clamping will be allowed. Cold working the metal with sledges or localized application of heat will not be allowed. Shop fabricate and install special closure butt straps or mitered pieces if field displacement of joints where butt strap joints are indicated does not allow proper fit up with the tolerances indicated.
8. Welded Lap Joints: During installation of welded steel pipe in either straight alignment or on curves, lay the pipe so that at any point around the circumference of the joint there is a minimum lap as shown on Drawings. Hold back the toe of the weld from the nearest point of tangency of the bell radius as shown on Drawings.
9. Prior to beginning the welding procedure, equally distribute annular space between the faying surfaces of the bell and spigot around the circumference of the joint by shimming, jacking, or other suitable means. Perform welding in a manner that will maintain the equalized fitup.
10. Welded Lap Joints (General): During installation of welded steel pipe in either straight alignment or on curves, lay the pipe so that at any point around the circumference of the joint there is a minimum lap as shown on Drawings. Hold back the toe of the weld from the nearest point of tangency of the bell radius as shown on Drawings. Prior to beginning the welding procedure, equally distribute annular space between the faying surfaces of the bell and spigot around the circumference of the joint by shimming, jacking, or other suitable means. Perform welding in a manner that will maintain the equalized fitup.
11. Welded Butt Joints: CJP and as indicated, where used or required.
12. Single and Double Lap Welded Joints:
 - a. After the pipe and pipe joint are properly positioned in the trench, field-weld lap joints before backfilling with fillet welds and provide external joint protection for joints except the special temperature control lap joint hereinafter specified.
 - b. Following successful tests of the joint, install exterior joint coating. Holiday test exterior joint coating. After a successful holiday test, backfilling may be completed.
 - c. Control of Temperature Stresses:
 - 1) Control temperature stresses in accordance with AWWA C206, the submitted and accepted temperature stress control submittal, and these Specifications.
 - 2) Supply a special temperature control lap joint at intervals not exceeding 300 feet along welded reaches of the pipeline, at the first regular lap-welded field joints outside concrete

- encasements and structures, and where shown, unless otherwise approved by the Design Engineer. Lay joint with an initial lap as indicated on Drawings. Where temperature control lap joints occur in a traveled roadway or other inconvenient location, the location of the joint may be adjusted, as acceptable to the Design Engineer.
- 3) Provide and install thermocouple temperature gauges on the inside top of the pipe or use infrared thermometers to monitor the temperature of the steel pipe wall as it lays in the trench.
 - 4) Measure the pipe temperature at the top of the steel cylinder. Meet specific temperature requirements for the pipeline steel cylinder prior to installation of the pipe zone material, during and after placement of pipe zone material, and during welding of the special temperature control joints. If atmospheric conditions do not allow the conditions to be met, supplemental cooling is required. The following outlines the specific temperature control requirements:
 - a) Prior to and during placement of the pipe zone and trench zone material, the pipeline steel temperature shall be no more than 85 degrees F for single lap and double lap welded joints and shall be no less than 40 degrees F for single and double lap welded joints if pipe zone material is CLSM. If pipe zone material is CLSM, maintain the specified temperature for at least 3 hours after the placement of pipe zone and trench zone material. If granular material is used in the pipe zone, specified temperature must be maintained until the temperature control joint on both sides of the backfilled section are welded and backfilled. Provide supplemental shading or cooling as required.
 - b) Proceed with placement of pipe zone and trench zone material in the direction of pipe laying from one special temperature control joint to the next. During placement of pipe zone and trench zone material, leave the lead end of the pipe section (toward the next special temperature control joint) unbackfilled or otherwise unrestrained such that the end of the pipe is free to move in response to expansion or contraction due to temperature changes.
 - c) During period between pipe zone and trench zone material placement operations, shade the sections of pipeline that are partially backfilled with pipe zone and trench zone material (less than 1 foot over the top of pipe) as specified above. Shading of the partially

backfilled pipe need not be performed when the Contractor can demonstrate to the satisfaction of the Construction Manager, using thermocouple temperature gauges or infrared thermometer data, that shading is not necessary to meet the specified temperature requirements. Do not allow the temperature of the partially backfilled pipe to exceed 85 degrees F at any time. Provide supplemental shading or cooling as required.

- d) Prior to welding the special temperature control joints, maintain the pipeline extending 300 feet each direction from the joint at or below 85 degrees F and at or above 40 degrees F for both single and double lap welded joints. Additionally, backfill the pipeline extending 300 feet each direction from the joint to at least 1 foot over the top of the pipe. If granular material is used in the pipe zone instead of CLSM, then completely backfill the pipeline extending 300 feet each direction from the joint. Maintain pipe temperature within in the specified range while welding the special temperature control joint. Use thermocouple or infrared thermometer data to demonstrate to the Construction Manager the pipe temperature is within specified limits.

13. Welding Procedures:

- a. Contractor's Field Welding Inspector:
 - 1) Upon completion of each field-welded joint, record the welder's name, location on the weld, and results of VT.
 - 2) Maintain these records and submit to Owner each week.
- b. Allow Owner's inspectors and Construction Manager access to field welded joints to perform NDT.

3.04 REPAIR OF SHOP-APPLIED COATINGS

- A. Inspect exterior surfaces of steel pipe, fittings, and specials upon delivery to Site and just prior to backfilling trench.
- B. Repair of Cement Mortar Coating: Field repairs shall be made in accordance with AWWA C205.

3.05 COATING OF FIELD-WELDED JOINTS

- A. Using Cement Mortar: Applied to joints in accordance with AWWA C205.

3.06 PIPE GROUNDING

- A. Provide pipe grounding as shown on Drawings.

3.07 CATHODIC PROTECTION

- A. Apply to pipe as shown and as specified in Section 26 42 00, Galvanic Anode Cathodic Protection System.

3.08 FIELD QUALITY CONTROL

- A. Field Welding:
 - 1. Perform VT inspection on 100 percent of welds and mark to indicate acceptance or rejection.
 - 2. In the presence of Owner and Construction Manager, Test butt-strap or double-welded lap joint welds by pressurizing connection between the two fillet welds in accordance with AWWA C206.
 - a. Apply air or other Design Engineer-approved gas into connection between the two fillet welds.
 - b. Paint welds with soap solution.
 - c. Mark leaks indicated by escaping gas bubbles.
 - d. Close threaded openings with flush pipe plugs or by welding them.
 - 3. Coordinate the work to allow Owner and Construction Manager to inspect 100 percent of butt joint groove welds with full circumference RT.
 - 4. Coordinate the Work to allow Owner and Construction Manager to inspect 100 percent of single lap joint, interior and exterior double lap joint, and butt-strap joint welds with full circumference VT, and PT or MT.
 - 5. Inspection performed by other parties does not release responsibility of Contractor.
 - 6. CJP Welds:
 - a. Inspect 10 percent of butt joint welds with full circumference RT.
 - b. Inspect 10 percent of other groove welds with UT.
 - 7. Inspect 10 percent of lap joint welds with PT or MT.
 - 8. Weld Acceptance:
 - a. If, in the opinion of Construction Manager, inspections indicate inadequate quality of welds, percentage of welds inspected shall be increased.
 - b. Welds to be inspected, if less than 100 percent rate, shall be selected at random by Construction Manager.
 - c. VT: Perform VT per AWS D1.1/D1.1M Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.

- d. UT: Perform UT of CJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.13.1.
 - e. RT: Perform RT of CJP butt joint welds in accordance with AWS D1.1/D1.1M, Paragraph 6.12.1.
 - f. PT or MT:
 - 1) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.10.
 - 2) Acceptance shall be in accordance with VT standards specified above.
 - g. Remove in manner that permits proper and complete repair by welding.
 - h. Caulking or peening of defective welds is not permitted.
 - i. Retest unsatisfactory welds.
9. Owner may conduct random nondestructive inspections of field-welded joints. Inspections will be of an appropriate type for weld being evaluated. Possible types of inspection include, but are not limited to, RT, UT, PT, and VT. Testing will be performed and evaluated per AWS D1.1/D1.1M. Provide Owner's Verification Inspector access to the Work.

B. Hydrostatic Testing:

1. Pipeline:
 - a. General:
 - 1) Notify Construction Manager in writing 10 days prior to testing. Perform testing in presence of Construction Manager.
 - 2) Test newly installed pipelines. Using water as test medium, pipes shall successfully pass a leakage test prior to acceptance.
 - 3) Furnish testing equipment and perform tests in manner satisfactory to Design Engineer. Testing equipment shall provide observable and accurate measurements of make-up water under specified conditions.
 - 4) Isolate new pipelines that are connected to existing pipelines.
 - 5) Conduct field hydrostatic test on buried piping after trench has been completely backfilled. Testing may, as approved by Design Engineer, be done prior to placement of asphaltic concrete or roadway structural section.
 - 6) Contractor may, if field conditions permit and as determined by Construction Manager, partially backfill trench and leave joints open for inspection and conduct an initial service leak test. Final field hydrostatic test shall not, however, be

conducted until backfilling has been completed as specified above.

- 7) Supply of temporary water shall be as stated in Section 01 50 00, Temporary Facilities and Controls.
 - 8) Dispose of water used in testing in accordance with federal, state, and local requirements.
- b. Procedure:
- 1) As specified in Section 40 80 01, Process Piping Leakage Testing, except as modified below.
 - 2) Water temperature shall be minimum 60 degrees F; minimum metal temperature shall be 40 degrees F.
 - 3) After the pipeline or test section has been filled, allow it to stand under slight pressure for at least 24 hours to allow the concrete or mortar lining to absorb what water it will and to allow the escape of air from any pockets.
- c. Allowable Leakage:
- 1) For Pipe with Welded Joints: Zero leakage.
 - 2) Flange Connections:
 - a) Allow Construction Manager to inspect flange connections.
 - b) Fix connections experiencing leakage.
 - 3) In the case of pipeline or pipeline sections that fail to pass the prescribed leakage test or if measured make-up water exceeds allowable:
 - a) Determine the cause of leakage and take corrective measures necessary to repair defective pipe section.
 - b) Retest the repaired section using the prescribed procedure.
 - c) Continue repair and retest procedures until the tested section passes the test.

3.09 MANUFACTURER'S SERVICES

- A. Manufacturer's representative available at Site for installation assistance and training of pipe installation crews.
1. Coordinate pipe manufacturer's representative services.
 2. Pipe manufacturer's representative shall visit Site and instruct, guide, and provide procedures for pipe handling, laying, and jointing at start of pipe installation by each crew.

END OF SECTION

SECTION 33 05 01.09
POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Water Works Association (AWWA):
 - a. C110, Ductile-Iron and Gray-Iron Fittings.
 - b. C605, Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVC) Pressure Pipe and Fittings.
 - c. C900-16, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches Through 60 Inches (100 mm Through 1500 mm), for Water Transmission and Distribution.
 2. ASTM International (ASTM):
 - a. D2241, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - b. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - c. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - d. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - e. D2672, Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.
 - f. D2855, Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
 - g. D3139, Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 3. NSF International (NSF).
 4. 2018 "Greenbook" Standard Specifications for Public Works Construction.
 5. 2018 City of San Diego Supplement "Whitebook" Standard Specifications for Public Works Construction.

1.02 SUBMITTALS

- A. Action Submittals: Catalog cut sheets showing pipe diameter, pipe class, dimension ratio (DR) and fitting details.
- B. Informational Submittals:
 - 1. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
 - 2. Leakage Testing Submittals, as specified in Section 40 80 01, Process Piping Leakage Testing.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Solvent Cement: Store in accordance with ASTM D2855.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Pipe, Joints, Fittings and Corrosion Protection:
 - 1. In accordance with the 2018 "Greenbook" Standard Specifications for Public Works Construction Section 209-4 and City of San Diego Supplement "Whitebook" Standard Specifications for Public Works Construction Section 209.
 - a. Corrosion Protection: Wrap with petrolatum wax tape as specified in 26 42 00, Galvanic Anode Cathodic Protection System.
 - 2. Restrained Joints:
 - a. Provide pipe restraint by system designed specifically for use with PVC pipe using wedges. Do not use systems with set screws, gripper rings, or gripper gaskets.
 - b. Minimum Pressure Rating: 150 psi.
- B. Service Saddles:
 - 1. Double strap type with minimum strap width of 2 inches.
 - 2. Straps: Type 304 stainless steel.
 - 3. Saddles: Ductile iron, epoxy-coated, 10 mils minimum thickness.
 - 4. Minimum Pressure Rating: 150 psi.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. In accordance with AWWA C605.

B. Joints:

1. Rubber Gasketed: In accordance with manufacturer's written instructions.
2. Restrained Joint Systems: In accordance with manufacturer's written instructions.

C. Pipe Bending for Horizontal or Vertical Curves:

1. Bending of pipe barrels larger than 12 inches in diameter is not allowed.
2. Radius of curves shall not exceed 50 percent of manufacturer's recommended values.
3. Use blocks or braces at pipe joints to ensure axial deflection in gasketed or mechanical joints does not exceed allowable deflection.

D. Maximum Joint Deflection at Mechanical Joint: 50 percent of manufacturer's recommended values.

E. No deflection is allowed at push-on joints.

3.02 INSPECTION AND HYDROSTATIC TESTING

A. General:

1. Notify Construction Manager in writing at least 5 days in advance of testing. Perform testing in presence of Construction Manager.
2. Using water as test medium, all newly installed pipelines must successfully pass hydrostatic leakage test prior to acceptance.
3. Conduct field hydrostatic test on buried piping after trench has been completely backfilled and compacted. Testing may, as approved by Design Engineer, be done prior to placement of asphaltic concrete or roadway structural section.
4. Contractor may, if field conditions permit and as approved by Design Engineer, partially backfill trench and leave joints open for inspection and conduct an initial informal service leak test. Final field hydrostatic test shall not, however, be conducted until backfilling has been completed as specified above.
5. Supply of Temporary Water: In accordance with Section 01 50 00, Temporary Facilities and Controls.
6. Dispose of water used in testing in accordance with federal, state, and local requirements.
7. Install temporary thrust blocking or other restraint as necessary to prevent movement of pipe and protect adjacent piping or equipment. Make necessary taps in piping prior to testing.

8. Wait a minimum of 5 days after concrete thrust blocking is installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.
 9. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
 10. New Piping Connected to Existing Piping:
 - a. Isolate new piping with grooved-end pipe caps, blind flanges, or other means as acceptable to Design Engineer.
 - b. Provide appropriate thrust blocking.
- B. Hydrostatic Testing Procedure: Hydrostatic test for pressure piping in accordance with Section 40 80 01, Process Piping Leakage Testing.

END OF SECTION

SECTION 33 41 01
STORM DRAIN CONVEYANCE

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section and any supplemental Data Sheets:
1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36M, Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
 - b. M190M, Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - c. M196M, Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
 2. American Water Works Association (AWWA):
 - a. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - b. C105/A21.5, Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - c. C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm) for Water and Other Liquids.
 - d. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast, for Water.
 3. ASTM International (ASTM):
 - a. A746, Standard Specification for Ductile Iron Gravity Sewer Pipe.
 - b. C14, Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - c. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - d. C150, Standard Specification for Portland Cement.
 - e. C311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
 - f. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - g. C425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
 - h. C443, Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

- i. C497, Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
 - j. C507, Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
 - k. C595, Standard Specification for Blended Hydraulic Cements.
 - l. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - m. C655, Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe.
 - n. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - o. C1012, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - p. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - q. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - r. D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 - s. D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - t. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - u. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - v. F679, Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
 - w. F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
 - x. F894, Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe.
4. The 2018 “Greenbook” Standard Specifications for Public Works Construction.
 5. The 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

1.02 SUBMITTALS

- A. Informational Submittals: Manufacturer’s Certification of Compliance. See Section 3-7 and 3-8 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 3-8 of the City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. 2018 “Greenbook” Standard Specifications for Public Works Construction Section 207-3 and Section 208-3 and City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction Section 207.

2.02 OPEN CHANNEL CONCRETE CONVEYANCE

- A. Air-placed concrete per 2018 “Greenbook” Standard Specifications for Public Works Construction Section 303-1.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE, FITTINGS, AND APPURTENANCES

- A. General:
 - 1. See Section 306-7 of the “Greenbook” Standard Specifications for Public Works Construction.
 - 2. Plug or close off pipes that are stubbed off for manhole, concrete structure, or for connection by others, with temporary watertight plugs.

3.02 INSTALLATION OF CONCRETE OPEN CHANNEL CONVEYANCES

- A. See Section 303-2 of 2018 “Greenbook” Standard Specifications for Public Works Construction.

3.03 DEMOLITION

- A. Removal and Abandonment of Existing Conduits and Structures: See 2018 “Greenbook” Standard Specifications for Public Works Construction and the City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

3.04 SUPPLEMENTS

A. The supplements listed below, following “End of Section,” are part of this Specification.

1. Data Sheets.

Section Number	Title
33 41 01.03	Polyvinyl Chloride (PVC)
33 41 01.05	Reinforced Concrete

END OF SECTION

SECTION 33 41 01.03 POLYVINYL CHLORIDE (PVC)	
Item	Description
Pipe: 15-inch diameter and under	ASTM D3034: Standard dimension ratio less than 35, except that the cell classification shall be 12454-B or 12454-C as defined in ASTM D1784.
Pipe: 18-inch through 24-inch diameter	ASTM F679: Standard dimension ratio less than 35, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Ribbed Profile Pipe: 18-inch through 36-inch diameter	ASTM F794: Minimum stiffness of 46 psi when tested in accordance with ASTM D2412, except that the cell classification shall be 12454-C as defined in ASTM D1784.
Joints	ASTM D3212 rubber gasketed.
Gaskets	ASTM F477 Lubricants: As approved by manufacturer.
Fittings	PVC, gasketed. Provide plug when service piping is not required.
Plugs	Removable. Removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
Source Quality Control Testing	In accordance with specified ASTM.

END OF SECTION

SECTION 33 41 01.05 REINFORCED CONCRETE	
Item	Description
Pipe	ASTM C76, Wall B, class as shown. Mark each joint with pipe class. Rotating packer or platform not allowed.
Cement	ASTM C150, Type II, or ASTM C150, Type I, with fly ash; maximum 12 percent Tricalcium Aluminate, or ASTM C595 Rev A, Type IP, with Fly Ash; Cement: ASTM C150. Minimum 564 pounds per cubic yard without fly ash. Minimum 479 pounds per cubic yard with fly ash.
Ratio: Water to Cementitious Materials	Not over 0.49.
Fly Ash	ASTM C618, Class C or Class F, Tables 1 and 2 modified as follows: Loss on Ignition: Maximum 3 percent Water Requirement: Maximum 100 percent of control Ratio Percent CaO/Fe ₂ O ₃ : Maximum 1.5 or test cement fly ash mix in accordance with ASTM C1012. Mix: Equal to or better than ASTM C150, Type II cement. 85 pounds per cubic yard minimum, 160 pounds per cubic yard maximum. Test: ASTM C311 and ASTM C618.
Joints	ASTM C443 Rev A. Captive gasket in groove.
Rubber Gaskets	ASTM C443.
Tee Fittings	Reinforced concrete, rubber gasketed. Provide plug when service piping is not required.
Plugs	Removable. Removal shall provide a socket suitable for making a flexible jointed lateral connection or extension.
Circumferential Reinforcement	Not closer than 1 inch to inside surface of pipe. Area of outer circular reinforcing cage not less than 75 percent of inner cage.

SECTION 33 41 01.05 REINFORCED CONCRETE	
Item	Description
Elliptical Reinforcement	Not allowed.
Source Quality Control Testing	<p>Load Bearing 0.01-inch Crack, Compressive Strength and Absorption: ASTM C76.</p> <p>Load Bearing Ultimate: ASTM C76.</p> <p>Permeability: ASTM C497.</p> <p>Voids: Longitudinally sawcut one pipe from each 100 lengths of pipe manufactured in half with saw that will not damage the concrete or reinforcing steel. Inspect for voids adjacent to circumferential bars. Voids will be considered continuous if a 1/16-inch diameter pin can be inserted 1/4 inch deep. If voids exist adjacent to more than 10 percent of the circumferential bars, two additional pipes shall be tested. If either of the two pipes fail, the entire 100 lengths will be rejected.</p>

END OF SECTION

SECTION 33 44 13.13
STORM DRAIN STRUCTURES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Welding Society (AWS): Code for Welding in Building Construction.
 2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A48, Standard Specification for Gray Iron Castings.
 - c. A615/A615M, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - d. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - e. C387, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - f. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.
 3. 2018 “Greenbook” Standard Specifications for Public Works Construction and the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

PART 2 PRODUCTS

2.01 CONCRETE

- A. See Section 201-1 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 201-1 of the 2018 City of San Diego Supplement “Whitebook” Standard Specifications for Public Works Construction.

2.02 FORMS

- A. See Section 303-1 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

2.03 REINFORCING STEEL

- A. See Section 201-2 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

2.04 MORTAR

- A. See Section 201-1 and Section 201-5 of the 2018 “Greenbook” Standard Specifications for Public Works Construction.

2.05 FRAMES AND GRATES

- A. Frames and grates for storm drain structures shall conform to Standard Details.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

- A. See Section 300-3 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 300-3.5 of the 2018 City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

3.02 CONSTRUCTION OF STORM DRAIN STRUCTURES

- A. See Section 303-1 of the 2018 “Greenbook” Standard Specifications for Public Works Construction and Section 303-1 of the 2018 City of San Diego “Whitebook” Standard Specifications for Public Works Construction.

3.03 INSTALLATION OF FRAMES AND GRATES

- A. Set frames and grates at elevations indicated or as determined in field and in conformance with Drawings.
- B. Frames may be cast in, or shall be set in mortar.

3.04 CLEANING

- A. Upon completion, clean each structure of all silt, debris, and foreign matter.

END OF SECTION

SECTION 33 46 00
SUBSURFACE DRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section covers requirements for subsurface drainage piping, cleanouts, used to control shallow groundwater elevations within the Project area.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M252, Standard Specification for Corrugated Polyethylene Drainage Pipe.
 - b. M294, Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter.
 2. ASTM International (ASTM):
 - a. A48/A48M, Standard Specification for Gray Iron Castings.
 - b. C387/C387M, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - c. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - d. D75, Standard Practice for Sampling Aggregates.
 - e. D422, Standard Test Method for Particle-Size Analysis of Soils.
 - f. D1140, Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75- μ m) Sieve.
 - g. F405, Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings.
 - h. F449, Standard Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control.
 - i. F667, Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings.
 3. Natural Resources Conservation Service (NRCS): Conservation Practice Standard 606, Subsurface Drain.
 4. 2018 "Greenbook" Standard Specifications for Public Works Construction.
 5. 2018 City of San Diego Supplement "Whitebook" Standard Specifications for Public Works Construction.

1.03 DEFINITIONS

- A. Cleanouts: Surface access ports used to access drain lines and constructed of solid corrugated piping.
- B. Drain Lines: Buried perforated pipe providing collection and conveyance of drain water from saturated soils to Drainage Management Unit (DMU).
- C. Granular Drain Material: Granular (sand or gravel) material used as an envelope around drain lines to provide pipe bedding, a permeable drainage zone, and stabilization of base soils to prevent migration of fines into drain lines.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Product Data:
 - 1) Drain line pipe and fittings.
 - 2) Drain line installation equipment.
 - 3) High-pressure water jet cleaning equipment.
 - 4) Drain line sock; include manufacturer's recommendation for length of time UV-resistant sock may be left exposed.
 - b. Precast Base, Cone, and Top Slab Manhole Sections: Details of construction.
 - c. Level Check Box, Stop Logs, Cover, and Pipe Boots: Details of construction.
- B. Informational Submittals:
 - 1. Granular Drain Material:
 - a. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
 - b. Test results from approved commercial testing laboratory before delivering material to Site and at least 10 days before material is required for use.
 - 2. Final drain line inspection and cleaning certification of compliance.

1.05 QUALITY ASSURANCE

A. Granular Drain Material Source:

1. Sampling:
 - a. Conduct sampling of granular drain material source under supervision of Construction Manager in accordance with ASTM D75.
 - b. Samples shall be representative and be clearly marked to show source of the material.
 - c. Testing:
 - 1) In accordance with ASTM D1140 to determine percentage of fines.
 - 2) In accordance with ASTM D422 to determine gradation of particles larger than No. 200 sieve.
 - d. Acceptance:
 - 1) Based on inspection of source by Construction Manager.
 - 2) Certified test results.
 - e. Provide additional sampling, testing, and certification for every 500 cubic yards of material and when there is a change in granular drain material.
 - f. Upon Construction Manager's request, supply supplemental samples of granular drain material to a testing laboratory designated by Owner during installation of drain lines. Owner will bear costs of testing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Drain Sock:

1. Free of tears or other damage. Replace damaged sock.
2. Protect polyethylene drain lines with geotextile sock from UV light while stored onsite, unless geotextile sock is certified UV resistant.
3. UV-resistant Sock Stored Onsite Uncovered:
 - a. Mark date of first sunlight exposure for each roll at factory.
 - b. Do not allow UV-resistant sock to remain uncovered for more time than recommended by manufacturer.

PART 2 PRODUCTS

2.01 DRAIN LINES

- A. Drain lines shall be perforated, unless otherwise noted on Drawings.
- B. Perforated Drain Lines:
1. Heavy-duty corrugated polyethylene pipe meeting NRCS Conservation Practice Specification 606.
 2. Conforming to ASTM F405 for 3-inch to 6-inch diameter pipe.
 3. Conforming to ASTM F667 for 8-inch to 15-inch diameter pipe.
 4. Water Inlet:
 - a. Area of at least 1 square inch per foot of length.
 - b. Dimensions of water inlet area shall be measured on a straight specimen with no external forces applied. Make measurements with instruments accurate to 0.01 inch.
 - c. Perforations:
 - 1) Locate at least one perforation in the middle of corrugation so there is a shoulder on each side of perforation.
 - 2) Pipe 4 Inches to 12 Inches in Diameter:
 - a) Slotted perforations shall be no wider than 1/8 inch or no longer than 1-1/4 inches.
 - b) Slotted perforations equally spaced along length and circumference of tubing in not less than three rows.
 - 3) Pipe 15 inches in Diameter: Circular perforations will be accepted.
 5. Biofiltration Underdrain: See Section 207-17.7 of the 2018 City of San Diego Supplement "Whitebook" Standard Specifications for Public Works Construction.
- C. Nonperforated Drain Lines:
1. Heavy-duty corrugated polyethylene pipe with smooth interior walls.
 2. Conforming to AASHTO M252 for 3-inch to 10-inch pipe.
 3. Conforming to AASHTO M294 for 12-inch to 15-inch pipe, Type S.
- D. Drain Sock: Provide geotextile fabric material (sock) surrounding perforated drain lines.
- E. Drain Line Fittings:
1. Includes cleanouts, elbows, tees, branch connections, snap end caps, and reducing couplers.
 2. Conforming to ASTM F405 and ASTM F667 as appropriate.

3. Cleanout snap end cap shall have a metal locating plate attached as shown on Drawings.
4. Diameter of cleanout fittings shall be as shown on Drawings.
5. Fittings installed as part of a continuous operation shall be clamp type rather than snap type. Fittings installed after pipe is in place may be either type.

2.02 GRANULAR DRAIN MATERIAL

- A. In accordance with Section 31 23 23.15, Trench Backfill.
- B. Composed of hard, durable, natural mineral particles free from organic matter, clay balls, soft particles, or other impurities or foreign matter.
- C. Provide Nonwoven Geotextile Type 180 N on top of granular drain material in accordance with the Greenbook Section 213-5.

2.03 TRENCH BACKFILL

- A. Above pipe zone shall be in accordance with Section 31 23 23.15, Trench Backfill.
- B. Within pipe zone shall be in accordance with Section 31 23 23.15, Trench Backfill.
- C. Native backfill free from organic matter and other impurities or foreign matter and free from rocks larger than 3 inches in diameter.

2.04 BASE ROCK

- A. In accordance with Section 31 23 23.15, Trench Backfill.
- B. Base rock shall be clean 3/4-inch minus crushed granular or crushed rock uniformly graded from coarse to fine and with sufficient fines for proper compaction.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION

- A. In accordance with Section 31 23 16, Excavation.
- B. Excavate to lines and grades shown on Drawings allowing required thickness of granular fill to be placed around drain lines as shown on Drawings.

3.02 DRAIN LINE INSTALLATION

A. Pipe Installation:

1. Handle and install in conformance with ASTM F449.
2. Lay drain lines and appurtenances to lines and grades shown on Drawings.
3. Take special precautions on hot days to ensure stretch limit is not exceeded and excessive deflection is not caused by premature backfilling.

B. Fitting Installation:

1. Standard connections shall be in conformance with ASTM F449.
2. For nonstandard connections, join drain lines using manufacturer's printed recommended methods to complete connection.
3. Drain lines that are exposed to make a connection after trench backfilling shall have 4 inches of granular drain material replaced around drain line and connection.
4. Wrap connections and fittings with geotextile sock.

3.03 GRANULAR DRAIN MATERIAL INSTALLATION

- A. Place granular drain material around perforated drain lines as shown on Drawings.
- B. Place granular drain material around perforated drain lines in a continuous operation during placement of drain lines.
- C. Place granular drain material with spreader boxes or other equipment in a manner to minimize segregation.

3.04 TRENCH BACKFILL

- A. Trench shall not be left open overnight; plug end of drain lines and backfill trench to prevent animals, sediment, or debris from entering pipe.
- B. Perform in a manner that shall minimize settlement.
- C. Backfill may be placed automatically by trencher.
- D. Where backfill material is placed in drain line trenches mechanically, backfill material shall be pushed onto slope of backfill previously placed and allowed to slide down into trench. Backfill shall not be pushed into trench in such a way as to permit free fall of material until at least 2 feet of cover has been provided over the top of drain line.

- E. Place in such a manner to prevent displacement of drain line and granular fill after backfilling.
- F. Trench Compaction:
 - 1. After initial backfilling to final grade, a rubber-tired tractor shall be driven a minimum of two passes with tires running parallel on top of trench to facilitate compaction.
 - 2. Additional mechanical backfilling shall be done to leave trench with 4-inch to 6-inch elevated mound on trench.
- G. Unless otherwise directed by Construction Manager, procedures for compaction of trench backfill material shall be accomplished by close of each day's work.

3.05 CLEANING ACCESS INSTALLATION

- A. Install inline cleanouts, and end-of-line caps as shown on Drawings.
- B. Install end-of-line caps at upstream end of drain lines.

3.06 FIELD QUALITY CONTROL

- A. Drain Line Grade:
 - 1. Measure by excavating down to drain every 250 feet and at the beginning and end of each line.
 - 2. Measure drain invert elevation with a survey method accurate to 0.01 foot vertical.
 - 3. Measure for grade at the top of pipe.
 - 4. Drain lines with grades less than 1 percent shall be placed to the design grade within a tolerance of plus or minus 0.1 foot of design invert elevation.
 - 5. Grades of 1 percent or steeper shall be placed to the design grade within a tolerance of plus or minus 0.2 foot of design invert elevation.
 - 6. No reversal in grade of the drain lines shall be permitted.
- B. Drain Line Stretching:
 - 1. Drain lines shall not be stretched more than 5 percent during installation.
 - 2. Measure stretch by measuring the distance across a minimum of 10 corrugations and comparing to manufacturer's standard corrugation dimensions.

3.07 FINAL INSPECTION AND CLEANING

A. Preparation:

1. Do not begin jet washing until subsurface drainage work within a DMU is complete.
2. Stage the Work to provide adequate supply of water for jet washing to allow inspection and cleaning of each section of drain line in one continuous operation.
3. Access to drain lines shall be through drain line cleanouts.

B. High Pressure Jet Washing Equipment:

1. Suitable type and size to perform cleaning specified herein.
2. Cleaning nozzle capable of jet washing 6-inch diameter to 15-inch diameter drain lines in sections up to 1,000 feet long.
3. Capable of negotiating 4-inch diameter cleaning access point.
4. Jet mechanism shall have a forward-piercing jet with trailing side jets that propel mechanism forward.
5. Operating pressures at pump shall not exceed a maximum of 2,300 psi.
6. Operate in accordance with manufacturer's printed instructions, recommendations, and best practice of the trade.

C. Pass high-pressure water jet cleaner through entire length of each drain line no sooner than 10 calendar days after installation of drain line.

D. When drain lines must be jet washed in sections, upstream sections shall be jet washed before connecting section downstream.

E. If tailwater produced is not clear, run jet cleaner through drain line section up to two more passes.

F. Obstructions within drain lines, collapsed drain line sections, or sections outside allowable tolerances for grade that are identified during final inspection and cleaning shall be repaired and corrected to meet Specification.

G. Complete final drain line inspection and cleaning certification of compliance addressing the following items:

1. Dates of work, equipment, and personnel performing work.
2. Locations and descriptions of obstructions, collapsed sections, out-of-grade sections, and actions taken to repair problems.
3. Locations of sections where tailwater did not run clear after three passes.

- H. After completing jet washing for a drain line, restore area to a neat and finished appearance.

END OF SECTION

SECTION 40 05 15
PIPING SUPPORT SYSTEMS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Wetted or Submerged: Under cover of tank or in other damp locations.

1.02 SUBMITTALS

A. Action Submittals:

1. Catalog information and drawings of piping support system, locating each support, sway brace, seismic brace, hanger, guide, component, and anchor for piping. Identify support, hanger, guide, and anchor type by catalog number and Shop Drawing detail number.
2. Calculations for each type of pipe support, attachment and anchor.
3. Revisions to support systems resulting from changes in related piping system layout or addition of flexible joints.
4. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
2. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
3. Maintenance information on piping support system.

1.03 QUALIFICATIONS

- A. Piping support systems shall be designed and Shop Drawings prepared and sealed by a Registered Professional Engineer in the State of California.

1.04 DESIGN REQUIREMENTS

A. General:

1. Design, size, and locate piping support systems throughout facility, whether shown or not.

2. Piping Smaller than 30 Inches: Supports are shown only where specific types and locations are required; additional pipe supports may be required.
 3. Piping 30 Inches and Larger: Support systems have been designed for piping shown.
 4. Meet requirements of MSS SP 58 and ASME B31.1 or as modified by this section.
- B. Pipe Support Systems:
1. Design pipe support systems for gravity and thrust loads imposed by weight of pipes or internal pressures, including insulation and weight of fluid in pipes.
 2. Seismic loads in accordance with governing codes and as shown on Structural General Drawings.
 3. Wind loads in accordance with governing codes and as shown on Structural General Drawings.
 4. Maximum Support Spacing and Minimum Rod Size: In accordance MSS SP 58 Table 3 and Table 4.
 - a. Ductile Iron Pipe 8 Inches and Under: Maximum span limited to that for standard weight steel pipe for water service.
 - b. Ductile Iron Pipe 10 Inches and Larger: Maximum span limited to 20 feet.
- C. Anchoring Devices: Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor support, to withstand shear and pullout loads imposed by loading and spacing on each particular support.
- D. Vertical Sway Bracing: 10-foot maximum centers or as shown.
- E. Existing Support Systems: Use existing supports systems to support new piping only if Contractor can show they are adequate for additional load, or if they are strengthened to support additional load.

PART 2 PRODUCTS

2.01 GENERAL

- A. When specified items are not available, fabricate pipe supports of correct material and to general configuration indicated.
- B. Special support and hanger details may be required for cases where standard catalog supports are not applicable.

- C. Materials: All hangers, rods, clamps, protective shields, metal framing support components, and hanger accessories shall be hot-dip galvanized unless otherwise specified for submerged and corrosive installations, or as noted on Drawings. Stainless steel components may be substituted where hot-dip galvanizing has been specified. Submerged or wetted piping shall be supported with Type 316 stainless steel hangers, brackets, clips, or Type 316 fabricated supports and stainless steel anchors complying with Section 05 50 00, Metal Fabrications.

2.02 HANGERS

- A. Clevis: MSS SP 58, Type 1.
 - 1. Anvil; Figure 260 for steel pipe and Figure 590 for ductile iron pipe, sizes 1/2 inch through 30 inches.
 - 2. B-Line; Figure B3100, sizes 1/2 inch through 30 inches.
- B. Adjustable Swivel Split-Ring Pipe Clamp: MSS SP 58, Type 6.
 - 1. Anvil; Figure 104, sizes 3/4 inch through 8 inches.
 - 2. B-Line; Figure B3171, sizes 3/4 inch through 8 inches.
- C. Steel Yoke Pipe Rolls and Roller Supports: MSS SP 58, Type 41 or Type 43.
 - 1. Anvil; Figure 181 for sizes 2-1/2 inches through 24 inches, and Figure 171 for sizes 1 inch through 30 inches.
 - 2. B-Line; Figure B3110 for sizes 2 inches through 24 inches and Figure B3114 for 30 inches.
- D. Pipe Rollers and Supports: MSS SP 58, Type 44.
 - 1. Anvil; Figure 175, sizes 2 inches through 30 inches.
 - 2. B-Line; Figure B3120, sizes 2 inches through 24 inches.

2.03 WALL BRACKETS, SUPPORTS, AND GUIDES

- A. Welded Steel Wall Bracket: MSS SP 58, Type 33 (heavy-duty).
 - 1. Anvil; Figure 199, 3,000-pound rating.
 - 2. B-Line; Figure B3067, 3,000-pound rating.
- B. Adjustable “J” hanger MSS SP 58, Type 5:
 - 1. Anvil; Figure 67, sizes 1/2 inch through 8 inches.
 - 2. B-Line; Figure B3690, sizes 1/2 inch through 8 inches.

- C. Offset Pipe Clamp: Anvil; Figure 103, sizes 3/4 inch through 8 inches.
- D. Channel Type:
 - 1. Unistrut.
 - 2. Anvil; Power-Strut.
 - 3. B-Line; Strut System.
 - 4. Aickinstrut (FRP).
 - 5. Or approved equal.

2.04 PIPE SADDLES

- A. Provide 90-degree to 120-degree pipe saddle for pipe 6 inches and larger with baseplates drilled for anchors bolts.
 - 1. In accordance with Standard Detail 4005-515.
 - 2. Sizes 20 inches though 60 inches, Piping Technology & Products, Inc.; Figure 2000.
- B. Saddle Supports, Pedestal Type:
 - 1. Minimum standard weight pipe stanchion, saddle, and anchoring flange.
 - 2. Nonadjustable Saddle: MSS SP, Type 37 with U-bolt.
 - a. Anvil; Figure 259, sizes 4 inches through 36 inches with Figure 63C base.
 - b. B-Line; Figure B3095, sizes 1 inch through 36 inches with B3088S base.
 - 3. Adjustable Saddle: MSS SP 58, Type 38 without clamp.
 - a. Anvil; Figure 264, sizes 2-1/2 inches through 36 inches with Figure 62C base.
 - b. B-Line; Figure B3092, sizes 3/4 inch through 36 inches with Figure B3088S base.

2.05 CHANNEL TYPE SUPPORT SYSTEMS

- A. Channel Size: 12-gauge, 1-5/8-inch-wide minimum steel.
- B. Members and Connections: Design for loads using one-half of manufacturer's allowable loads.
- C. Fasteners: Encapsulated steel fasteners.

D. Manufacturers and Products:

1. B-Line; Strut System.
2. Unistrut.
3. Anvil; Power-Strut.
4. Or approved equal.

2.06 PIPE CLAMPS

A. Riser Clamp: MSS SP 58, Type 8.

1. Anvil; Figure 261, sizes 3/4 inch through 24 inches.
2. B-Line; Figure B3373, sizes 1/2 inch through 30 inches.

2.07 ELBOW AND FLANGE SUPPORTS

- A. Elbow with Adjustable Stanchion: Sizes 2 inches through 18 inches, Anvil; Figure 62C base.
- B. Elbow with Nonadjustable Stanchion: Sizes 2-1/2 inches through 42 inches, Anvil; Figure 63A or Figure 63B base.
- C. Flange Support with Adjustable Base: Sizes 2 inches through 24 inches, Standon; Model S89.

2.08 INTERMEDIATE PIPE GUIDES

A. Type: Hold down pipe guide.

1. Manufacturer and Product:
 - a. B-Line; Figure B3552, 1-1/2 inches through 30 inches.
 - b. Or approved equal.

B. Type: U-bolts with double nuts to provide nominal 1/8-inch to 1/4-inch clearance around pipe; MSS SP 58, Type 24.

1. Anvil; Figure 137 and Figure 137S.
2. B-Line; Figure B3188 and Figure B3188NS.

2.09 PIPE ALIGNMENT GUIDES

- A. Type: Spider.
- B. Manufacturers and Products:
 - 1. Anvil; Figure 255, sizes 1/2 inch through 24 inches.
 - 2. B-Line; Figure B3281 through Figure B3287, sizes 1/2 inch through 24 inches.
 - 3. Or approved equal.

2.10 PIPE ANCHORS

- A. Type: Anchor chair with U-bolt strap.
- B. Manufacturer and Product:
 - 1. B-Line; Figure B3147A or Figure B3147B.
 - 2. Or approved equal.

2.11 SEISMIC RESTRAINTS

- A. Solid pipe bracing attachment to pipe clevis with clevis cross brace and angle rod reinforcement.
- B. Manufacturers:
 - 1. Mason Industries.
 - 2. B-Line.
 - 3. Anvil.
 - 4. Or approved equal.

2.12 ACCESSORIES

- A. Anchor Bolts:
 - 1. Size and Material: Sized by Contractor for required loads, 1/2-inch minimum diameter, and as specified in Section 05 50 00, Metal Fabrications.
 - 2. Bolt Length (Extension Above Top of Nut):
 - a. Minimum Length: Flush with top of nut preferred. If not flush, shall be no more than one thread recessed below top of nut.
 - b. Maximum Length: No more than a full nut depth above top of nut.

- B. Dielectric Barriers:
 - 1. Plastic coated hangers, isolation cushion, or tape.
 - 2. Manufacturer and Products:
 - a. B-Line; B1999 Vibra Cushion.
 - b. B-Line; Iso Pipe, Isolation Tape.
 - c. Or approved equal.
- C. Hanger Rods, Clevises, Nuts, Sockets, and Turnbuckles: In accordance with MSS SP 58.
- D. Attachments:
 - 1. I-Beam Clamp: Concentric loading type, MSS SP 58, Type 21, Type 28, Type 29, or Type 30, which engage both sides of flange.
 - 2. Concrete Insert: MSS SP 58, Type 18, continuous channel insert with load rating not less than that of hanger rod it supports.
 - 3. Welded Beam Attachment: MSS SP 58, Type 22.
 - a. Anvil; Figure 66.
 - b. B-Line; Figure B3083.
 - 4. U-Channel Concrete Inserts: As specified in Section 05 50 00, Metal Fabrications.
 - 5. Concrete Attachment Plates:
 - a. Anvil; Figure 47, Figure 49, or Figure 52.
 - b. B-Line; Figure B3084, Figure B3085, or Figure B3086.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Install support systems in accordance with MSS SP 58, unless shown otherwise.
 - 2. Install pipe hanger rods plumb, within 4 degrees of vertical during shut down, start up or operations.
 - 3. Support piping connections to equipment by pipe support and not by equipment.
 - 4. Support large or heavy valves, fittings, and appurtenances independently of connected piping.
 - 5. Support no pipe from pipe above it.
 - 6. Support pipe at changes in direction or in elevation, adjacent to flexible joints and couplings, and where shown.
 - 7. Do not use adhesive anchors for attachment of supports to ceiling or walls.

8. Do not install pipe supports and hangers in equipment access areas or bridge crane runs.
9. Brace hanging pipes against horizontal movement by both longitudinal and lateral sway bracing and to reduce movement after startup.
10. Install lateral supports for seismic loads at changes in direction.
11. Install pipe anchors where required to withstand expansion thrust loads and to direct and control thermal expansion.
12. Repair mounting surfaces to original condition after attachments are completed.

B. Standard Pipe Supports:

1. Horizontal Suspended Piping:
 - a. Single Pipes: Clevis hangers or adjustable swivel split-ring.
 - b. Grouped Pipes: Trapeze hanger system.
2. Horizontal Piping Supported from Walls:
 - a. Single Pipes: Wall brackets, or attached to wall, or to wall mounted framing with anchors.
 - b. Stacked Piping: Wall mounted framing system and “J” hangers acceptable for pipe smaller than 3-inch.
 - c. Pipe clamp that resists axial movement of pipe through support is not acceptable. Use pipe rollers supported from wall bracket.
3. Horizontal Piping Supported from Floors:
 - a. Saddle Supports:
 - 1) Pedestal Type, elbow and flange.
 - 2) Provide minimum 1-1/2-inch grout beneath baseplate.
 - b. Floor Mounted Channel Supports:
 - 1) Use for pipe smaller than 3-inch running along floors and in trenches at pipe elevations lower than can be accommodated using pedestal pipe supports.
 - 2) Attach channel framing to floors with baseplate on minimum 1-1/2-inch nonshrink grout and with anchor bolts.
 - 3) Attach pipe to channel with clips or pipe clamps.
 - c. Concrete Cradles: Use for pipe larger than 3 inches along floor and in trenches at pipe elevations lower than can be accommodated using stanchion type.
4. Vertical Pipe: Support with wall bracket and elbow support, or riser clamp on floor penetration.

C. Standard Attachments:

1. Steel Beams: I-beam clamp or welded attachments.
2. Wooden Beams: Lag screws and angle clips to members not less than 2-1/2 inches thick.

3. Concrete Walls: Concrete inserts or brackets or clip angles with concrete anchors.
 4. Concrete Beams: Concrete inserts, or if inserts are not used attach to vertical surface similar to concrete wall. Do not drill into beam bottom.
- D. Saddles for Steel or Concrete Pipe: Provide 90-degree to 120-degree pipe saddle for pipe sizes 6 inches and larger when installed on top of steel or concrete beam or structure, pipe rack, trapeze, or where similar concentrated point supports would be encountered.

END OF SECTION

SECTION 40 27 00
PROCESS PIPING—GENERAL

PART 1 GENERAL

1.01 DEFINITIONS

- A. Submerged or Wetted: Zone below elevation of top of tank wall or under tank cover.

1.02 DESIGN REQUIREMENTS

- A. Where pipe diameter, thickness, pressure class, pressure rating, or thrust restraint is not shown or specified, design piping system in accordance with the following:
1. Process Piping: ASME B31.3, normal fluid service unless otherwise specified.
 2. FRP Piping: FRP Piping shall be designed for the conditions shown on Drawings as required by Section 40 27 00.12, Fiberglass Reinforced Plastic (FRP) Pipe and Fittings Data Sheet.
 3. Buried Piping: H20-S16 traffic load with 1.5 impact factor, AASHTO HB-17, as applicable.
 4. Thrust Restraints:
 - a. Design for test pressure shown in Piping Schedule as shown on Drawings.
 - b. Allowable Soil Pressure: 1,000 pounds per square foot.
 - c. Low Pressure Pipelines:
 - 1) When bearing surface of the fitting against soil provides an area equal to or greater than area required for thrust restraint, concrete thrust blocks will not be required.
 - 2) Determine bearing area for fittings without thrust blocks by projected area of 70 percent of internal diameter multiplied by chord length for fitting centerline curve.

1.03 SUBMITTALS

- A. Action Submittals:
1. Shop Fabricated Piping:
 - a. Detailed pipe fabrication or spool drawings showing special fittings and bends, dimensions, coatings, and other pertinent information.

- b. Layout drawing showing location of each pipe section and each special length; number or otherwise designate laying sequence on each piece.
2. Pipe Wall Thickness: Identify wall thickness and rational method or standard applied to determine wall thickness for each size of each different service including exposed, submerged, buried, and concrete-encased installations for Contractor-designed piping.
3. Hydraulic Thrust Restraint for Restrained Joints: Details including materials, sizes, assembly ratings, and pipe attachment methods.
4. Thrust Blocks: Concrete quantity, bearing area on pipe, and fitting joint locations.
5. Thrust restraint design calculations.
6. Dissimilar Buried Pipe Joints: Joint types and assembly drawings.
7. Pipe Corrosion Protection: Product data.
8. Any relocation of piping or changes of material, jointing methods, or supports from where it is detailed on Drawings or specified.
9. Complete list of piping identification label titles and color schemes.
10. All required protective coating information.
11. Anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Manufacturer's Certification of Compliance, in accordance with Section 01 61 00, Common Product Requirements:
 - a. Pipe and fittings.
 - b. Factory applied resins and coatings.
2. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
3. Flanged Pipe and Fittings: Manufacturer's product data sheets for gaskets including torqueing requirements and bolt tightening procedures.
4. Qualifications:
 - a. Nondestructive Testing Personnel: SNT-TC-1A Level II certification and qualifications.
 - b. AWS QC1 Certified Welding Inspector: Submit evidence of current certification prior to commencement of welding activities.
 - c. Welders:
 - 1) Continuity log for welders and welding operators.
 - 2) Welder qualification test records conducted by Contractor or manufacturer.
5. Welding Procedures: Qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX for weld type(s) and base metal(s).
6. Nondestructive inspection and testing procedures.
7. Test logs.

8. Pipe coating applicator certification.
9. Laboratory Testing Equipment: Certified calibrations, manufacturer's product data, and test procedures.
10. CWI inspection records and NDE test records.
11. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Independent Inspection and Testing Agency:
 - a. Provide a listing of projects and references in field of welding and welded pipe and fittings' testing required for this Project.
 - b. Calibrated instruments and equipment, and documented standard procedures for performing specified testing.
 - c. Certified in accordance with ASNT SNT-TC-1A for testing procedures required for this Project.
 - d. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.
 - e. Verification Welding Inspector: AWS QC1 Certified.
2. Welding Procedures: In accordance with ASME BPVC SEC IX (Forms QW-482 and QW-483) or AWS D1.1/D1.1M (Annex N Forms).
3. Welder Qualifications: In accordance ASME BPVC SEC IX (Form QW-484) or AWS D1.1/D1.1M (Annex N Forms).
4. Contractor's CWI: Certified in accordance with AWS QC1, and having prior experience with specified welding codes. Alternate welding inspector qualifications require approval by Design Engineer.

B. Quality Assurance: Provide services of independent inspection and testing agency for welding operations.

1. Note, the presence of Owner's Special Inspector or Verification CWI does not relieve Contractor from performing own quality control, including 100 percent visual inspection of welds.

1.05 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Section 01 61 00, Common Product Requirements, and:

1. Flanges: Securely attach metal, hardboard, or wood protectors over entire gasket surface.
2. Threaded or Socket Welding Ends: Fit with metal, wood, or plastic plugs or caps.
3. Linings and Coatings: Prevent excessive drying.

4. Cold Weather Storage: Locate products to prevent coating from freezing to ground.
5. Handling: Use heavy canvas or nylon slings to lift pipe and fittings.

PART 2 PRODUCTS

2.01 PIPING

- A. As specified on Piping Data Sheet(s) and in Piping Schedule located on Drawings.
- B. Diameters Shown:
 1. Standardized Products: Nominal size.
 2. Fabricated Steel Piping (Except Cement-Lined): Outside diameter, ASME B36.10M.
 3. Cement-Lined Steel Pipe: Lining inside diameter.

2.02 JOINTS

- A. Grooved End System:
 1. Rigid type.
 2. Use of flexible grooved joints only allowed where shown on Drawings or with prior approval by Design Engineer.
 3. Flanges: When required, furnish with grooved type flange adapters of same manufacturer as grooved end couplings.
- B. Flanged Joints:
 1. Flat-faced, carbon steel, or alloy flanges when mating with flat-faced cast or ductile iron flanges.
 2. Higher pressure rated flanges as required to mate with equipment when equipment flange is of higher pressure rating than required for piping.
- C. Threaded Joints: NPT taper pipe threads in accordance with ASME B1.20.1.
- D. Mechanical Joint Anchor Gland Follower:
 1. Ductile iron anchor type, wedge action, with break-off tightening bolts.
 2. Thrust rated to 250 psi minimum.
 3. Rated operating deflection not less than:
 - a. 3 degrees for sizes through 12 inches.
 - b. 2 degrees for sizes 14 inches through 16 inches.
 - c. 1.5 degrees for sizes 18 inches through 24 inches.
 - d. 1 degree for sizes 30 inches through 48 inches.

4. UL and FM approved.

E. Flexible Mechanical Compression Joint Coupling:

1. Stainless steel, ASTM A276, Type 305 bands.
2. Manufacturers:
 - a. Pipeline Products Corp.
 - b. Fernco Joint Sealer Co.
 - c. Or approved equal.

2.03 GASKET LUBRICANT

A. Lubricant shall be supplied by pipe manufacturer and no substitute or approved equal will be allowed.

2.04 PIPE CORROSION PROTECTION

A. Coatings: See Section 09 90 00, Painting and Coating, for details of coating requirements.

B. Heat Shrink Wrap:

1. Type: Cross-linked polyolefin wrap or sleeve with mastic sealant.
2. Manufacturer and Product:
 - a. Raychem; WPC or TPS.
 - b. Or approved equal.

C. Insulating Flanges, Couplings, and Unions:

1. Materials:
 - a. In accordance with applicable piping material specified in Pipe Data Sheet. Complete assembly shall have ASME B31.3 working pressure rating equal to or higher than that of joint and pipeline.
 - b. Galvanically compatible with piping.
 - c. Resistant for intended exposure, operating temperatures, and products in pipeline.
2. Union Type, 2 Inches and Smaller:
 - a. Screwed or solder-joint.
 - b. O-ring sealed with molded and bonded insulation to body.
3. Flange Type, 2-1/2 Inches and Larger:
 - a. Flanged, complete with bolt insulators, dielectric gasket, bolts, and nuts.
 - b. Bolt insulating sleeves shall be provided full length between insulating washers.
 - c. Ensure fit-up of components of insulated flange assembly to provide a complete functioning installation.

- d. AWWA C207 steel flanges may be drilled oversize up to 1/8-inch to accommodate insulating sleeves.
- e. No less than minimum thread engagement in accordance with specified bolting standards will be permitted to accommodate thicknesses of required washers, flanges, and gasket.
- 4. Flange Insulating Kits:
 - a. Gaskets: Full-face, Type E with elastomeric sealing element. Sealing element shall be retained in a groove within retainer portion of gasket.
 - b. Insulating Sleeves: Full-length fiberglass reinforced epoxy (NEMA LI-1, G-10 grade).
 - c. Insulating Washers: Fiberglass-reinforced epoxy (NEMA LI-1, G-10 grade).
 - d. Steel Washers: Plated, hot-rolled steel, 1/8 inch thick.
 - 1) Flange Diameters 36 Inches or Less: Provide two washers per bolt.
 - 2) Flange Diameters Larger Than 36 Inches: Provide four washers per bolt.
- 5. Manufacturers and Products:
 - a. Dielectric Flanges and Unions:
 - 1) PSI, Houston, TX.
 - 2) Advance Products and Systems, Lafayette, LA.
 - 3) Or approved equal.
 - b. Insulating Couplings:
 - 1) Dresser; STAB-39.
 - 2) Baker Coupling Company, Inc.; Series 216.
 - 3) Or approved equal.

2.05 THRUST BLOCKS

- A. Concrete: As specified in Section 03 30 00, Cast-in-Place Concrete.

2.06 THRUST TIES

- A. Steel Pipe: Fabricated lugs and rods in accordance with details when shown on Drawings.
- B. Buried Ductile Iron Pipe and Fittings: Unless restraint is otherwise specified or shown, conform to NFPA 24. Tie-rod attachments relying on clamp friction with pipe barrel to restrain thrust are unacceptable.

2.07 FABRICATION

- A. Mark each pipe length on outside with the following:
 - 1. Size or diameter and class.

2. Manufacturer's identification and pipe serial number.
3. Location number on laying drawing.
4. Date of manufacture.

B. Code markings according to approved Shop Drawings.

C. Shop fabricate flanged pipe in shop, not in field, and delivered to Site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on matching threaded pipe by manufacturer.

2.08 FINISHES

A. Factory prepare, prime, and finish coat in accordance with Pipe Data Sheet(s) and Piping Schedule as shown on Drawings.

B. Galvanizing:

1. Hot-dip applied, meeting requirements of ASTM A153/A153M.
2. Electroplated zinc or cadmium plating is unacceptable.
3. Stainless steel components may be substituted where galvanizing is specified.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify size, material, joint types, elevation, horizontal location, and pipe service of existing pipelines to be connected to new pipelines or new equipment.

B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.

3.02 PREPARATION

A. See Piping Schedule as shown on Drawings and Section 09 90 00, Painting and Coating, for additional requirements.

B. Notify Construction Manager at least 2 weeks prior to field fabrication of pipe or fittings.

C. Inspect pipe and fittings before installation, clean ends thoroughly, and remove foreign matter and dirt from inside.

D. Damaged Coatings and Linings: Repair using original coating and lining materials in accordance with manufacturer's instructions.

3.03 WELDING

- A. Perform in accordance with Section IX, ASME Boiler and Pressure Vessel Code and ASME B31.3 for Pressure Piping, as may be specified on Piping Data Sheets, and if recommended by piping or fitting manufacturer.
- B. Weld Identification: Keep paper record of which welder welded each joint.
- C. Pipe End Preparation:
 - 1. Machine Shaping: Preferred.
 - 2. Oxygen or Arc Cutting: Smooth to touch, true, and slag removal by chipping or grinding.
 - 3. Beveled Ends for Butt Welding: ASME B16.25.
- D. Surfaces:
 - 1. Clean and free of paint, oil, rust, scale, slag, or other material detrimental to welding.
 - 2. Thoroughly clean each layer of deposited weld metal, including final pass, prior to deposition of each additional layer of weld metal with a power-driven wire brush.
- E. Alignment and Spacing:
 - 1. Align ends to be joined within existing commercial tolerances on diameters, wall thicknesses, and out-of-roundness.
 - 2. Root Opening of Joint: As stated in qualified welding procedure.
 - 3. Minimum Spacing of Circumferential Butt Welds: Minimum four times pipe wall thickness or 1 inch, whichever is greater.
- F. Climatic Conditions: Do not perform welding if there is impingement of any rain, snow, sleet, or wind exceeding 5 mph on the weld area, or if ambient temperature is below 32 degrees F.
- G. Tack Welds: Performed by qualified welder using same procedure as for completed weld, made with electrode similar or equivalent to electrode to be used for first weld pass, and not defective. Remove those not meeting requirements prior to commencing welding procedures.
- H. Surface Defects: Chip or grind out those affecting soundness of weld.
- I. Weld Quality: Meet requirements of governing welding codes.

3.04 INSTALLATION—GENERAL

- A. Join pipe and fittings in accordance with manufacturer’s instructions, unless otherwise shown or specified.
- B. Remove foreign objects prior to assembly and installation.
- C. Flanged Joints:
 - 1. Install perpendicular to pipe centerline.
 - 2. Bolt Holes: Straddle vertical centerlines, aligned with connecting equipment flanges or as shown.
 - 3. Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.
 - 4. Plastic Flanges: Install annular ring filler gasket at joints of raised-face flange.
 - 5. Grooved Joint Flange Adapters: Include stainless steel washer plates as required for mating to serrated faces and lined valves and equipment.
 - 6. Raised-Face Flanges: Use flat-face flange when joining with flat-faced ductile or cast iron flange.
 - 7. Verify compatibility of mating flange to adapter flange gasket prior to selecting grooved adapter flanging.
 - 8. Flange fillers are to be avoided, but if necessary, may be used to make up for small angles up to 6 degrees and for filling gaps up to 2 inches between flanges. Stacked flange fillers shall not be used.
 - 9. Threaded flanged joints shall be shop fabricated and delivered to Site with flanges in-place and properly faced.
 - 10. Manufacturer: Same as pipe manufacturer or grooved joint flange adapter manufacturer.
- D. Threaded and Coupled Joints:
 - 1. Conform to ASME B1.20.1.
 - 2. Produce sufficient thread length to ensure full engagement when screwed home in fittings.
 - 3. Countersink pipe ends, ream and clean chips and burrs after threading.
 - 4. Make connections with not more than three threads exposed.
 - 5. Lubricate male threads only with thread lubricant or tape as specified on Piping Data Sheets.
- E. Grooved-End Joints:
 - 1. Piping shall be grooved in accordance with manufacturer’s latest published instructions and shall be accurately cut with tools conforming to coupling manufacturer’s standards and to AWWA C606.

2. Install grooved joint couplings and gaskets in accordance with manufacturer's latest published installation instructions.
- F. Pipe Connections at Concrete Structures: As specified in Article Piping Flexibility Provisions in Section 40 27 01, Process Piping Specialties.
- G. PVC Piping:
1. Provide Schedule 80 threaded nipple where necessary to connect to threaded valve or fitting.
 2. Use strap wrench for tightening threaded plastic joints. Do not overtighten fittings.
 3. Do not use Schedule 40 pipe.
- H. Ductile Iron Piping:
1. Cutting Pipe: Cut pipe with milling type cutter, rolling pipe cutter, or abrasive blade cutter. Do not flame cut.
 2. Dressing Cut Ends:
 - a. General: As required for the type of joint to be made.
 - b. Flexible Couplings, Flanged Coupling Adapters, and Grooved End Pipe Couplings: As recommended by the coupling or adapter manufacturer.
- I. Fiberglass Reinforced Piping:
1. Cut, fabricate, and install in accordance with manufacturer's written instructions.
 2. Provide manufacturer's representative for instructing workers on proper installation and jointing methods.
 3. Installation shall be made by workers experienced in FRP pipe lay-up techniques.

3.05 INSTALLATION—EXPOSED PIPING

- A. Piping Runs:
1. Parallel to building or column lines and perpendicular to floor, unless shown otherwise.
 2. Piping upstream and downstream of flow measuring devices shall provide straight lengths as required for accurate flow measurement.
- B. Supports: As specified in Section 40 05 15, Piping Support Systems.
- C. Group piping wherever practical at common elevations; install to conserve building space and not interfere with use of space and other work.

- D. Unions or Flanges: Provide at each piping connection to equipment or instrumentation on equipment side of each block valve to facilitate installation and removal.
- E. Install piping so that no load or movement in excess of that stipulated by equipment manufacturer will be imposed upon equipment connection; install to allow for contraction and expansion without stressing pipe, joints, or connected equipment.
- F. Piping clearance, unless otherwise shown:
 - 1. Over Walkway and Stairs: Minimum of 7 feet 6 inches, measured from walking surface or stair tread to lowest extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - 2. Between Equipment or Equipment Piping and Adjacent Piping: Minimum 3 feet, measured from equipment extremity and extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - 3. From Adjacent Work: Minimum 1 inch from nearest extremity of completed piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 - 4. Do not route piping in front of or to interfere with access ways, ladders, stairs, platforms, walkways, openings, doors, or windows.
 - 5. Headroom in front of openings, doors, and windows shall not be less than the top of the opening.
 - 6. Do not install piping containing liquids or liquid vapors in transformer vaults or electrical equipment rooms.
 - 7. Do not route piping over, around, in front of, in back of, or below electrical equipment including controls, panels, switches, terminals, boxes, or other similar electrical work.

3.06 INSTALLATION—BURIED PIPE

- A. Joints:
 - 1. Dissimilar Buried Pipes:
 - a. Provide flexible mechanical compression joints for pressure pipe.
 - b. Provide concrete closure collar for gravity and low pressure (maximum 10 psi) piping or as shown.
 - 2. Concrete Encased or Embedded Pipe: Do not encase joints in concrete, unless specifically shown.

B. Placement:

1. Keep trench dry until pipe laying and joining are completed.
2. Pipe Base and Pipe Zone: As specified in Section 31 23 23.15, Trench Backfill.
3. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
4. Measure for grade at pipe invert, not at top of pipe.
5. Excavate trench bottom and sides of ample dimensions to permit visual inspection and testing of entire flange, valve, or connection.
6. Prevent foreign material from entering pipe during placement.
7. Close and block open end of last laid pipe section when placement operations are not in progress and at close of day's work.
8. Lay pipe upgrade with bell ends pointing in direction of laying.
9. Install closure sections and adapters for gravity piping at locations where pipe laying changes direction.
10. Deflect pipe at joints for pipelines laid on a curve using unsymmetrical closure of spigot into bell. If joint deflection of standard pipe lengths will not accommodate horizontal or vertical curves in alignment, provide:
 - a. Shorter pipe lengths.
 - b. Special mitered joints.
 - c. Standard or special fabricated bends.
11. After joint has been made, check pipe alignment and grade.
12. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.
13. Prevent uplift and floating of pipe prior to backfilling.

C. PVC Pipe Placement:

1. Lay pipe snaking from one side of trench to other.
2. Offset: As recommended by manufacturer for maximum temperature variation between time of solvent welding and during operation.
3. Do not lay pipe when temperature is below 40 degrees F, or above 90 degrees F when exposed to direct sunlight.
4. Shield ends to be joined from direct sunlight prior to and during the laying operation.

D. Tolerances:

1. Deflection from Horizontal Line, Except PVC: Maximum 2 inches.
2. Deflection from Vertical Grade: Maximum 1/4 inch.
3. Joint Deflection: Maximum of 75 percent of manufacturer's recommendation.

4. Horizontal position of pipe centerline on alignment around curves maximum variation of 1.75 feet from position shown.
5. Pipe Cover: Minimum 3 feet, unless otherwise shown.

3.07 INSTALLATION—CONCRETE ENCASED

- A. Provide reinforced concrete pipe encasement where shown on Drawings and where otherwise required. Some piping may be required to be concrete encased for pipe strength requirements that are included in the Specifications. Piping under and within the influence of buildings, utility trenches, vaults, slabs, and other structures shall be concrete encased. See details on Drawings for encasement requirements.
- B. Where concrete encased piping crosses structure construction and expansion joints, provide flexible piping joints to coincide with structure joints to prevent excessive pipe stress and breakage.

3.08 PIPE CORROSION PROTECTION

- A. Ductile Iron Pipe:
 1. Exposed: As specified in Section 09 90 00, Painting and Coating, and as shown in Piping Schedule on Drawings.
 2. Buried: As specified in Section 09 90 00, Painting and Coating, and as shown in Piping Schedule on Drawings.
 3. Submerged or Embedded: Coat with epoxy as specified in Section 09 90 00, Painting and Coating.
- B. Carbon Steel Pipe:
 1. Exposed: As specified in Section 09 90 00, Painting and Coating.
 2. Buried:
 - a. Pipe: Wrap with tape coating system as specified in Section 09 90 00, Painting and Coating.
 - b. Joints: Wrap with tape coating system as specified in Section 09 90 00, Painting and Coating, or heat shrink wrap as specified herein.
 3. Submerged or Embedded: Shop coat with epoxy as specified in Section 09 90 00, Painting and Coating.
- C. PVC Pipe, Exposed: As specified in Section 09 90 00, Painting and Coating.

- D. Piping Accessories:
1. Exposed:
 - a. Field paint black and galvanized steel, brass, copper, and bronze piping components as specified in Section 09 90 00, Painting and Coating, as applicable to base metal material.
 - b. Accessories include, but are not limited to, pipe hangers, supports, expansion joints, pipe guides, flexible couplings, vent and drain valves, and fasteners.
 2. Buried:
 - a. Ferrous Metal and Stainless Steel Components: Tape wrap as specified in Section 09 90 00, Painting and Coating.
 - b. Bolts, Nuts, and Similar Items: Coat with bituminous paint.
 - c. Flexible Couplings, Grooved Couplings, and Similar Items: Wrap with heat shrink wrap.
 - d. Buried Valves and Similar Elements on Wrapped Pipelines: Coat with fusion-bonded epoxy coating (3M “Scotchkote” #134 or equivalent) in accordance with AWWA C116.
 - e. Cement-Coated Pipelines: Cement coat appurtenances same as pipe.
- E. Tape Coating System: As specified in Section 09 90 00, Painting and Coating.
- F. Heat Shrink Wrap: Apply in accordance with manufacturer’s instructions to surfaces that are cleaned, prepared, and primed.
- G. Insulating Flanges, Couplings, and Unions:
1. Applications:
 - a. Dissimilar metal piping connections.
 - b. Cathodically protected piping penetration to buildings and watertight structures.
 - c. Connections to existing metallic pipe.
 - d. Where required for electrically insulated connection.
 2. Pipe Installation:
 - a. Submerged carbon steel, ductile iron, or galvanized piping in reinforced concrete shall be isolated from the concrete reinforcement steel.
 - b. Align and install insulating joints as shown on Drawings and according to manufacturer’s recommendations. Bolt lubricants that contain graphite or other metallic or electrically conductive components that can interfere with the insulating capabilities of the completed flange shall not be used.

- H. Pipe Bonding for Buried Piping: As specified in Section 26 42 00, Galvanic Anode Cathodic Protection System.
- I. Cathodic Protection for Buried Piping: As specified in Section 26 42 00, Galvanic Anode Cathodic Protection System, and as shown.

3.09 THRUST RESTRAINT

A. Location:

- 1. Buried Piping: Where shown and where required to restrain force developed at pipeline tees, plugs, caps, bends, and other locations where unbalanced forces exist because of hydrostatic testing and normal operating pressure.
- 2. Exposed Piping: At all joints in piping.

B. Thrust Ties:

- 1. Steel Pipe: Attach with lugs fabricated in accordance with details when shown on Drawings.
- 2. Flanged Coupling Adapters: For exposed installations, install manufacturer's anchor studs through coupling sleeve or use dismantling joints.

C. Mechanical Joint Valve Restraint in Proprietary Restrained Joint Piping: Install pipe joint manufacturer's adapter gland follower and pipe end retainer, or mechanical joint anchor gland follower.

D. Thrust Blocking:

- 1. Place between undisturbed ground and fitting to be anchored.
- 2. Quantity of Concrete: Sufficient to cover bearing area on pipe and provide required soil bearing area as shown.
- 3. Place blocking so that pipe and fitting joints will be accessible for repairs.
- 4. Place concrete in accordance with Section 03 30 00, Cast-in-Place Concrete.

3.10 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

- A. Application and Installation: As specified in Section 40 27 01, Process Piping Specialties.

3.11 BRANCH CONNECTIONS

- A. Do not install branch connections smaller than 1/2-inch nominal pipe size, including instrument connections, unless shown otherwise.
- B. When line of lower pressure connects to a line of higher pressure, requirements of Piping Data Sheet for higher pressure rating prevails up to and including first block valve in the line carrying the lower pressure, unless otherwise shown.
- C. Threaded Pipe Tap Connections:
 - 1. Ductile Iron Piping: Connect only with service saddle or at tapping boss of a fitting, valve body, or equipment casting.
 - 2. Welded Steel: Connect only with welded threadolet or half-coupling as specified on Piping Data Sheet.
 - 3. Limitations: Threaded taps in pipe barrel are unacceptable.

3.12 VENTS AND DRAINS

- A. Vents and drains at high and low points in piping required for completed system may or may not be shown. Install vents on high points and drains on low points of pipelines as shown and at all low and high point locations.

3.13 FIELD FINISHING

- A. Notify Construction Manager at least 3 days prior to start of surface preparation or coating application work.
- B. As specified in Section 09 90 00, Painting and Coating.

3.14 PIPE IDENTIFICATION

- A. As specified in Section 31 23 23.15, Trench Backfill, and Section 09 90 00, Painting and Coating.

3.15 FIELD QUALITY CONTROL

- A. Pressure Leakage Testing: As specified in Section 40 80 01, Process Piping Leakage Testing.
- B. Minimum Duties of Welding Inspector:
 - 1. Job material verification and storage.
 - 2. Qualification of welders.
 - 3. Certify conformance with approved welding procedures.
 - 4. Maintenance of records and preparation of reports in a timely manner.

5. Notification to Construction Manager of unsatisfactory weld performance within 24 hours of weld test failure.
- C. Required Weld Examinations:
1. Perform examinations in accordance with Piping Code ASME B31.3 for Normal Fluid Service.
 2. Perform examinations for every pipe thickness and for each welding procedure, progressively, for piping covered by this section.
 3. Examine at least one of each type and position of weld made by each welder or welding operator.
 4. For each weld found to be defective under the acceptance standards or limitations on imperfections contained in the applicable Piping Code, examine two additional welds made by the same welder that produced the defective weld. Such additional examinations are in addition to the minimum required above. Examine, progressively, two additional welds for each tracer examination found to be unsatisfactory.

3.16 CLEANING

- A. Following assembly and testing, and prior to final acceptance, flush pipelines, except as stated below, with water at 2.5 fps minimum flushing velocity until foreign matter is removed.
- B. Blow clean of loose debris service air lines with compressed air at 4,000 fpm; do not flush with water.
- C. If impractical to flush large diameter pipe at 2.5 fps or blow at 4,000 fpm velocity, clean in-place from inside by brushing and sweeping, then flush or blow line at lower velocity.
- D. Insert cone strainers in flushing connections to attached equipment and leave in-place until cleaning is complete.
- E. Remove accumulated debris through drains 2 inches and larger or by removing spools and valves from piping.

3.17 SUPPLEMENTS

A. The supplements listed below, following “End of Section,” are a part of this Specification:

1. Data Sheets.

Number	Title
40 27 00.01	Cement-Mortar or Polyurethane-Lined Ductile Iron Pipe and Fittings
40 27 00.09	Stainless Steel Piping and Fittings
40 27 00.10	Polyvinyl Chloride (PVC) Pipe and Fittings
40 27 00.12	Fiberglass Reinforced Plastic (FRP) Pipe and Fittings
40 27 00.13	Copper and Copper Alloy Pipe, Tubing, and Fittings

END OF SECTION

SECTION 40 27 00.01 CEMENT-MORTAR OR POLYURETHANE-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
General	Pipe manufacturer shall submit certification that source manufacturing facility has been producing ductile iron pipe of the specified diameters, dimensions, and standards by providing a listing of projects and references. Testing of pipe required by AWWA A21.51 shall be conducted in testing and laboratory facilities located in the USA and operating under USA laws and regulations. Pipe shall be handled during manufacture and shipped without nesting (without insertion of one pipe inside another).
Pipe	Buried Liquid Service Using Mechanical, or Proprietary Restrained Joints: AWWA C111/A21.11, and AWWA C151/A21.51, pressure class conforming to Table 5 and Table 7 for Type 4 trench, 250 psi minimum working pressure. Follower glands shall be ductile iron. Exposed Pipe Using Grooved End and Flange Joints: AWWA C115/A21.15, thickness Class 53 minimum, 250 psi minimum working pressure. Grooved End only allowed where shown on Drawings or approved by Design Engineer.
Lining	Cement-mortar: Lining shall be in accordance with City of San Diego Greenbook Table 209-1.1.2. Polyurethane-lined: Per Section 09 90 00, Painting and Coating.
Fittings	Lined and coated same as pipe. Mechanical: AWWA C110/A21.10 and AWWA C111/A21.11 ductile iron, 250 psi minimum working pressure. Follower glands shall be ductile iron. Compact fittings not allowed. Proprietary Restrained: AWWA C110/A21.10 and AWWA C111/A21.11 ductile iron, 250 psi minimum working pressure. Restraint shall be achieved with removable metal elements fitted between a welded bar on the pipe barrel and the inside of the joint bell or fitting sizes smaller than 16 inches may be mechanical joint, restrained by anchor gland followers, ductile iron anchor type, wedge action, with break-off tightening bolts. Assembled joints shall be rated for deflection in operation at rated pressure. Rated deflection shall be not less than 1-1/2 degrees for 36-inch and smaller pipe. Rated deflection shall be not less than 1/2 degree for 42-inch and larger pipe.

SECTION 40 27 00.01 CEMENT-MORTAR OR POLYURETHANE-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
	<p>Clow Corp., American Cast Iron Pipe Co., U.S. Pipe. Restrained joints relying on metal teeth molded into the gasket to prevent joint separation under pressure will not be accepted. Compact Fittings not allowed.</p> <p>Grooved End: AWWA C606 and AWWA C110/A21.10, ductile iron, 250 psi minimum working pressure; Victaulic.</p> <p>Flange: AWWA C110/A21.10 ductile iron, faced and drilled, Class 125 flat face. Gray cast iron will not be allowed.</p>
Joints	<p>Mechanical: 250 psi minimum working pressure.</p> <p>Proprietary Restrained: 150 psi minimum working pressure. Clow Corp., Super-Lock; American Cast Iron Pipe Co., Flex-Ring or Lok-Ring; U.S. Pipe, TR Flex.</p> <p>Grooved End: Rigid type radius cut conforming to AWWA C606, 250 psi minimum working pressure; Victaulic.</p> <p>Flange: Class 125 flat face, ductile iron, threaded conforming to AWWA C115/A21.15. Gray cast iron will not be allowed.</p> <p>Branch connections 3 inches and smaller, shall be made with service saddles as specified in Section 40 27 01, Process Piping Specialties.</p>
Couplings	<p>Grooved End: 250 psi minimum working pressure, malleable iron per ASTM A47/A47M or ductile iron per ASTM A536; Victaulic.</p> <p>Grooved End Adapter Flanges: 250 psi minimum working pressure, malleable iron per ASTM A47/A47M or ductile iron per ASTM A536; Victaulic.</p>

SECTION 40 27 00.01 CEMENT-MORTAR OR POLYURETHANE-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
Bolting	<p>Mechanical, Proprietary Restrained, and Grooved End Joints: Manufacturer's standard.</p> <p>Class 125 Flat-Faced Flange: ASTM A307, Grade B carbon steel hex head bolts, ASTM A563, Grade A carbon steel hex head nuts and ASTM F436/F436M hardened steel washers at nuts and bolt heads. Bolting to be torqued to gasket manufacturer's recommendation.</p> <p>Flanged Joints in Sumps, Wet Wells, and Submerged and Wetted Installations: Type 316 stainless steel, ASTM A320/A320M, Grade B8M hex head bolts; ASTM A194/A194M, Grade 8M hex nuts and Type 316 stainless steel hardened washers at nuts and bolt heads. Bolting to be torqued to gasket manufacturer's recommendation.</p>
Gaskets	<p>General: Gaskets in contact with potable water shall be NSF 61 certified.</p> <p>Mechanical and Proprietary Restrained Joints; Water and Sewage Service: Rubber conforming to AWWA C111/A21.11.</p> <p>Grooved End Joints: Halogenated butyl conforming to ASTM D2000 and AWWA C606.</p> <p>Flanged, Water and Sewage: 1/8-inch-thick, homogeneous black rubber (EPDM), hardness 60 (Shore A), rated to 275 degrees F, conforming to ASME B16.21 and ASTM D2000 4CA 415 A25 B35 C32 EA14 F19.</p> <p>Full face for Class 125 flat-faced flanges. Blind flanges shall be gasketed covering entire inside face with gasket cemented to blind flange.</p> <p>Gasket pressure rating to equal or exceed the system hydrostatic test pressure.</p>
Joint Lubricant	Manufacturer's standard.

END OF SECTION

SECTION 40 27 00.09 STAINLESS STEEL PIPE AND FITTINGS		
Item	Size	Description
Action Submittal	N/A	<p>Workplan: Contractor shall submit a workplan detailing the codes, standards, and procedures that will be followed for completing the work on the Landfill Gas Line.</p> <p>Workplan shall include but is not limited to: Schedule, sequencing, owner and 3rd party operator coordination, isolation and purging plan, and other required elements.</p>
Pipe	<p>All</p> <p>2" & smaller</p> <p>2-1/2" through 24"</p>	<p>ASTM A312/A312M Type 316/316L seamless annealed, pipe. All stainless steel pipe and fittings for landfill gas, regardless of joint type, shall be pickled and passivated, inside and out, in accordance with ASTM A380.</p> <p>Schedule 40S. Schedule 80S if threaded.</p> <p>Schedule 10S.</p>
Pipe Joints	<p>3/4" & smaller</p> <p>1" & 2"</p> <p>2 1/2" & larger</p>	<p>Socket weld, threaded, or flanged at equipment as required or shown. Threaded only where required to connect to existing equipment.</p> <p>Socket weld or flanged at equipment as required or shown.</p> <p>Butt-welded or flanged at valves and equipment as required or shown.</p>
Pipe Fittings	<p>3/4" & smaller</p> <p>1" to 2"</p>	<p>Threaded or Socket Weld Forged: ASTM A182/A182M, Grade F316/316L, Class 3000 (socket weld) or Class 2000 (threaded) conforming to ASME B16.11. Threaded fittings allowed only where required to connect to existing fittings.</p> <p>Socket Weld Forged: ASTM A182/A182M, Grade F316/316L, Class 3000 (socket weld) conforming to ASME B16.11.</p>
	2" & larger	Butt Welded: ASTM A403/A403M, Grade WP316/316L conforming to ASME B16.9, annealed, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise.

SECTION 40 27 00.09 STAINLESS STEEL PIPE AND FITTINGS		
Item	Size	Description
Pipe Branch Connections	3/4" & smaller	Tee or reducing tee in conformance with fittings above.
	2" & smaller	2-Inch and Smaller Branch: Sockolet in conformance with Fittings above and meeting the requirements of MSS SP-97.
	2-1/2" & larger	Butt-Welded Tee or Reducing Tee: In accordance with Fittings above. Weldolet per MSS SP-97 where branch size is less than 1/2 the header size. Weldolet material A182/A182M, Grade F316/316L, schedule to match pipes.
Flanges	1-1/2" & smaller	Forged: ASTM A182/A182M Grade F316/316L, ASME B16.5 Class 150, socket weld, 1/16-inch raised face.
	2" & larger	Forged: ASTM A182/A182M Grade F316/316L, ASME B16.5 Class 150, slip-on or welding neck, 1/16-inch raised face. Weld neck bore to match pipe internal diameter. Use weld neck flanges when abutting butt-weld fittings. Weld slip-on flanges inside and outside.
Unions	1-1/2" & smaller	Socket Weld Forged: ASTM A182/A182M Grade F316/316L, Class 3000, integral ground seats, AAR design meeting requirements of MSS SP-83.
Bolting	All	General Conditions: Type 316 stainless steel, ASTM A193/A193M, Grade B8M heavy hex head or stud bolts, ASTM A194/A194M Grade 8M heavy hex head nuts. Torque bolts per gasket manufacturer recommendations. When mating flange on valve or equipment is cast iron and gasket is flat ring, provide ASTM A307 Grade B heavy hex head or stud bolts, ASTM A563 Grade A heavy hex nuts and ASTM F436/F436M hardened steel washers at nuts and bolt heads. Torque bolts per gasket manufacturer recommendations.

SECTION 40 27 00.09 STAINLESS STEEL PIPE AND FITTINGS		
Item	Size	Description
Gaskets	All Flanges	Landfill Gas Service: 1/16-inch-thick virgin Teflon or inorganic filled Teflon flat ring type for raised face flanges and full face type for flat face flanges; Garlock or Durlon. UWHP Service: 1/8-inch-thick, homogeneous black rubber (EPDM), hardness 60 (Shore A), rated to 250 degrees F. continuous and conforming to ASME B16.21 and ASTM D1330, Steam Grade.
Thread Lubricant	1-1/2" & smaller	General Service: 100 percent virgin PTFE Teflon tape.

END OF SECTION

SECTION 40 27 00.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS		
Item	Size	Description
General	All	Materials in contact with potable water shall conform to NSF 61 acceptance.
Pipe	All	Schedule 80 PVC: Type I, Grade I or Class 12454-B conforming to ASTM D1784 and ASTM D1785. Pipe shall be manufactured with titanium dioxide for ultraviolet protection. Threaded Nipples: Schedule 80 PVC. All piping to be Schedule 80 unless otherwise specified or shown.
Fittings	All	Schedule to Match Pipe Above: ASTM D2466 and ASTM D2467 for socket weld type and Schedule 80 ASTM D2464 for threaded type. Fittings shall be manufactured with titanium dioxide for ultraviolet protection.
Joints	All	Solvent socket weld except where connection to threaded valves and equipment may require future disassembly.
Flanges	All	One-piece, molded hub type PVC flat face flange in accordance with Fittings above, ASME B16.1, Class 125 drilling.
Bolting	All	Flat Face Mating Flange and In Corrosive Areas: ASTM A193/A193M, Type 316 stainless steel Grade B8M hex head bolts, ASTM A194/A194M Grade 8M hex head nuts and ASTM F436 Type 3 alloy washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress. With Raised Face Mating Flange: Carbon steel ASTM A307 Grade B square head bolts, ASTM A563 Grade A heavy hex head nuts and ASTM F436 hardened steel washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress.

SECTION 40 27 00.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS		
Item	Size	Description
Gaskets	All	Flat Face Mating Flange: Full faced 1/8-inch-thick ethylene propylene (EPR) rubber. Raised Face Mating Flange: Flat ring 1/8-inch ethylene propylene (EPR) rubber, with filler gasket between OD of raised face and flange OD to protect the flange from bolting moment.
Solvent Cement	All	Socket type joints shall be made employing solvent cement that meets or exceeds the requirements of ASTM D2564 and primer that meets or exceeds requirements of ASTM F656, chemically resistant to the fluid service, and as recommended by pipe and fitting manufacturer. Solvent cement and primer shall be listed by NSF 61 for contact with potable water.
Thread Lubricant	All	Teflon Tape.

END OF SECTION

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
Pipe	<p><u>Fabricator Requirements:</u></p> <p>Listing of previous installations, owners and references demonstrating the fabricator shall provide a listing of projects and references with experience with the manufacture of helically filament-wound fiberglass equipment for municipal or industrial service of a size similar to the equipment specified for this Project.</p> <p>Design calculations stamped by a registered Professional Engineer in the State of California.</p> <p>All FRP products shall be fabricated in an ASME RTP-1 certified shop; however, products do not need to be certified.</p> <p><u>Fabricators:</u></p> <p>Ershigs, Inc., Bellingham, Washington, Grand Bay, AL and Sarnia, ON.</p> <p>Or equals meeting all experience requirements of this section.</p> <p><u>Design Requirements:</u></p> <p>The Fabricator shall be responsible for the basic design of the FRP Pressure Pipe and Fittings based on these Specifications and associated Drawings, including resin selection, wall thickness, methods and locations of support and stiffener requirements. This is subject to review and approval by the purchaser.</p> <p>The mechanical properties of any contact molded reinforced laminate shall meet or exceed all requirements of ASTM C582.</p> <p>Filament wound material shall be designed with a strain limit of 0.0012 in./in., unless noted otherwise.</p>

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
	<p><u>Resin:</u></p> <p>Resin System: Selected by the Fabricator, subject to approval by the Design Engineer and suitable for the intended service.</p> <p>Liner Resin: Premium grade and corrosion resistant.</p> <p>The same resin shall be used throughout the structure. Dual resin systems shall not be used unless specifically requested by or approved by the Design Engineer.</p> <p>No dyes, pigments, or colorants shall be used except in the exterior coat. Exterior color shall be Fabricator’s standard, unless specifically requested by or approved by the Design Engineer. Final resin coat shall contain UV inhibitors.</p> <p>The resin shall not contain fillers or thixotropic agents unless specified.</p> <p>Use Fabricator’s currently recommended cure system, unless otherwise agreed upon by the Fabricator and Design Engineer.</p>
	<p><u>Reinforcement:</u></p> <p>Veil: Chemical surfacing mat with a finish and a binder compatible with the resin.</p> <p>Corrosion Barrier: Resin-rich interior surface of nominal 100 mils to 120 mils using chopped strand mat backing the veil. Use no additive in the corrosion barrier. Application by chopper gun is acceptable if mechanically slaved and synchronized to the rotation of the mandrel.</p> <p>Chopped Strand Mat: Type E glass, minimum 1-1/2 ounces per square foot, with silane finish and styrene soluble binder.</p> <p>Continuous roving used in chopper gun for spray-up shall be Type E glass.</p> <p>Woven roving shall be Type E glass, nominal 24 ounces per square yard, 4 x 5 weave, with silane type finish.</p> <p>Continuous roving used for filament winding shall be Type E glass with a silane type finish, with a nominal yield of at least 110 strand yards per pound.</p>

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
	<p><u>Laminate:</u></p> <p>Laminate shall consist of an inner surface (corrosion barrier), an interior layer and an exterior layer.</p> <p>Laminate Quality: Meet requirements of the visual acceptance criteria in ASTM D2563 Level II including, but not limited to, the following:</p> <ol style="list-style-type: none"> 1. Appearance, defects, cut edges, and construction joints. <p>Reinforce inner surface with a resin-rich polyester surfacing veil of 10 mils to 20 mils thick.</p> <p>The resin content of the inner surface shall be a minimum of 80 percent by weight.</p> <p>Construct interior layer of resin reinforced with at least two plies of chopped strand mat. Thickness of interior layer shall be at least 100 mils, unless specifically specified.</p> <p>Glass content of combined inner surface and interior layer shall be 25 percent plus or minus 5 percent (70 percent to 80 percent resin by weight).</p> <p>The exterior or structural layer of pipe shall be filament wound. Filament winding shall be with continuous strand roving to provide a glass content of 50 percent to 80 percent.</p> <p>The exterior or structural layer of fittings and joints shall be contact-molded to provide a resin content of 70 percent to 80 percent.</p>
	<p><u>Cure:</u></p> <p>Both the corrosion barrier and structural wall of all material shall be cured using the resin manufacturer's currently recommended cure system.</p>
	<p><u>Post Curing:</u></p> <p>After fabrication and inspection, all material not meeting the resin manufacturer's recommended Barcol hardness shall be post cured with heat. Post curing shall use indirect heaters to avoid hot spots. Follow resin manufacturer's recommendations for post cure temperatures and times. Any material not meeting recommended Barcol hardness after post curing will be rejected.</p>

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
Inspection	<p>Inspection of all products fabricated to this Specification is required prior to shipment unless specifically waived in writing by Design Engineer. This shall include:</p> <ol style="list-style-type: none"> 1. Visual inspection to the requirements of ASTM D2563 Level II. 2. Barcol hardness measurements per ASTM D2583. 3. Acetone sensitivity test for all internal secondary bonds. 4. Glass content by ignition loss on three cutouts per ASTM D2584. <p>A clearance for shipment shall not relieve the Fabricator’s responsibility as to performance guarantees, quality of materials and workmanship and dimensional conformity with Drawings.</p> <p>Design Engineer will be permitted access to the plant area at all times during fabrication and shall be notified 1 week prior to the estimated date of fabrication.</p> <p>Repairs authorized by Design Engineer shall be reinspected before final acceptance unless specifically waived.</p> <p>Noncompliance with this section or evidence of poor workmanship shall be cause for rejection.</p> <p>Field Testing/Inspection: After final installation, each system shall be hydrostatically tested to detect any damage during shipment and installation.</p>

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
Fittings	<p>Fittings shall be fabricated by contact molding (hand lay-up) or filament winding. The precise sequence and number of layers shall be specified by the Design Engineer and detailed in the manufacturing specifications.</p> <p>All fittings, regardless of construction, shall have the same corrosion barrier as the adjoining pipe.</p> <p>Flanges shall be fabricated by hand lay-up construction with the flange being integral to the stub wall or layed up to prepared pipe sections.</p> <p>All joints required to assemble various fittings and pipe sections will be of the hand lay-up straight butt or tapered butt type.</p> <p>To minimize flow disturbances, construction of fittings shall be such that all internal intersecting surfaces are smooth, contoured, and without abrupt edges.</p> <p>Reducers will be concentric unless otherwise specified. Eccentric reducers may be required in certain locations such as pump suction connections. Taper shall be smooth and uniform. The maximum included angle of the taper will be 25 degrees.</p>
Flanges	<p>All flanges will be Vanstone or full flat face drilled type. The drilling pattern for 24 inch and smaller flanges shall follow ANSI B16.5 for 150-pound steel flanges. The drilling pattern for all flanges larger than 24 inch shall follow ANSI B16.1 for 125 lb. cast iron flanges.</p> <p>Flanged connections shall be sealed with a face sealing O-ring or flat gasket.</p> <p>Full flat face FRP drilled flanges must be bolted to full face companion flanges with full face gaskets. Mating flanges of raised face or Vanstone type must use hard spacers to provide full support of the FRP flange.</p>
Bolting	<p>Raised Face Flanges: Carbon steel, ASTM A307 Grade B square head bolts, ASTM A563 Grade A heavy hex head nuts and ASTM F436 hardened steel washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress.</p> <p>Flat Face Flanges: Stainless steel Type 316, ASTM A193/A193M, Grade B8M hex head bolts, ASTM A194/A194M Grade 8M hex head nuts and ASTM F436 Type 3 alloy washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress.</p>

SECTION 40 27 00.12 FIBERGLASS REINFORCED PLASTIC (FRP) PIPE AND FITTINGS	
Item	Description
Gaskets	<p>Flat-Face Flanges: Ethylene propylene rubber (EPR), 1/8 inch thick or as sized by Fabricator, full faced.</p> <p>Raised-Face Mating Flange: Ring gasket same material as full face, with filler gasket between OD of raised face and flange OD, thickness same as raised-face lip.</p> <p>Van Stone Mating Flange: Tetrafluoroethylene (TFE) envelope type, flat ring gasket.</p>
Color	Add pigment to the final layer only of exterior surfacing resin to lightly tint the surface, but not obliterate laminate quality. Colors is as follows: Blue.

END OF SECTION

SECTION 40 27 00.13 COPPER AND COPPER ALLOY PIPE, TUBING, AND FITTINGS	
Item	Description
General	Materials in contact with potable water shall conform to NSF 61 acceptance.
Pipe	Oxygen Service: Red brass, seamless, standard wall thickness, conforming to ASTM B43.
Tubing	Seamless, conforming to ASTM B88 as follows: Compressed air serviceType L, hard drawn
Fittings	ASTM B75 commercially pure wrought copper, socket joint, dimensions conforming to ASME B16.22.
Flanges	Class 150, ASTM B75 commercially pure wrought copper, socket joint, ASME B16.24 standard.
Bolting	ASTM A307, carbon steel, Grade A hex head bolts, ASTM A563 Grade A hex head nuts and ASTM F436/F436M hardened steel washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress.
Gaskets	1/16-inch-thick nonasbestos compression type, full face, Cranite, John Manville.
Solder	Joints 2-1/2 Inch and Smaller: Wire solder (95 percent tin), conforming to ASTM B32 Alloy Grade Sn95. Do not use cored solder. Joints Larger Than 2-1/2 Inch: Wire solder, melt range approximately 440 degrees F to 660 degrees F, conforming to ASTM B32 Alloy Grade HB or HN. Do not use cored solder.

END OF SECTION

SECTION 40 27 01
PROCESS PIPING SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals: Manufacturer's data on materials, construction, end connections, ratings, overall lengths, and live lengths (as applicable).
- B. Informational Submittals:
 - 1. Coupling Harness:
 - a. Details, ratings, calculations, and test reports for thrust restraints relying on welded bars or rings.
 - b. Weld procedure qualifications.
 - c. Load proof-testing report of prototype restraint for any size coupling.
- C. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide required piping specialty items, whether shown or not shown on Drawings, as required by applicable codes and standard industry practice.
- B. Rubber ring joints, mechanical joints, flexible couplings, and proprietary restrained ductile iron pipe joints are considered flexible joints; welded, screwed, and flanged pipe joints are not considered flexible.

2.02 CONNECTORS

- A. Elastomer Bellows Connector:
 - 1. Type: Fabricated spool, with single filled arch.
 - 2. Materials: Nitrile tube and wrap-applied neoprene cover.
 - 3. End Connections: Flanged, drilled 125-pound ASME B16.1 standard, with full elastomer face and steel retaining rings.
 - 4. Working Pressure Rating: 140 psig, minimum, at 180 degrees F for sizes 12 inches and smaller.
 - 5. Thrust Restraint: Control rods to limit travel of elongation and compression.

6. Manufacturers and Products:
 - a. Goodall Rubber Co.; Specification E-1462.
 - b. Garlock; Style 204.
 - c. Unisource Manufacturing, Inc.; Style 1501.
 - d. Proco Products, Inc.; Series 220.
 - e. Or approved equal.

- B. Closure Collar Concrete: As specified in Section 03 30 00, Cast-in-Place Concrete.

2.03 COUPLINGS

A. General:

1. Coupling linings for use in potable water systems shall be in conformance with NSF/ANSI 61.
2. Couplings shall be rated for working pressure not less than indicated in Piping Schedule for the service and not less than 150 psi.
3. Couplings shall be lined and coated with fusion-bonded epoxy in accordance with AWWA C213.
4. Unless thrust restraint is provided by other means, couplings shall be harnessed in accordance with requirements of AWWA Manual M11 or as shown on Drawings.
5. Sleeve type couplings shall conform to AWWA C219 and shall be hydraulically expanded beyond minimum yield for accurate sizing and proofing of tensile strength.

B. Flexible Sleeve Type Coupling:

1. Manufacturers and Products:
 - a. Steel Pipe:
 - 1) Dresser Piping Specialties; Style 38.
 - 2) Smith-Blair, Inc.; Style 411.
 - 3) Or approved equal.
 - b. Ductile Iron Pipe:
 - 1) Dresser Piping Specialties; Style 253.
 - 2) Smith-Blair, Inc.; Style 441.
 - 3) Or approved equal.

C. Transition Coupling for Steel Pipe:

1. Manufacturers and Products:
 - a. Dresser Piping Specialties; Style 162.
 - b. Smith-Blair, Inc.; Style 413.
 - c. Or approved equal.

D. Flanged Coupling Adapter:

1. Only allowed where shown on Drawings. Do not use on piping that needs to be restrained.
2. Manufacturers and Products:
 - a. Steel Pipe:
 - 1) Dresser Piping Specialties; Style 128.
 - 2) Smith-Blair, Inc.; Style 913.
 - 3) Or approved equal.
 - b. Ductile Iron Pipe:
 - 1) Dresser Piping Specialties; Style 128.
 - 2) Smith-Blair, Inc.; Style 912.
 - 3) Or approved equal.

E. Restrained Flange Adapter:

1. Pressure Rating:
 - a. Minimum Working Pressure Rating: Not less than 150 psi.
 - b. Safety Factor: Not less than two times working pressure and shall be supported by manufacturer's proof testing.
2. Thrust Restraint:
 - a. Provide hardened steel wedges that bear against and engage outer pipe surface, and allow articulation of pipe joint after assembly while wedges remain in their original setting position on pipe surface.
 - b. Products employing set screws that bear directly on pipe will not be acceptable.
3. Manufacturer and Product:
 - a. EBAA Iron Sales Co.; Mega-Flange.
 - b. Or approved equal.

F. Restrained Dismantling Joints:

1. Pressure Rating:
 - a. Minimum working pressure rating shall not be less than rating of the connecting flange.
 - b. Proof testing shall conform to requirements of AWWA C219 for bolted couplings.
2. Manufacturers and Products:
 - a. Dresser Piping Specialties; Style 131.
 - b. Smith Blair, Inc.; Model 975.
 - c. Or approved equal.

G. Exposed Metallic Piping Plain End Couplings:

1. Plain end pipe couplings shall be self-restrained against hydrostatic thrust forces equal to not less than two times the working pressure rating of the coupling. Couplings shall accommodate 4 degrees angular deflection at the time of installation and subsequent to pressurization.
2. Casing, bolts, and nuts shall be Type 304 or Type 316 stainless steel. The sealing sleeve shall be EPDM or NBR elastomer as best suited for the fluid service.
3. Couplings manufacturer and product shall be Straub Couplings, Grip-L or Metal Grip, or approved equal.

2.04 EXPANSION JOINTS

A. Elastomer Bellows:

1. Type: Reinforced molded wide arch.
2. End Connections: Flanged, drilled 125-pound ASME B16.1 standard, with split galvanized steel retaining rings.
3. Washers: Over retaining rings to help provide leak-proof joint under test pressure.
4. Thrust Protection: Control rods to protect the bellows from overextension.
5. Bellows Arch Lining: Buna-N, nitrile, or butyl.
6. Rated Temperature: 250 degrees F.
7. Rated Deflection and Pressure:
 - a. Lateral Deflection: 3/4 inch, minimum.
 - b. Burst Pressure: Four times the working pressure.
 - c. Compression deflection and minimum working pressure as follows:

Size (inch)	Deflection (inch)	Pressure (psig)
2-1/2 to 12	1.06	150
14	1.65	130
16 to 20	1.65	110

8. Manufacturers and Products:
 - a. General Rubber Corp.; Style 1015 Maxijoint.
 - b. Mercer; Flexmore Style 450.
 - c. Goodall Rubber Co.; Specification E-711.
 - d. Unisource Manufacturing, Inc.; Series 1500.

- e. Proco Products, Inc.; Series 251.
- f. Or approved equal.

2.05 SERVICE SADDLES

A. Double-Strap Iron:

- 1. Pressure Rating: Capable of withstanding 150 psi internal pressure without leakage or over stressing.
- 2. Run Diameter: Compatible with outside diameter of pipe on which saddle is installed.
- 3. Taps: Iron pipe threads.
- 4. Materials:
 - a. Body: Malleable or ductile iron.
 - b. Straps: Galvanized steel.
 - c. Hex Nuts and Washers: Steel.
 - d. Seal: Rubber.
- 5. Manufacturers and Products:
 - a. Smith-Blair; Series 313 or 366.
 - b. Dresser; Style 91.
 - c. Or approved equal.

B. Nylon-Coated Iron:

- 1. Pressure Rating: Capable of withstanding 150 psi internal pressure without leakage or over stressing.
- 2. Run Diameter: Compatible with outside diameter of pipe on which saddle is installed.
- 3. Materials:
 - a. Body: Nylon-coated iron.
 - b. Seal: Buna-N.
 - c. Clamps and Nuts: Stainless steel.
- 4. Manufacturer and Product:
 - a. Smith-Blair; Style 315 or 317.
 - b. Or approved equal.

2.06 PIPE SLEEVES

A. Modular Mechanical Seal:

- 1. Type: Interconnected synthetic rubber links shaped and sized to continuously fill annular space between pipe and wall sleeve opening.

2. Fabrication:
 - a. Assemble interconnected rubber links with ASTM A276, Type 316 stainless steel bolts and nuts.
 - b. Pressure plates shall be reinforced nylon polymer.
3. Size: According to manufacturer's instructions for size of pipes shown to provide a watertight seal between pipe and wall sleeve opening and to withstand a hydrostatic head of 40 feet of water.
4. Manufacturer:
 - a. Thunderline Corp., Link-Seal Division.
 - b. Or approved equal.

2.07 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

A. Ductile Iron Wall Pipe:

1. Diameter, Lining, and Ends: Same as connecting ductile iron pipe.
2. Thickness: Equal to or greater than remainder of pipe in line.
3. Fittings: In accordance with applicable Pipe Data Sheet.
4. Thrust Collars:
 - a. Rated for thrust load developed at 250 psi.
 - b. Safety Factor: 2, minimum.
 - c. Material and Construction: Ductile iron or cast iron, cast integral with wall pipe wherever possible, or thrust rated, welded attachment to wall pipe.
5. Manufacturers:
 - a. American Cast Iron Pipe Co.
 - b. U.S. Pipe and Foundry Co.
 - c. Or approved equal.

B. Steel Wall Pipe:

1. Same material and thickness as connecting pipe, except 1/4-inch minimum thickness.
2. Lining: Same as connecting pipe.
3. Thrust Collar:
 - a. Outside Diameter: Unless otherwise shown, 3 inches greater than outside diameter of wall pipe.
 - b. Continuously fillet welded on each side all around.

2.08 MISCELLANEOUS SPECIALTIES

A. Flow Equalization Basin Washdown Spray Nozzles:

1. Wall Mount Spray Nozzles:
 - a. Furnish 64 spray nozzles.

- b. Nozzles shall be designed to provide a wide angle flat spray pattern with medium impact and shall deliver approximately 74 gpm at 60 psi. At 60 psi, the nozzle shall produce a uniform spray distribution of approximately 135 degrees.
 - c. Nozzles shall be constructed of Type 316 stainless steel.
 - d. Nozzles shall be fabricated with male pipe thread inlet connections and each nozzle shall be furnished with a Type 316 stainless steel threaded adjustable ball fitting to facilitate positioning of the nozzle spray pattern.
 - e. Manufacturer and Product:
 - 1) Spraying Systems Company; Flood Jet Model 1K-316SS-300.
 - 2) Or approved equal.
2. Floor Mount Spray Nozzles:
- a. Furnish 88 spray nozzles.
 - b. Nozzles shall be designed to provide a wide angle flat spray pattern with high impact flat spray pattern and shall deliver approximately 57 gpm at 80 psi. At 80 psi, the nozzle shall produce a uniform spray distribution of approximately 52 degrees.
 - c. Nozzles shall be constructed of Type 316 stainless steel.
 - d. Nozzles shall be fabricated with male pipe thread inlet connections and each nozzle shall be furnished with a Type 316 stainless steel threaded adjustable ball fitting to facilitate positioning of the nozzle spray pattern.
 - e. Manufacturer and Product:
 - 1) Spraying Systems Company; Vee Jet Model 3/4H-U-316SS-50400.
 - 2) Or approved equal.
- B. Manways:
1. Manways shall meet ASME Code. Provide complete assemblies including side hinges, recessed cover gaskets, and 5/8-inch handle cam closures. Manways shall be rated for 20 psi normal operating pressure. Cover and collar material shall be stainless steel (per Section 40 27 00.09, Stainless Steel Pipe and Fittings Data Sheet), and gaskets shall be neoprene. Manways shall be installed in the field prior to testing.
 2. Manway shall be installed using a flanged connection.
 - a. Flange shall be forged, ASTM A182/A182M Grade F316/316L, ASME B16.5 Class 150, slip-on or welding neck, with a 1/16-inch raised face. Weld neck bore to match pipe internal diameter. Use weld neck flanges when abutting butt-weld fittings. Weld slip-on flanges inside and outside.

3. Manufacturer and Product:
 - a. West Coast Engineered Products Co.; Model 3039/10.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide accessibility to piping specialties for control and maintenance.

3.02 PIPING FLEXIBILITY PROVISIONS

- A. General:
 1. Thrust restraint shall be provided as specified in Section 40 27 00, Process Piping—General.
 2. Install flexible couplings to facilitate piping installation, in accordance with approved Shop Drawings.
- B. Flexible Joints at Concrete Backfill or Encasement: Install within 18 inches or one-half pipe diameter, whichever is less, from the termination of any concrete backfill or concrete encasement.
- C. Flexible Joints at Concrete Structures: Install as shown on Drawings.

3.03 PIPING TRANSITION

- A. Applications:
 1. Provide complete closure assembly where pipes meet other pipes or structures.
 2. Pressure Pipeline Closures: Plain end pieces with double flexible couplings, unless otherwise shown.
 3. Restrained Joint Pipe Closures: Install with thrust tie-rod assemblies as shown.
 4. Gravity Pipe Closures: As specified for pressure pipelines, or concrete closures.
 5. Concrete Closures: Use to make connections between dissimilar pipe where standard rubber gasketed joints or flexible couplings are impractical, as approved.
 6. Elastomer sleeves bonded to pipe ends are not acceptable.

B. Installation:

1. Flexible Transition Couplings: Install in accordance with coupling manufacturer's instructions to connect dissimilar pipe and pipes with a small difference in outside diameter.
2. Concrete Closures:
 - a. Locate away from structures so there are at least two flexible joints between closure and pipe entering structure.
 - b. Clean pipe surface before placing closure collars.
 - c. Wet nonmetallic pipe thoroughly prior to pouring collars.
 - d. Prevent concrete from entering pipe.
 - e. Extend collar a minimum of 12 inches on each side of joint with minimum thickness of 6 inches around outside diameter of pipe.
 - f. Make entire collar in one placement.
 - g. After concrete has reached initial set, cure by covering with well-moistened earth.

3.04 PIPING EXPANSION

- A. Piping Installation: Allow for thermal expansion due to differences between installation and operating temperatures.
- B. Expansion Joints:
 1. Grooved Joint and Flanged Piping Systems: Elastomer bellows expansion joint.
 2. Screwed and Soldered Piping Systems: Copper or galvanized and black steel pipe expansion compensator, as applicable.
 3. Pipe Run Offset: Flexible metal hose.
- C. Anchors: Install as specified in Section 40 05 15, Piping Support Systems, to withstand expansion joint thrust loads and to direct and control thermal expansion.

3.05 SERVICE SADDLES

- A. Ferrous Metal Piping (except stainless steel): Double-strap iron.
- B. Plastic Piping: Nylon-coated iron.

3.06 OUTLET/TAPPING SADDLE

- A. Install in accordance with manufacturer's written instructions.

3.07 COUPLINGS

A. General:

1. Install in accordance with manufacturer's written instructions.
2. Before coupling, clean pipe holdback area of oil, scale, rust, and dirt.
3. Do not remove pipe coating. If damaged, repair before joint is made.
4. Application:
 - a. Metallic Piping Systems: Flexible couplings, transition couplings, and flanged coupling adapters.
 - b. Concrete Encased Couplings: Flexible coupling.

3.08 FLEXIBLE PIPE CONNECTIONS TO EQUIPMENT

- A. Install to prevent piping from being supported by equipment, for vibration isolation, and where shown.
- B. Product Applications Unless Shown Otherwise:
 1. Copper Piping: Flexible metal hose connector.
 2. All Other Piping: Elastomer bellows connector.
- C. Limit Bolts and Control Rods: Tighten snug prior to applying pressure to system.

3.09 PIPE SLEEVES

A. Application:

1. As specified in Section 40 27 00, Process Piping—General.
2. Abovegrade in Nonsubmerged Areas: Hot-dip galvanized after fabrication.
3. Belowgrade or in Submerged or Damp Environments: Shop-lined and coated.
4. Alternatively, molded polyethylene pipe sleeve as specified may be applied.

B. Installation:

1. Support noninsulating type securely in formwork to prevent contact with reinforcing steel and tie-wires.
2. Caulk joint with specified sealant in nonsubmerged applications and seal belowgrade and submerged applications with wall penetration seal.

3.10 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

A. Applications:

1. Watertight and Belowground Penetrations:
 - a. Wall pipes with thrust collars.
 - b. Provide taps for stud bolts in flanges to be set flush with wall face.
2. Nonwatertight Penetrations: Pipe sleeves with seep ring.
3. Existing Walls: Rotary drilled holes.
4. Fire-Rated or Smoke-Rated Walls, Floors or Ceilings: Insulated and encased pipe sleeves.

B. Wall Pipe Installation:

1. Isolate embedded metallic piping from concrete reinforcement.
2. Support wall pipes securely by formwork to prevent contact with reinforcing steel and tie-wires.

END OF SECTION

SECTION 40 27 02
PROCESS VALVES AND OPERATORS

PART 1 GENERAL

1.01 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Product data sheets for each make and model. Indicate valve Type Number, applicable Tag Number, and facility name/number or service where used.
 - b. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
 - c. Power and control wiring diagrams, including terminals and numbers.
 - d. For each power actuator provided, manufacturer's standard data sheet, with application specific features and options clearly identified.
 - e. Sizing calculations for open-close/throttle and modulating valves.
 - f. Anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
2. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for:
 - a. Electric actuators; full compliance with AWWA C542.
 - b. Butterfly valves; full compliance with AWWA C504.
3. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
4. Tests and inspection data.
5. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
6. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

PART 2 PRODUCTS

2.01 GENERAL

- A. Valves to include operator, actuator, handwheel, chain wheel, extension stem, floor stand, operating nut, chain, wrench, and accessories to allow a complete operation from the intended operating level.
- B. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- C. Valve same size as adjoining pipe, unless otherwise called out on Drawings or in Supplements.
- D. Valve ends to suit adjacent piping.
- E. Resilient seated valves shall have no leakage (drip-tight) in either direction at valve rated design pressure. All other valves shall have no leakage (drip-tight) in either direction at valve rated design pressure, unless otherwise allowed for in this section or in stated valve standard.
- F. Size operators and actuators to operate valve for full range of pressures and velocities.
- G. Valve to open by turning counterclockwise, unless otherwise specified.
- H. Factory mount operator, actuator, and accessories.

2.02 SCHEDULE

- A. Additional requirements relative to this section are shown on Electric Motor Actuated Valve Schedule located at the end of this section.

2.03 FACTORY FINISHING

- A. General:
 - 1. Interior coatings for valves shall be in accordance with AWWA C550, unless otherwise specified.
 - 2. Exterior coating for valves shall be in accordance with Section 09 90 00, Painting and Coating.

2.04 VALVES

A. Gate Valves:

1. General:

- a. AWWA gate valves to be in full compliance with stated AWWA standard and the following requirements:
 - 1) Provide Affidavit of Compliance per the applicable AWWA standard for AWWA gate valves.
 - 2) Mark AWWA gate valves with manufacturer's name or mark, year of valve casting, valve size, and working water pressure.
 - 3) Repaired AWWA gate valves shall not be submitted or supplied.

2. Type V120 Gate Valve 3 Inches to 48 Inches for Water Service:

- a. AWWA C500, iron body, bronze mounted, flanged ends, double-disc gate, nonrising bronze stem, working water pressure of 150 psi.
- b. Manufacturers and Products:
 - 1) M&H Valve Company; Style 67.
 - 2) Clow Valve Company; AWWA C500.
 - 3) Or approved equal.

B. Globe Valve:

1. Type V204 Globe Valve 2 Inches and Smaller:

- a. All-bronze, NPT threaded ends, union bonnet, packed gland, inside screw, rising stem, replaceable stainless steel tapered plug type disc and seat ring, Class 300 rated 300 psi SWP/1,000 psi CWP, complies with MSS SP-80 Type 3.
- b. Manufacturers and Products:
 - 1) Crane; Figure 382P.
 - 2) Stockham; Figure B-74.
 - 3) Or approved equal.

C. Ball Valves:

1. Type V300 Ball Valve 3 Inches and Smaller for General Water and Air Service:

- a. Two-piece, standard port, NPT threaded ends, bronze body and end piece, hard chrome-plated solid bronze or brass ball, RTFE seats and packing, blowout-proof stem, adjustable packing gland, zinc-coated steel hand lever operator with vinyl grip, rated 600-pound WOG, 150-pound SWP, complies with MSS SP-110.

- b. Manufacturers and Products:
 - 1) Threaded:
 - a) Conbraco Apollo; 70-100.
 - b) Nibco; T-580-70.
 - c) Or approved equal.
 - 2) Soldered:
 - a) Conbraco Apollo; 70-200.
 - b) Nibco; S-580-70.
 - c) Or approved equal.
- 2. Type V302 Actuator Ready Ball Valve 2 Inches and Smaller for General Water and Air Service:
 - a. Two-piece, standard port, NPT threaded ends, bronze body and end piece, actuator mounting pad, Type 316 stainless steel ball and stem, vented ball, reinforced PTFE seats and seals, adjustable packing nut, blowout-proof stem, rated 600-pound WOG, 150-pound SWP, complies with MSS SP-110.
 - b. Manufacturers and Products:
 - 1) Conbraco Apollo; 71-140.
 - 2) Milwaukee; 20BSOR-02.
 - 3) Or approved equal.
- 3. Type V306 Stainless Steel Ball Valve 2 Inches and Smaller:
 - a. Two-piece, full port, ASTM A276 GR 316 or ASTM A351/A351M GR CF8M stainless steel body and end piece, NPT threaded ends, ASTM A276 Type 316 stainless steel ball, reinforced PTFE seats, seals, and packing, adjustable packing gland, blowout proof stainless steel stem, stainless steel lever operator with vinyl grip, rated 1,000 psig CWP, complies with MSS SP-110.
 - b. Manufacturers and Products:
 - 1) Conbraco Apollo; 76F-100 Series.
 - 2) Nibco; T-585-S6-R-66-LL.
 - 3) Or approved equal.
- 4. Type V330 PVC Ball Valve 2 Inches and Smaller:
 - a. Rated 150 psi at 73 degrees F, with ASTM D1784, Type I, Grade 1 polyvinyl chloride body, ball, and stem, end entry, double union design, solvent-weld socket ends, elastomer seat, Viton or Teflon O-ring stem seals, to block flow in both directions.
 - b. Manufacturers and Products:
 - 1) Nibco; Chemtrol Tru-Bloc.
 - 2) ASAHI/America; Type 21.
 - 3) Spears; True Union.
 - 4) Or approved equal.

D. Plug Valves:

1. Type V405 Eccentric Plug Valve 3 Inches to 12 Inches:
 - a. Nonlubricated type rated 175 psig CWP, drip-tight shutoff with pressure from either direction, cast-iron body, exposed service flanged ends per ASME B16.1.
 - b. Plug cast iron with round or rectangular port of no less than 80 percent of connecting pipe area and coated with Buna-N, seats welded nickel, stem bearings lubricated stainless steel or bronze, stem seal multiple V-rings, or U-cups with O-rings of nitrile rubber, grit seals on both upper and lower bearings.
 - c. Operators:
 - 1) 6-Inch to 12-Inch Valves: Totally enclosed, geared, manual operator with handwheel, 2-inch nut or chain wheel. Size operator for 1.5 times maximum operating shutoff pressure differential for direct and reverse pressure, whichever is higher. For buried service, provide completely sealed operator filled with heavy lubricant and 2-inch nut.
 - d. Manufacturers and Products:
 - 1) Pratt; Ballcentric.
 - 2) DeZurik; Style PEC.
 - 3) Milliken; Millcentric Series 600.
 - 4) Or approved equal.

E. Butterfly Valves:

1. General:
 - a. In full compliance with AWWA C504 and following requirements:
 - 1) Suitable for throttling operations and infrequent operation after periods of inactivity.
 - 2) Elastomer seats which are bonded or vulcanized to the body shall have adhesive integrity of bond between seat and body assured by testing, with minimum 75-pound pull in accordance with ASTM D429, Method B.
 - 3) Bubble-tight with rated pressure applied from either side. Test valves with pressure applied in both directions.
 - 4) No travel stops for disc on interior of body.
 - 5) Self-adjusting V-type or O-ring shaft seals.
 - 6) Isolate metal-to-metal thrust bearing surfaces from flowstream.
 - 7) Provide traveling nut or worm gear actuator with handwheel. Valve actuators to meet the requirements of AWWA C504.

- 8) Provide linings and coatings per AWWA, unless otherwise indicated on Drawings or specified herein.
 - b. Non-AWWA butterfly valves to meet the following actuator requirements:
 - 1) For above ground installations, provide handle and notch plate for valves 6 inches and smaller and heavy-duty, totally enclosed gearbox type operators with handwheel, position indicator and travel stops for valves 8 inches and larger, unless otherwise indicated on Drawings or specified herein.
 2. Type V500 Butterfly Valve Water Works Service 3 Inches to 72 Inches:
 - a. AWWA C504, Class 150B.
 - b. Short body type, flanged ends.
 - c. Cast-iron body, cast or ductile iron disc, Type 304 stainless steel shafts, Buna-N rubber seat bonded or molded in body only, and stainless steel seating surface.
 - d. Provide epoxy lining and coating in compliance with AWWA C550.
 - e. Manufacturers and Products:
 - 1) Pratt; Model 2FII or Triton XR-70.
 - 2) DeZurik; AWWA Valve.
 - 3) Or approved equal.
- F. Self-Regulated Automatic Valves:
1. Type V744 Air Release Valve 1/2 Inch to 2 Inches:
 - a. Suitable for water service, automatically exhaust small amounts of entrained air that accumulates in a system. In CLOSED position, seat against resilient seat to prevent water leakage.
 - b. Rated 150 psi working pressure, cast-iron or ductile iron body and cover, stainless steel float and trim, NPT threaded inlet and outlet, built and tested to AWWA C512. Operating pressure is 80 psi.
 - c. Manufacturers and Products:
 - 1) APCO Valve and Primer Corp.; Series 50, 200, and 200A.
 - 2) Val-Matic Valve; Series 15A to 45.6.
 - 3) Or approved equal.
 2. Type V780 Pressure Relief and Vacuum Valve 8 Inches:
 - a. Construction: Valve shall be of FRP construction throughout. The valve shall be initially set to relieve at 1-inch water column.
 - b. Performance: When opening on pressure, the valve shall have a minimum capacity of 170,000 scfh at a maximum 6-inch WC above the relief setting. When opening on vacuum, the valve shall have a minimum capacity of 60,000 scfh at 2 inches water column below the vacuum relief setting.

- c. Manufacturer's and Products:
 - 1) APCO; A70074.
 - 2) Varec; Figure 2010.
 - 3) Protectoseal; Series 8548.
 - 4) Or approved equal.

2.05 OPERATORS AND ACTUATORS

A. Manual Operators:

- 1. General:
 - a. For AWWA valves, operator force not to exceed requirements of applicable valve standard. Provide gear reduction operator when force exceeds requirements.
 - b. For non-AWWA valves, operator force not to exceed applicable industry standard or 80 pounds, whichever is less, under operating condition, including initial breakaway. Provide gear reduction operator when force exceeds requirements.
 - c. Operator self-locking type or equipped with self-locking device.
 - d. Position indicator on quarter-turn valves.
 - e. Worm and gear operators one-piece design, worm-gears of gear bronze material. Worm of hardened alloy steel with thread ground and polished. Traveling nut type operator's threaded steel reach rod with internally threaded bronze or ductile iron nut.
- 2. Exposed Operator:
 - a. Galvanized and painted handwheel.
 - b. Cranks on gear type operator.
 - c. Chain wheel operator with tieback, extension stem, floor stand, and other accessories to permit operation from normal operation level.
 - d. Valve handles to take a padlock, and wheels a chain and padlock.

B. Electric Motor Actuators, 480 Volts:

- 1. General:
 - a. Comply with latest version of AWWA C542.
 - b. Size to 1-1/2 times required operating torque. Motor stall torque not to exceed torque capacity of valve.
 - c. Controls integral with actuator and fully equipped as specified in AWWA C542.
 - d. Stem protection for rising stem valves.
- 2. Actuator Operation—General:
 - a. Suitable for full 90-degree rotation of quarter-turn valves or for use on multiturn valves, as applicable.
 - b. Manual override handwheel.

- c. Valve position indication.
 - d. Operate from FULL CLOSED to FULL OPEN positions or the reverse in the number of seconds given in Electric Actuated Valve Schedule.
 - e. Integral, padlockable electrical disconnect switch.
 - f. Nonintrusive Electronic Control: Local controls, diagnostics, and calibration, including limit and torque settings, shall be accomplished nonintrusively. Electronic valve position display with capability to show continuous torque output. If applicable, provide two hand-held configuration units for every ten actuators provided, two minimum.
3. Open-Close(O/C)/Throttling(T) Service:
- a. Size motors for one complete OPEN-CLOSE-OPEN cycle no less than once every 10 minutes.
 - b. Actuator suitable for throttling operation of valve at intermediate positions.
 - c. LOCAL-OFF-REMOTE Selector Switch, padlockable in each position:
 - 1) Integral OPEN-STOP-CLOSE momentary pushbuttons with seal-in circuits to control valve in LOCAL position.
 - 2) Remote OPEN-STOP-CLOSE momentary control dry contact inputs in REMOTE position. Integral seal-in circuits for remote OPEN and CLOSE commands; valve travel stops when remote STOP contact opens.
 - 3) Auxiliary contact that closes in REMOTE position.
 - d. OPEN and CLOSED indicating lights.
 - e. Integral reversing motor starter with built-in overload protection.
4. Limit Switch:
- a. Single-pole, double-throw (SPDT) type, field adjustable, with contacts rated for 5 amps at 120V ac.
 - b. Each valve actuator to have a minimum of two auxiliary transfer contacts at end position, one for valve FULL OPEN and one for valve FULL CLOSED.
 - c. Housed in actuator control enclosure.
5. Control Features: Electric motor actuators with features as noted above, and as modified/supplemented in Electric Actuated Valve Schedule.
6. Manufacturers and Products:
- a. Rotork Controls; Models IQ and IQT.
 - b. AUMA.
 - c. Or approved equal.

2.06 ACCESSORIES

- A. Tagging: 1-1/2-inch diameter heavy brass or stainless steel tag attached with No. 16 solid brass or stainless steel jack chain for each valve operator, bearing valve tag number shown on Electric Actuated Valve Schedule.
- B. Limit Switch:
 - 1. Factory installed NEMA 4X limit switch by actuator manufacturer.
 - 2. SPST, rated at 5 amps, 120V ac.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Flange Ends:
 - 1. Flanged valve bolt holes shall straddle vertical centerline of pipe.
 - 2. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.
- B. Valve Installation and Orientation:
 - 1. General:
 - a. Install valves so handles operate from fully open to fully closed without encountering obstructions.
 - b. Install valves in location for easy access for routine operation and maintenance.
 - c. Install valves per manufacturer's recommendations.
 - 2. Gate Valves:
 - a. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished floor, unless otherwise shown.
 - b. Install operating stem horizontal in horizontal runs of pipe having centerline elevations greater than 4 feet 6 inches above finish floor, unless otherwise shown.
 - 3. Eccentric Plug Valves:
 - a. Unless otherwise restricted or shown on Drawings, install valve as follows:
 - 1) Liquids with suspended solids service with horizontal flow: Install valve with stem in horizontal position with plug up when valve is open. Install valve with seat end upstream (flow to produce unseating pressure).
 - 2) Liquids with suspended solids service with vertical flow: Install valve with seat in highest portion of valve (seat up).

4. Butterfly Valves:
 - a. Unless otherwise restricted or shown on Drawings, install valve a minimum of 8 diameters downstream of a horizontal elbow or branch tee with shaft in horizontal position.
 - b. For vertical elbow or branch tee immediately upstream of valve, install valve with shaft in vertical position.
 - c. For horizontal elbow or branch tee immediately upstream of valve, install valve with shaft in horizontal position.
 - d. When installed immediately downstream of swing check, install valve with shaft perpendicular to swing check shaft.
 - e. For free inlet or discharge into basins and tanks, install valve with shaft in vertical position.

C. Locate valve to provide accessibility for control and maintenance.

3.02 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly under operating pressure conditions. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
- C. Inspect pressure and vacuum valves as basin is being filled to verify venting and seating is fully functional.
- D. Count and record number of turns to open and close valve; account for discrepancies with manufacturer's data.
- E. Set, verify, and record set pressures for relief and regulating valves.
- F. Automatic valves to be tested in conjunction with control system testing. Set opening and closing speeds, limit switches, as required or recommended by Design Engineer.

3.03 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is part of this Specification.
 1. Electric Actuated Valve Schedule.

END OF SECTION

ELECTRIC ACTUATED VALVE SCHEDULE									
Tag Number	Valve Type	Actuator Power Supply	Valve Size (inches)	Process Fluid	Maximum Operating Flow (gpm)	Maximum ΔP (psi)	Service	Travel Time (Seconds)	Control Feature Modifications/Supplements
12FV542	V120	480-volt, 3-ph	42	PEF	21,000	30	O/C		C
12FV552	V405	480-volt, 3-ph	10	PD	6,700	25	O/C		C
12V543	V500	480-volt, 3-ph	8	UWHP	1,800	100	O/C	>=45	C
12V544	V500	480-volt, 3-ph	8	UWHP	1,800	100	O/C	>=45	C
12V545	V500	480-volt, 3-ph	8	UWHP	1,800	100	O/C	>=45	C
12V546	V500	480-volt, 3-ph	8	UWHP	1,800	100	O/C	>=45	C
12V547	V500	480-volt, 3-ph	10	UWHP	1,800	100	O/C	>=45	C
12V548	V500	480-volt, 3-ph	10	UWHP	1,800	100	O/C	>=45	C
12V549	V500	480-volt, 3-ph	10	UWHP	1,800	100	O/C	>=45	C
12V550	V500	480-volt, 3-ph	10	UWHP	1,800	100	O/C	>=45	C

ELECTRIC ACTUATED VALVE SCHEDULE									
Tag Number	Valve Type	Actuator Power Supply	Valve Size (inches)	Process Fluid	Maximum Operating Flow (gpm)	Maximum ΔP (psi)	Service	Travel Time (Seconds)	Control Feature Modifications/Supplements
<p>Service: O/C = Open-Close, T = Throttling, M = Modulating</p> <p>Control Feature Modifications/Supplements:</p> <p>A = Actuator shall open valve upon loss of signal.</p> <p>B = Actuator shall close valve upon loss of signal.</p> <p>C = Actuator shall remain in last position upon loss of signal.</p> <p>D = Local OPEN-CLOSE momentary pushbuttons that must be continuously depressed to initiate/maintain valve travel; travel stops when pushbutton is released or when end of travel limit is reached.</p> <p>E = Remote OPEN-CLOSE maintained dry contacts; travel stops when remote contact opens, or when end of travel limit is reached.</p> <p>F = Three 24V dc interposing relays for remote OPEN-STOP-CLOSE control. Relays powered externally, thereby permitting valve control from greater distances.</p> <p>G = Motor and control enclosure(s) NEMA 250, Type 4 with 120-volt space heaters.</p> <p>H = Motor and control enclosure(s) NEMA 250, Type 6 (IP 68) with 120-volt space heaters.</p> <p>I = Motor and control enclosure(s) NEMA 250, Type 7 with 120-volt space heaters.</p> <p>J = Valve position output converter that generates isolated 4 mA to 20 mA dc signal in proportion to valve position, and is capable of driving into loads of up to 500 ohms at 24V dc.</p> <p>K = 120-volt secondary control power transformer.</p> <p>L = Externally operable power disconnect switch.</p>									

SECTION 40 80 01
PROCESS PIPING LEAKAGE TESTING

PART 1 GENERAL

1.01 SUBMITTALS

A. Action Submittals:

1. Testing Plan:

- a. Submit prior to testing and include at least the information that follows.
 - 1) Testing dates.
 - 2) Piping systems and section(s) to be tested.
 - 3) Test type.
 - 4) Method of isolation from existing piping and equipment.
 - 5) Method of isolation from instrumentation and other items not to be tested.
 - 6) Method to remove all air from piping prior to testing.
 - 7) Method of removing air from all high points.
 - 8) Method of filling and removing water.

B. Informational Submittals:

1. Certifications of Calibration: Testing equipment.
2. Certified Test Report.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Notify Construction Manager in writing 5 days in advance of testing. Perform testing in presence of Construction Manager.

B. Pressure Piping:

1. Install temporary thrust blocking or other restraint as necessary to protect adjacent piping or equipment and make taps in piping prior to testing.
2. Wait 5 days minimum after concrete thrust blocking is installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.

3. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
 4. New Piping Connected to Existing Piping:
 - a. Isolate new piping with grooved-end pipe caps, spectacle blinds, blind flanges, or as acceptable to Design Engineer.
 - b. Test joint between new piping and existing piping by methods that do not place entire existing system under test load, as approved by Construction Manager and Design Engineer.
 5. Test Pressure: As indicated in Piping Schedule as shown on Drawings.
- C. Test section may be filled with water and allowed to stand under low pressure prior to testing.
- D. Gravity Piping:
1. Perform testing after service connections, manholes, and backfilling have been completed between stations to be tested.
 2. Determine groundwater level at time of testing by exploratory holes or other method acceptable to Construction Manager.

3.02 HYDROSTATIC TEST FOR PRESSURE PIPING

- A. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.
- B. Exposed Piping:
1. Perform testing on installed piping prior to application of insulation.
 2. Maximum Filling Velocity: 0.25 foot per second, applied over full area of pipe.
 3. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.
 4. Maintain hydrostatic test pressure continuously for 60 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.
 5. Examine joints and connections for leakage.
 6. Maximum Allowable Leakage: Zero pressure drop.
 7. Correct visible leakage and retest as specified.
 8. Empty pipe of water prior to final cleaning or disinfection unless otherwise instructed by Construction Manager.
- C. Buried Piping:
1. Test after backfilling has been completed.
 2. Expel air from piping system during filling.

3. Apply and maintain specified test pressure with hydraulic force pump. Valve off piping system when test pressure is reached.
4. Maintain hydrostatic test pressure continuously for 2 hours minimum, reopening isolation valve only as necessary to restore test pressure.
5. Maximum Allowable Leakage: Zero pressure drop.
6. Correct leakage, and retest as specified.

3.03 PNEUMATIC TEST FOR PRESSURE PIPING

- A. Perform only on service air and landfill gas piping.
- B. Fluid: Oil-free, dry air.
- C. Procedure:
 1. For buried piping, perform testing prior to backfill.
 2. Apply preliminary pneumatic test pressure of maximum 25 psig to service air and maximum 5 psig to landfill gas piping system prior to final leak testing, to locate visible leaks. Apply soap bubble mixture to joints and connections; examine for leakage.
 3. Correct visible leaks and repeat preliminary test until visible leaks are corrected.
 4. For Service Air piping, gradually increase pressure in system to half of specified test pressure. Thereafter, increase pressure in steps of approximately one-tenth of specified test pressure until required test pressure is reached.
 5. Maintain pneumatic test pressure continuously for minimum of 10 minutes and for such additional time as necessary to conduct soap bubble examination for leakage.
 6. Correct visible leakage and retest as specified.
- D. Allowable Leakage: Piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of leakage.

3.04 FIELD QUALITY CONTROL

- A. Test Report Documentation:
 1. Test date.
 2. Description and identification of piping tested.
 3. Test fluid.
 4. Test pressure.
 5. Remarks, including:
 - a. Leaks (type, location).
 - b. Repair/replacement performed to remedy excessive leakage.

6. Signed by Contractor and Construction Manager to represent that test has been satisfactorily completed.

END OF SECTION

**SECTION 40 90 00
INSTRUMENTATION AND CONTROL**

PART 1 GENERAL

1.01 WORK OF THIS SECTION

- A. The Work of the following Divisions and sections applies to the Work of this section. Other sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 01 33 00, Submittal Procedures.
 - 2. Division 26, Electrical.
 - 3. Division 40, Process Interconnections.
- B. The Work of this section includes the general specification and requirements for the Instrumentation and Control (I&C) Work under this, and other applicable Specifications, including providing instrumentation and all related wiring as shown in these Contract Documents and Drawings.
- C. The Contractor shall be responsible for the design, procurement, installation, testing, training, and documentation for I&C systems provided under this Contract in accordance with this section. An existing Distributed Control System (DCS), will be upgraded by the City's DCS provider, Emerson Process Management (EPM). The Contractor shall be responsible for terminating and integrating all I&C equipment with the EPM DCS systems.

1.02 SCOPE

- A. The intent of this section is that the Contractor will provide a complete and operational, turn-key, integrated I&C system, including all instrumentation and equipment as shown on Drawings and as specified herein.
- B. The Contractor shall furnish all materials, tools, equipment, consumables and supplies and shall perform all labor required to complete the Work in this section.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in the section:
 - 1. American National Standards Institute (ANSI):
 - a. ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.
 - b. ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

- c. ANSI/AWWA C207, Steel Pipe Flanges for Waterworks Service - Sizes 4 In Through 144 In.
 - d. ANSI/AWWA C701, Cold-Water Meters - Turbine Type for Customer Service.
 - e. ANSI/AWWA C702, Cold-Water Meters - Compound Type.
 - f. ANSI/AWWA, Ductile-Iron and Gray-Iron Fittings, 3-In Through C110/A21.10 48-In for Water and Other Liquids.
 2. American Petroleum Institute (API): API RP-550, Manual on Installation of Refinery Instruments and Control Systems, Part 1 - Process Instrumentation and Control Sections 1 through 13.
 3. American Society of Mechanical Engineers (ASME): ASME Report Fluid Meters, Sixth Edition, 1971.
 4. American Water Works Association (AWWA): AWWA C704, Cold-Water Meters - Propeller Type for Main Line Applications.
 5. ASTM International (ASTM):
 - a. ASTM A105, Specification for Forgings, Carbon Steel for Piping Components.
 - b. ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - c. ASTM A193, Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
 - d. ASTM A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service.
 - e. ASTM A283, Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars.
 - f. ASTM A312, Stainless Steel Piping.
 - g. ASTM B61, Specification for Steam or Valve Bronze Castings.
 6. International Society of Automation (ISA):
 - a. ISA-RP60.6, Nameplates, Labels, and Tags for Control Centers.
 - b. ISA-RP7.1, Pneumatic Control Circuit Pressure Test.
 - c. ISA-RP12.6, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations.
 - d. ISA-S5.1, Instrument Symbols and Identification.
 - e. ISA-S5.4, Instrument Loop Diagrams.
 - f. ISA-S12.4, Instrument Purging for Reduction of Hazardous Area Classification.
 - g. ISA-S20, Specification Forms for Process Measurement and Control Instrumentation; Primary Elements and Control Valves.
- B. Work of this section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:
1. Uniform Fire Code.
 2. National Electrical Code.
 3. National Fire Protection Association: NFPA 70.

- C. UL: All I&C and instrument equipment furnished in this section shall be listed by and shall bear the label of UL or of an independent testing laboratory acceptable to the City of San Diego (City).
- D. No exposed voltage that would require PPE or work permits will be allowed.

1.04 SUBMITTALS

A. General:

1. All submittals shall be provided in accordance with Section 01 33 00, Submittal Procedures, as a minimum, and in accordance with specialty submittal requirements below.
2. All submittal of this section shall be provided with six hard copy and one soft copy [CD].
3. Submittals of this section shall be in Adobe Acrobat PDF format, unless otherwise specified. Vendor and Contractor shop drawings developed under this section shall be in Bentley Microstation (.dgn) format, utilizing monochrome.
 - a. Documents not available in electronic format shall be scanned at 600 dpi, black and white for documents without graphics, or color for documents with graphics and converted to Adobe Acrobat (PDF).
4. Operations and Maintenance (O&M) Submittal Requirements of this Section:
 - a. Preliminary Submittal: Where required by Specification, two hard copies and one PDF of the preliminary submittals shall be provided to the City's representative for review.
 - b. Final Submittal: All Submittal documents in this section, including design and O&M documents, shall be provided on two CDs; one CD shall provide documents in native format (e.g., Microstation, MS Word, MS Excel, etc.), and the other CD shall provide documents in PDF format. Both CDs shall use the same file naming convention, except that the suffixes shall be different (e.g., PDF, XLS, etc.).
 - c. Each document shall be indexed and a database table in Excel shall be provided, which includes the following data for each document:
 - 1) Document file name.
 - 2) Document description.
 - 3) Hard Copy Catalog No. (used by facility document coordinator).

- 4) Document Type:
 - a) Shop Drawings:
 - (1) P&IDs.
 - (2) Loop Drawings.
 - (3) Instrument Data Sheets.
 - (4) Other.
 - b) Manufacturer's data.
 - c) Maintenance instructions.
 - d) Training.
- 5) Facility Name.
- 6) Specification Number.
- 7) Process Name.
- 8) Unit Process Number.

B. Informational Submittals:

1. Submittal List: The Contractor shall develop and deliver a detailed list of all submittals required by the Specification, as well as all additional Submittal envisions. This should be inclusive of Instruments and I&C hardware, software, reports, plans, status of schedules, testing documents and relevant maintenance documentation and forms.
2. Shop Drawings: The Contractor shall submit a sample of each 'type' of Shop Drawing that the Contractor anticipates for the Project.
3. Loop Drawings: The Contractor shall submit a sample for each 'type', Analog, Discrete and Foreign Device Interface (Data link), Loop Drawings.
 - a. The Sample Loop Drawings will utilize a City Standard format which will be provided to the Contractor after Contract NTP. The loop drawing and DCS standards are available on the City's website under the Clean Water Operations Management Network (COMNET) Project Standards and Procedures Manual webpage. The purpose of this is to prove that the Contractor understands the various steps necessary to deliver a final, as-constructed, set of Loop Drawings to the City.

C. Action Submittals:

1. General: The Contractor shall be responsible for providing instrument and I&C Submittals to be used in the generation of control-panel wiring diagrams and Loop Drawings which depict the interconnection between instruments, panels, valve actuators, MCCs, and the DCS.

2. Shop Drawings:
 - a. Preliminary Shop Drawings shall be submitted as a single package at one time not later than 90 days after NTP.
 - b. All systems, meters, instruments, and other elements shall be represented by symbology derived from the latest version of ANSI/ISA S5.1 and in accordance with Contract Documents and Drawings. The ISA nomenclature and numbers indicated herein shall be used exclusively in all Shop Drawings. No manufacturer's standard symbology or nomenclature shall replace those indicated in Contract Documents.
 - c. During Shop Drawing development, the Contractor shall maintain a direct, informal liaison with the City's Representative, for exchange of technical information. As a result, certain minor refinements and revisions to the indicated systems may be authorized informally by the City's Representative. However, these shall not alter the Work of this section and shall not cause increase or decrease in the Contract Price. No statement or direction by the City's Representative shall be construed as approval of any component or method, or exception to, or deviation from these Contract Documents.
 - d. All Shop Drawings shall include the letterhead or title block of the Contractor. The title block shall include, as a minimum, the Contractor registered business name and address, project name, drawing name, revision level, and personnel responsible for drawing development and the name of the QA/QC reviewer.
 - 1) Shop drawing copies shall be submitted as standard size 3-ring, loose-leaf, vinyl plastic binders suitable for bookshelf storage.
 - 2) A complete index shall be placed at the front of each binder. All sections indexed shall be separated by Alpha-Numeric Tabs that match the index.
 - 3) A separate technical brochure or bulletin shall be included for each instrument, meter system, and other element. The brochures shall be indexed by systems or loops. If, within a single system or loop, a single item is employed more than once, one brochure may cover all identical uses of that item in the system. Each brochure shall include a list of tag numbers to which it applies. System groups shall be separated by labeled tags.
3. Loop Drawings:
 - a. Contractor is responsible for the overall development, coordination efforts, and final delivery of Loop Drawings. Special requirements are outlined below.

- b. Loop Diagrams: Loop diagrams shall be submitted in accordance with Section 01 33 00, Submittal Procedures, and the special requirements of this section. All Loop Drawings will conform to ISA 5.4 to verify DCS interface with all instrumentation and devices provided or installed under the Project. The loop diagrams shall also define all interfaces with equipment provided by skid-mounted for foreign device interfaces.
- c. Loop Drawings shall be developed utilizing a three-sheet format. A sample of the City's Standard three-sheet format will be provided to the Contractor after NTP. The following three-sheet format is required:
 - 1) Sheet 1:
 - a) Provide a device schedule developed from an electronic spreadsheet or database file, which will be submitted with the loop diagrams. The table will show the following:
 - (1) Device tag number, with Prefix, Unit Process, ISA Tag Prefix, Tag No. (a three or four-digit number based on the loop number) and Tag suffix.
 - (2) Equipment Service.
 - (3) Device Type.
 - (4) Location.
 - (5) Device Manufacturer.
 - (6) Model No.
 - (7) Spec. No.
 - (8) Area Contractor (if applicable).
 - (9) Submittal No.
 - (10) Calibrated Range/Remarks.
 - (11) Data Sheet No.
 - (12) I/O Signal type (AI, AO, DI, or DO).
 - (13) Signal Level.
 - (14) Device Range (full available instrument range).
 - (15) Engineering Units.
 - (16) Process Set Point.
 - (17) Loop Diagram No., reflecting the field instrument tag number.
 - (18) Loop Drawing File Name.
 - (19) Interconnect Drawing File Name.
 - 2) Sheet 2: Loop Drawing meeting the Requirements of ANSI/ISA S5.4, except that intermediate terminal junction boxes may be omitted, and shall be shown on Page 3 for clarity. Butt splices and wire nuts shall be shown on as-builts, with the corresponding termination housing (JB,

- LB, etc.) shown on Sheet 3. Datalinks, third-party I/O, and bus connections shall also be shown.
- 3) Sheet 3: (Expansion sheet - required if the number of intermediate devices or terminal junction boxes exceeds what can be legibly shown on Sheet 2). Abbreviated diagram showing instrument, wire and cable numbers, intermediate terminal junction boxes, and PCM terminations. Wire identification numbers will reflect the field instrument tag number, and not the DCS I/O number.
 - 4) DCS I/O tag numbers will generally reflect the device tag number. Each I/O tag number will be unique. The tag prefix will be based on ISA-5.4, with the following additional special acronyms:

Acronym	Signal Use
YL	Ready Signals/ Status
ZL	In Computer status
ZSO	Device Open
ZSC	Device Closed
YL	Motor Run
HS	Equipment Start/Stop

- d. The Contractor in concert with his I&C subcontractor shall be responsible for the development of all Loop Drawings, in the format specified.
- e. Contractor shall ensure that all ‘as constructed’ information (such as I/O wiring being re-addressed at the DCS) has been incorporated onto finalized Loop Drawings.
- f. The Contractor shall deliver the finalized loop drawings to the project Design Engineer. The Design Engineer is responsible for Quality Assurance/Quality Control of the final Loop Drawings, and shall check all Loop Drawings against design P&IDs, electrical design, and Contractor’s field as-constructed drawings. Contractor is responsible for all coordination with the Design Engineers and shall incorporate all changes and corrections required by the Design Engineer.
- g. Contractor shall prepare and deliver all loop drawing packages in accordance with these Specifications. Note: All Loop Drawings shall be submitted to the City’s representative, prior to the start of any DCS cutover.

- b. Piping and wiring diagrams shall show terminal assignments from all primary measurement devices, such as flow meters, and to all final control devices, such as pumps, valves, chemical feeders and local control panels. Wiring diagrams shall include MCC Panel, circuit, and breaker number for each power feed.
- c. Assembly and construction drawings for each Panel and Local Control Panel type. These drawings shall include dimensions, identification of all components, surface preparation and finish data, and nameplates. These drawings also shall include enough other details, including prototype photographs, to define exactly the style and overall appearance of the assembly; a finish treatment sample shall be included.
- d. Installation, mounting, and anchoring details for all components and assemblies to be field-mounted, including conduit connection or entry details. Where applicable and required by Code, Contractor shall include seismic calculations for the panel assembly and mounting, which shall be stamped by a California registered structural engineer.
- e. Complete control panel layouts, all drawn to a 1-1/2 inch equals 1 foot scale showing.
 - 1) Physical arrangements which define and quantify the physical groupings of annunciators, hand-stations, recorders, indicators, pilot lights, and all other instrumentation devices associated with control panel sections, auxiliary panels, subpanels, and racks.
 - 2) All cutout locations fully dimensioned. All outside panel dimensions shall be shown.
 - 3) Locations of back-of-panel stiffeners.
 - 4) Terminal point locations for all panel and back-of-panel piping and wiring connections. Terminations shall be coded with identifiers for wiring and piping connections for all electric, hydraulic, and pneumatic terminations.
- f. Contractor shall submit a complete nameplate engraving list, annotating the size of each engraved plate, the material, font size, color, and attaching methodology. Note: Adhesive-backed mount is to be avoided, except in those cases where screw mounting is not possible.
- g. A complete and detailed bill of material list shall be submitted for each field mounted device or assembly as well as cabinet assemblies and subassemblies. Bills of material shall include all items within an enclosure. An incomplete submittal shall be rejected and no further evaluation performed until a complete and detailed bill of material is submitted.

1.05 OWNER'S MANUAL

- A. The Owner's Manual shall be submitted in both paper and electronic format. Electronic format shall conform to the Electronic Document Submittal Requirements for Shop Drawings.
- B. Information included in the Owner's Manual shall comply with the requirements of Section 01 33 00, Submittal Procedures, with the following exceptions:
 - 1. Two copies of the Owner's Manual shall be submitted after acceptance of all submittals. One set will be returned to the Contractor with comments.
 - 2. Final copies of the Owner's Manual, after revision, shall be submitted to the City's representative 15 days prior to startup.
- C. The following shall be included in the Owner's Manual in accordance with Section 01 33 00, Submittal Procedures.
 - 1. Installation, connection, operating, troubleshooting, maintenance, and overhaul instructions from the manufacturer.
 - 2. Exploded or details views of all instruments, assemblies, and accessory components.
 - 3. Parts lists and ordering instructions.
 - 4. Wiring diagrams.
 - 5. A list of spare parts for 1 year operation recommended by the manufacturers of all DCS and analog equipment.
 - 6. As-built drawings.

1.06 AS-BUILT DRAWINGS

- A. As-built drawings shall be prepared in accordance with Section 01 33 00, Submittal Procedures, with the following exceptions and changes:
 - 1. The Contractor shall keep current an approved set of complete loop diagrams and schematic diagrams which shall include all field and panel wiring, all piping and tubing runs, all routing, all mounting details, all point-to-point diagrams with cable, wire, tube and termination numbers. These drawings shall include all instruments and all instrument elements for the complete instrument loop as provided under equipment and electrical requirements of this Contract.
 - 2. Two copies of each as-built drawing under this section shall be submitted to the City's representative after completion of field checkout but before placing the systems in service for the Owner's use.
 - 3. Drawings shall also be submitted in electronic format (Microstation) and in PDF.

1.07 SERVICES OF MANUFACTURER

- A. Calibration, Testing and Startup: A technical service representative of the manufacturer shall visit the site and perform the following on all flow meters and analyzers.
 - 1. Inspection, checking, and calibrating the equipment.
 - 2. Startup and field testing for proper operation.
 - 3. Performing field adjustments to ensure that installation and operation comply with the Specifications.
- B. Instruction of Owner's Personnel: The manufacturer's technical service representative shall instruct the Owner's personnel as indicated in Article Installation, Calibration, Testing, Precommissioning, Startup and Instruction of this section.

1.08 SPECIAL GUARANTEE

- A. The Contractor shall guarantee the Work of this section for 2 years following final acceptance of the Work. In making any warranty repairs, the Contractor shall utilize technical service personnel designated by the manufacturer of the failed device. Repairs shall be completed within 5 days after written notification by the Owner.

1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials: Products delivered to the Site for incorporation into the Work of this section shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.
- B. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

1.10 ENVIRONMENTAL CONDITIONS

- A. General: All instrumentation and control system components and associated wiring shall be suitable for use in a treatment facility environment where there may be high energy ac fields, dc control pulses, and varying ground potentials between transducers and system components. The system design shall be adequate to provide proper protection against interferences from all such possible situations.

B. Field Situated Equipment:

1. The instrumentation and control system shall be installed on a wastewater treatment plant site. All devices shall be designed to exist in environments rated (G2)(G3)(GX) per ISA S71.04. The system design shall be adequate to provide proper protection the environment typically associated with these facilities. As a minimum, the instrumentation and control systems shall be designed and constructed for satisfactory operation and low maintenance requirements under the following environmental conditions:
 - a. Temperature Range: 0 degree C through 50 degrees C (32 degrees F through 122 degrees F).
 - b. Thermal Shock: 0.55 degree C per minute (1.0 degrees F per minute).
 - c. Relative Humidity: 20 percent through 95 percent (noncondensing).

1.11 CABLE NUMBERING

- A. The first two characters denote the facility or area number.
- B. The second group of characters identifies the device being served (field device).
- C. The third section uses one of the four suffixes in the table below. Where multiple circuits of the same type are routed to the same endpoint, the suffix will be P1, P2, as required.
- D. At each device or termination point, the circuit identification number is appended with the individual wire number. For Direct-Current (DC) circuits only, wire polarity is shown in parentheses as (+) or (-).
- E. Spaces are not allowed, and letters are not case-sensitive, and written in upper case.

Suffix	Circuit Type	Example
(A)	24V dc analog (4 to 20 mA)	01FIT022(A)-1(+)
(C)	120V ac control	05P320(C)-2
(D)	24V dc digital status or control	55LSH201(D)-1(+)
(P)	Power (120-volt, 480V, 5 kV, 15 kV, etc.)	01MCC6101(P)-2

PART 2 PRODUCTS

2.01 GENERAL

- A. All meters, all instruments, and all other components shall be of the most recent field-proven models marketed by their manufacturers at the time of submittal of Shop Drawings unless otherwise indicated.
- B. Panel mounted instruments shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be of one manufacturer.
- C. Outdoor instrumentation shall be suitable for operation in the ambient conditions at the equipment installation locations. Heating, cooling, and dehumidifying devices shall be incorporated with the outdoor instrumentation in order to maintain it within its rated environmental operating ranges. The Contractor shall provide all power wiring for these devices. Outdoor enclosures suitable for the environment shall be provided.
- D. All instrumentation in hazardous areas shall be intrinsically safe or be approved for use in the particular hazardous classification in which it is to be installed.
- E. Mercury switches and components containing liquid mercury shall not be used.
- F. Analog measurements and control signals shall be electrical and shall vary in direct linear proportion to the measured variable, except as indicated. Electrical signals outside control board(s) shall be 4 mA to 20 mA dc except as noted. Analog instruments shall be provided with Highway Addressable Remote Transducer (HART) Protocol.
- G. The accuracy of each instrumentation system or loop shall be expressed as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of the designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual instrument shall have a minimum accuracy of plus or minus 0.5 percent of full scale and a minimum repeatability of plus or minus 0.25 percent of full scale unless otherwise indicated. Instruments which do not conform to or improve upon these criteria are not acceptable.

- H. Control panels shall be provided with redundant power supplies which are configured in a fault-tolerant manner to prevent interruption of service upon failure and interruption of service necessitated by the replacement of a power supply. All power supplies shall have an excess rated capacity of 40 percent. The failure of a power supply shall be annunciated locally and shall generate an alarm to the DCS.

2.02 CONTROL PANELS

- A. Control panels, including those furnished by equipment manufacturers, and shall be provided according to the following requirements.
1. Where indicated, control panels shall be provided with all required taps, fittings, rotameters, regulation and alarm interlocks to enable the implementation of a purge system which is in conformance with ISA-S12.4 Type Z requirements. Dimensions shall be in accordance with manufacturer's requirements. Elevations and horizontal spacing shall be subject to City's representative approval.
 2. Panels shall be fabricated, piped and wired by fully qualified panel shop who are properly trained, experienced, and supervised.
 3. See Supplements for control panels to be provided under this Contract.
- B. Materials:
1. Panel section faces shall be No. 10 gauge minimum thickness steel for free standing panels and No. 14 gauge minimum thickness steel for smaller panels. All materials shall be selected for levelness and smoothness.
 2. Relay rack high density type panels shall utilize standard relay racks with No. 14-gauge steel frame and supports.
 3. Structural Shapes and Strap Steel: ASTM A283.
 4. Bolting Material: Commercial quality carbon steel bolts, nuts and washers, all 1/2-inch diameter with UNC threads. Carriage bolts shall be used for attaching end plates. All other bolts shall be hex head machine bolts. All nuts shall be hot pressed hex, American Standard, heavy. Standard wrought washers shall be used for foundation bolts and attachments to building structures. All other bolted joints shall have S.A.E. standard lock washers.
- C. Fabrication:
1. End plates, top plates, and top closure panels shall be furnished when required. End plates, top plates, and top closure panels shall be removable with countersunk bolts to match panels. Top closure panels shall be furnished in lengths which match the widths of standard panels, except that one top closure panel may extend across two 4 feet 6 inches

- wide or five 2 feet 0 inches wide standard panels. The vertical joints of these panels shall align with the vertical joints of the standard panels.
2. End closure or rear closure doors shall be provided. Such doors shall be flush fitting and gasketed and be of the hinged lift-off type with lockable door handles. A common key shall be provided for all doors on one panel assembly. Where removable access panels are indicated, they shall be furnished with dished handle fasteners. Screw driver 1/4 turn type fasteners are not acceptable.
 - a. The flanged edges of all panels shall be straight and smooth. Corners shall be welded and ground smooth.
 - b. The face of the panel shall be true and level after flanging.
 - c. All panel cut-outs and holes may be cut or drilled by any standard method that will not cause deformation. Burrs shall be ground smooth.
 - d. Adjacent panels shall be assembled with faces flush. Gaps or cracks shall not be visible from the front of the assembled instrument board.
 - e. Stiffeners shall be welded to the back of panels, as required to prevent panel deformation due to the weight of front of panel mounted instruments.
 - f. Panels shall be self-supporting as defined below.

D. Framework and Supports:

1. The rear of each panel section shall have a steel framework for supporting conduit, tubing, wireways, switches, air piping and all instrument accessory items such as relay or terminal enclosures, transducers, pressure switches, valves, and air relays. The main frame work shall be constructed of standard structural shapes. Special shapes such as "Unistrut" may be used for secondary supports. Framework must not interfere with instrument connections or access needed for maintenance or adjustments.
2. Steel framework shall extend 2 feet 8 inches back of the panel face unless otherwise required. Where indicated, individual adjustable leg supports shall be provided at the back of the framework so that the entire panel shall be self-supporting.

E. Finish:

1. Preparation:
 - a. The front and rear face of the panel, both sides and the edges of all flanges, and the periphery of all openings shall be prepared as follows:
 - 1) All high spots, burrs, and rough spots shall be ground smooth.

- 2) The surfaces shall be sanded or sandblasted to a smooth, clean bright finish.
 - 3) All traces of oil shall be removed with a solvent.
2. Finishing:
 - a. A 3-mil dry coat of Amercoat 185, or approved equal primer shall be applied over the entire panel surface immediately after solvent cleaning.
 - b. Wet sand, dry, then quick glaze spot putty on the front of the panel only. Dry, then wet sand again and dry.
 - c. Apply a second 3-mil dry coat of alkyd enamel primer to the front of the panel.
 - d. Wet sand to smooth clear finish, then dry.
 - e. At least two 3-mil dry coats of air-dry, satin finish, alkyd enamel shall be applied over the entire surface. Color to be as selected by City's representative.
 - f. The Contractor shall furnish two 1 pint containers of the enamel to the City's representative.
 3. Instrument Finishing: The final coats applied to painted surface of instrument cases, doors, or bezels which are visible from the front of panels shall be manufacturer's standard unless otherwise indicated. Black japan or "crinkle" finishes on instrument cases are not acceptable.

F. Mounting of Instruments:

1. The Contractor shall provide cut-outs, and shall mount all instrument items indicated to be panel mounted, including any instruments indicated to be furnished by other manufacturers.
2. The Contractor shall also mount, behind the panels, other instrument accessory items as indicated.
3. Rear of panel mounted equipment shall be installed with due regard to commissioning adjustments, servicing requirements and cover removal.
4. Wiring shall be kept clear of spare space to give maximum space for future additions.

G. Piping Requirements for Control Panels:

1. General:
 - a. The Contractor shall provide terminal connections near the top, rear of the panel for all tubing and piping which connect to instruments, valves, air supply and other pressure leads external to the panel. Terminal connections for tubing shall be bulkhead tube unions. Those for pipe shall be threaded couplings, plugged for shipping purposes.
 - b. Each terminal connection shall have an engraved metal or plastic plate with a terminal and instrument tag number affixed nearby.

- c. The Contractor shall provide the air supply pressure reducing station, all instrument and supply piping and all pneumatic tubing or piping to terminal connections and between instruments located within the confines of the panel and supporting framework.
2. Air Supply Piping:
- a. The Contractor shall provide air supply piping from a point near the top of the panel framework to the inlet side of the pressure reducing station, or alternately to the inlet side of individual filter regulators.
 - b. Piping, fittings, and valves downstream of the filters at the air supply reducing station shall be brass or copper. Headers may be extruded aluminum if the tube wall section is thick enough to accept threaded connections.
 - c. The low pressure instrument air supply header shall extend from the downstream side of the main pressure reducing valves across the length of panel which includes air users. Where the header must be broken for shipping purposes, brass unions shall be provided at the panel section junctions.
 - d. A separate air supply take-off consisting of a 1/4-inch brass connection braced into the air header (if brass or copper) shall be furnished for each instrument requiring an air supply. An additional 10 percent of the take-offs shall also be provided. Take-offs for 3/4-inch size headers may be made by using 3/4-inch by 3/4-inch by 1/4-inch reducing tees.
 - e. Each take-off shall be fitted with a 1/4-inch brass diaphragm of needle type shut-off valve. Provide circular type handle with tag number shown thereon.
 - f. The dead end of the air header opposite the supply end shall be fitted with a plugged 1/2-inch brass gate valve.
 - g. The connection from the shut-off valves air head to the instruments shall be by means of 1/4-inch or 3/8-inch O.D. tubing as required.

H. Electrical Requirements for Control Panels:

1. The Contractor shall provide all wiring, conduit, wireways, and switches required to make instruments and other panel electrical devices operational.
2. Conduit, wireways, junction boxes and fittings shall be installed for all signal wire, all thermocouple and resistance thermometer lead wire including those between temperature sensors and temperature indicators.
3. Each terminal connection shall have a plastic plate with a terminal and instrument tag number. All wiring shall be identified with stamped tubular wire markers.

4. Freestanding panels shall be provided with switched 100-watt incandescent back-of-panel lights which are powered from a source independent from that which powers the panel devices. One light shall be provided for every 4 feet of panel width and shall be mounted inside in the top of the back-of-panel area.
5. Freestanding panels shall be provided with a 15-amp, 120-volt service outlet circuit within the back-of-panel area which are powered from a source independent from that which powers the panel devices. The circuit shall be provided with one three-wire, 120-volt, 15-ampere, duplex receptacle for every 4 feet of panel width spaced evenly along the back-of-panel area. As a minimum, two duplex outlets shall be provided for each panel.
6. Smaller panels shall be sized to adequately dissipate heat generated by equipment mounted in or on the panel.
7. Where smaller panels are mounted outside or in unshaded areas, they shall be provided with thermostatically controlled heaters capable of maintaining inside temperatures above 40 degrees F.
8. Smaller panels shall be provided with a hand-switch controlled 100-watt incandescent light and a breaker protected 120-volt, 15-amp duplex receptacle.
9. Wiring Methods: Wiring methods and materials for all panels shall be in accordance with the NEC requirements for General Purpose unless otherwise indicated. Opening wiring in close cabinet type panels is allowed when indicated.
10. Construction:
 - a. Wire for 115-volt circuits shall be No. 14 AWG stranded with Type THWN or THHN insulation. All terminals for external wiring connections shall be suitable for No. 12 AWG wire.
 - b. Flexible conduit is not acceptable.
 - c. Conduit fittings shall be cast fittings.
 - d. Soldered or pressure crimped wire splicing in conduits shall be acceptable.
 - e. For case grounding, panels shall be provided with a 1/4-inch by 1-inch copper ground buss completed with solderless connector for one No. 4 AWG bare stranded copper cable. The Contractor shall connect the copper cable to a system ground loop.
 - f. Single case annunciator units with no remote logic which are installed at the top of a panel may be considered as being a terminal box when top of panel wire entry is indicated. If bottom of panel entry is indicated, terminal box shall be provided at the bottom of the panel and wired to the annunciator. Terminals shall be identified with plastic marker strips.
 - g. Terminal boxes for incoming and outgoing signal leads shall be located at the top or bottom of the panel as indicated or as otherwise required.

11. Power Supply Wiring:
 - a. Unless otherwise indicated, all instruments, all alarm systems, and all motor controls shall operate on 24V dc circuits.
 - b. The Contractor shall furnish terminal box connections for the main power supply entry as indicated.
 - c. Power supply switches for alarm units shall be three pole type, arranged to open both the power and alarm circuits. Each annunciator shall be equipped with a separate switch.
 - d. Instruments located on a single panel section which serve one process unit may be connected to a common branch power circuit. The number of branch circuits shall be such that no circuit load exceeds 10 amps. Different panel sections and instruments serving different process units shall not use common branch circuits. A 15-amp, two-pole circuit breaker shall be provided in each branch circuit. When instruments do not come equipped with integral fuses, the panel fabricator shall furnish and install fuses as required for the protection of individual instrument against fault currents. Fuses shall be mounted on the back of the panel, in a fuse holder, with each fuse identified by a service name tag.
 - e. Each potentiometer type instrument, electronic transducer, controller or analyzer shall have an individual disconnect switch. Disconnect switches shall have metal or plastic tags listing the associated instrument tag numbers. Individual plug and cord set power supply connections may be used without switches when indicated.
 - f. Where alarm units are single unit types, one switch may be used to disconnect not more than six alarm units located on the same or adjacent panels.
12. Alarm Wiring: The Contractor shall provide all alarms including light cabinets, audible signal units, test and acknowledge switches, and remote logic units as indicated. Interconnecting wiring to panel mounted initiating devices shall also be provided. Wiring from external initiating devices shall be provided by the Contractor. Where plug and cord sets are provided for component interconnection, the Contractor shall harness and support the cables in a neat and orderly fashion. Where separate wire is required, the Contractor shall install 16 AWG with THWN or THHN insulation between all components.
13. Signal Wiring:
 - a. Computer and Noncomputer Use: Signal wire shall be twisted shielded pair or triads in conduit or troughs. Cable shall be constructed of No. 16 AWG copper signal wires with THWN or THHN insulation. Color code for instrument signal wiring shall be:
 - 1) Positive: Black (+).
 - 2) Signal Ground Negative: White (-).

- 3) Equipment Ground: Green.
 - 4) Ungrounded: Red.
 - 5) Energized by Voltage Sound External to Panel: Yellow.
 - 6) DC Circuit: Blue.
- b. Multiconductor cables where indicated shall consist of No. 16 AWG copper signal wires twisted in pairs, with 600-volt fault insulation. A copper drain wire shall be provided for the bundle with a wrap of aluminum polyester shield. The overall bundle jacket shall be PVC.
 - c. Multi-conductor cables, wireways, and conduit shall provide for 10 percent allocation of spare, unused signal wires in addition to the indicated requirements.
14. Terminal Blocks: Terminal blocks shall be molded plastic with barriers and box lug terminals, and shall be rated 15 amperes at 600 volts. White marking strips, fastened securely to the molded sections, shall be provided and wire numbers or circuit identifications shall be marked thereon with permanent marking fluid.

I. Color Conventions:

1. Lens covers for indicating lights on all panels will be colored as follows:
 - a. Red-ON when:
 - 1) Motor not running (STOPPED).
 - 2) Valve CLOSED (not fully opened).
 - 3) Device not energized.
 - 4) Circuit breaker CLOSED.
 - b. Green-ON when:
 - 1) Motor running in forward direction (fast speed for multi-speed motors).
 - 2) Valve OPEN (not fully closed).
 - 3) Device energized.
 - 4) Circuit breaker OPENED.
 - c. White-ON when:
 - 1) Power available.
 - 2) System in AUTOMATIC mode.
 - 3) Monitoring taking place.
 - d. Amber-ON when:
 - 1) Malfunction trip.
 - 2) Equipment locked out.
 - 3) Alarm condition.

- J. Nameplates: Nameplates shall be provided for instruments, function titles for each group of instruments, and other components mounted on the front panel(s) as indicated. A nameplate shall be provided for each signal transducer, signal converter, signal isolator, and electronic trip mounted inside the panel(s). Nameplates shall be descriptive to define the function and system of such element. These nameplates shall be of the same material as those on the front of the panel(s). Adhesives shall be used for attaching nameplates. Nameplates shall be fabricated from black face white-center laminated engraving plastic. Painted surfaces shall be prepared to allow permanent bonding of adhesives. Colors, lettering, styles, abbreviations, and sizes shall be in conformance with ISA-RP60.6, with an intended viewing distance of 3 feet to 6 feet.
- K. Factory Inspection:
1. Panels shall be inspected for compliance with requirements at the factory before shipment to the Site. The Contractor shall notify the City's representative 2 weeks in advance of the testing date. A representative of the City's representative will visit the factory to make the inspection.
 2. Contractor shall perform the following tests prior to arrival of the City's representative:
 - a. All air lines adequately tested for leaks.
 - b. All alarm circuits rung out to determine their operability.
 - c. Electrical circuits checked for continuity and where applicable, operability.
 - d. Nameplates checked for correct spelling and correct size of letters.
 - e. Other test required to place the panel in an operating condition.
 3. It shall be the responsibility of the Contractor to furnish all necessary testing devices and sufficient manpower to perform the tests required by the City's representative to determine conformance to the requirement of the Contract Documents.
 4. If the above tests have not been performed prior to the arrival of the City's representative, the Contractor shall reimburse the Owner for the cost of the extra time required for the inspector's services and travel expenses.
- L. Shipment: Panels shall be crated for shipment using a heavy framework and skids. Panel sections shall be cushioned to protect the finish of the instruments and panel during shipment. Instruments which are shipped with the panel shall have suitable shipping stops and cushioning material installed to protect instrument parts from mechanical shock damage during shipment. Each panel crate shall be provided with removable lifting lugs to facilitate handling.

2.03 GENERAL INSTRUMENTATION ENCLOSURE COMPONENTS

- A. Provide components that are listed in the Instrument List in Article Supplement at the end of this section.
- B. Signal Isolators, Converters, and Power Supplies: Signal isolators shall be provided in each measurement and control loop, wherever required, to match adjacent component impedances, or where feedback paths may be generated or to maintain loop integrity when the removal of a component of a loop is required. Signal converters shall be provided where required to resolve any signal incompatibilities. Signal power supplies shall be provided to supply sufficient power to each loop component.
- C. General Purpose Relays: General purpose relays in the Control Panels shall be plug-in type with contacts rated 10 amperes at 120V ac; quantity and type of contacts shall be as indicated. Each relay shall be enclosed in a clear plastic heat and shock resistant dust cover. Sockets for relays shall have screw type terminals.
- D. Slave Relays: Slave relays shall be provided when the number or type of contacts indicated exceed the contact capacity of the indicated relays and timers.
- E. Circuit Breakers: Circuit breakers shall be single pole, 120-volt, 15-ampere rating or as required to protect wiring and equipment. Circuit breakers shall be mounted inside the panels as shown.

2.04 FIELD-MOUNTED INSTRUMENTATION

- A. Provide components that are listed in the Instrument List in Article Supplement at the end of this section. Specific component requirements are defined in the Instrument Data Sheets at the end of this section.
- B. NEMA 4X Digital Indicators:
 - 1. Digital indicators shall be self-contained instruments that display process signals directly in engineering units. The unit shall be suitable for panel mounting and shall utilize an LED display where numerals are no less than 0.5-inch height.
 - 2. The input signal to the digital process indicator shall be 4 mA to 20 mA dc or 1V dc to 5V dc. The input sample rate of the unit shall be a minimum of 2 per second. The unit shall have an auto-zeroing feature and shall have provisions for field adjustable scaling and offset. Accuracy shall be plus or minus 1 least significant digit. Input power to the digital indicator shall be 120V ac, 60-Hz.
 - 3. Unit enclosure shall be rated for NEMA 4X.

2.05 CONTROL PANEL INSTRUMENTATION

A. Digital Indicators:

1. Digital indicators shall be self-contained instruments that display process signals directly in engineering units. The unit shall be suitable for panel mounting and shall utilize an LED display where numerals are no less than 0.5-inch height.
2. The input signal to the digital process indicator shall be 4 mA to 20 mA dc or 1V dc to 5V dc. The input sample rate of the unit shall be a minimum of 2 per second. The unit shall have an auto-zeroing feature and shall have provisions for field adjustable scaling and offset. Accuracy shall be plus or minus one least significant digit. Input power to the digital indicator shall be 120V ac, 60-Hz.

B. Current Alarm Trip Switches: Current alarm trips shall be single or dual type as indicated. Units shall accept voltage or current input signals. Dead bands shall be factory set at 1.0 percent of full span for dual trips and adjustable over 100 percent of span for single trips. Alarm trips shall be equipped with 10A DPDT contacts. Alarm trips shall include setpoint dials calibrated 0 percent to 100 percent for each trip point. Single alarm trips shall include a dead band adjustment dial calibrated 0 percent to 100 percent.

C. Selector and Pushbutton Switches: Selector and pushbutton switches shall be rated 10A at 600 volts, shall be heavy-duty, oil-tight, and shall have the number of positions and poles indicated. Operators shall be corrosion resistant.

D. Indicating Lights: Indication lights shall be incandescent push-to-test type and shall be heavy-duty, oil-tight. Each light shall have a screwed-on glass prismatic lens approximately 1-inch in diameter. Each light shall have a factory-engraved legend plate as indicated. Indicating lights shall be 120V ac type with transformers for use with 6.3-volt lamps.

E. Alarm Annunciator Systems:

1. Alarm annunciator systems shall consist of a back lighted window display, alarm modules, flasher-audible modules, power supply, and horn. All annunciators which are installed in NEMA 3, NEMA 3R, NEMA 4, or NEMA 4X enclosures shall be protected by window kits which preserve the panels NEMA rating. Annunciator shall be furnished with (integral) (remotely mounted) acknowledge, test, reset, and silence, pushbuttons. The alarm sequence shall conform to ISA M-1 as follows:
 - a. Alarm condition sounds the horn and causes the display to flash.

- b. Depression of the Acknowledge Pushbutton causes the horn to go silent and the display goes from flashing to continuously lit and remains illuminated until the alarm condition ceases to exist.
 - c. Depression of the Reset Pushbutton, subsequent to the process condition returning to a normal condition, returns the sequence to a normal state.
 - d. Depression of the Test Pushbutton shall simulate simultaneous abnormal process conditions on all related alarm points to reveal lamp or circuit failures.
2. Alarm Modules: Alarm point modules shall be solid state electronic devices. Each module's relay contacts shall be configured normally open to accept dry inputs. The annunciator shall provide 24V dc wetting voltage for all inputs. All input and alarm logic shall conform to the surge test immunity requirements of IEEE-472-1974. All solid state logic circuits shall conform to the requirements of SAMA PMC 33.1 "Electromagnetic Susceptibility of Process Control Instrumentation" in their ability to resist Radio Frequency Interference (RFI) with the control panel doors open. The time period between the operation of the field contacts and the annunciation of the alarm state shall not exceed 50 milliseconds. Each alarm module shall be field configurable for normally open or normally closed contact operation. Alarm modules and flasher-audible modules shall be easily removable for ease of inspection and servicing. Alarm logic shall be provided for all currently utilized and spare display points.
 3. Alarm Display: Annunciator windows shall be translucent white with black letters. Annunciator cells shall be approximately 2 inch/50 mm high and 3 inch/75 mm wide. Each window shall have two high intensity 6-volt, 1 watt lamps rated at 20,000 hours. The lamps shall be wired so that the burnout of a lamp will not affect the other lamp. All lamps shall be replaceable from the front of the annunciator.
 4. Window Engraving: The window arrangement and associated text shown in Contract Documents shall be interpreted as a guideline only which is subject to modification at the time of submittal by the Construction Manager. All lines of characters shall be centered in the window. All characters shall be engraved in the same size and line thickness all in conformance with the requirements of ISA-RP60.6 (Nameplates, Labels, and Tags for Control Centers) with a recommended viewing distance of 3-foot/1m to 6-foot/2m. All characters shall be in uniformly and symmetrically spaced to give a clear, easy-to-read, informative display. Each window shall have two high intensity 67-volt, 1 watt lamps rated at 50,000 hours. The lamps shall be wired so that the burnout of a lamp will not affect the other lamp. All lamps shall be replaceable from the front of the annunciator.

5. Audible Alarm Horn: Solid state tone generators shall be located in the annunciator or control panel enclosure. The adjustable tone generator shall activate an alarm horn located on the front of the annunciator. The sound shall be continuous until silenced by manual pushbutton operation. The sound shall be adjustable between steady and fluctuating or warble. The audible alarm shall silence automatically after an adjustable time. Audible devices shall conform to the environmental requirements that apply to other panel mounted devices.
6. Power Supply Systems: Each annunciator shall be provided with its own dedicated redundant 24V dc power supplies. The sharing of power supplies with panel power shall not be permitted. Power supplies shall provide electrical isolation between power sources and annunciator circuits. Ground detectors shall annunciate the occurrence of accidental circuit grounds. The power supply system shall enable the offending grounds to be located and removed without affecting the annunciator operation or the power source. The power supplies shall be redundantly configured with diode auctioneering to enable the transition between a failed power supply to the backup without impact to the annunciator and to enable the replacement of a failed supply without impact to the annunciator's operation. Power failure detectors shall be provided to alarm the failure of each power source and each power supply to an independent alarm device.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, all instruments, all accessories, and all assemblies provided under this Contract.
- B. The Contractor shall install all instruments according to the manufacturer's installation instructions and the following:
 1. Perform field engineering as required for mounting and supporting all field mounted components.
 2. Prepare any additional schematic and interconnection diagrams required for installation.
 3. Assemble and interconnect instrument components disconnected for shipping purposes.
 4. Remove all temporary supports, bracing, and padding inserted in instrument control panels and other equipment to prevent damage during shipping, storage, or installation.

5. All piping shall be field measured prior to fabrication and erection. Any significant discrepancies between Drawings and field conditions shall be reported to the City's representative. The Owner will not be responsible for any costs to the Contractor for rework because of Contractor failure to take measurements prior to fabrication.
 6. Adequately support and protect capillary tubing. All extra tubing shall be carefully coiled, tied, and protected at the instrument location.
- C. The Contractor shall install pneumatic instrument air systems according to the manufacturer's installation instructions and the following:
1. Install all pneumatic tubing and make all connections at control panels, instruments, and control valves.
 2. Perform field engineering as required for instrument air supply headers and individual air supply taps and lines.
 3. Check all air supply branch headers by blowing with clean air and checking for tightness.
 4. Clean all transmission and control tubing by blowing with dried and filtered air prior to connecting to instrument components.
 5. Leak test all pneumatic control circuits in accordance with ISA Recommended Practice RP-7.1.
 6. Set all instrument air regulators at manufacturer's recommended supply pressures.
- D. It is the intent of the Contract Documents that all wiring external to Control Panels be provided under the requirements of Division 26, Electrical. Further, it is the general intent that all 4 mA to 20 mA signal circuits, process equipment control wiring, signal wiring to field instruments, and Control Panel input and output wiring, be provided under Division 26, Electrical and be terminated and identified under Division 40, Process Interconnections.
- E. The Contractor's attention is directed to the electrical and mechanical schematics and details of this Project. Referral to these portions of the Contract Documents shall be required in order to understand the full intent and scope of work required.
- F. Monitoring and control system configurations are diagrammatic only. Locations of equipment are approximate unless dimensioned on Drawings. Exact locations and routing of wiring and cables shall be governed by structural conditions, physical interferences, and locations of electrical terminations on equipment.
- G. Where job conditions require minor changes in approximated locations and arrangements, the Contractor shall make such changes without additional cost to the Owner.

- H. All instruments shall be located and installed for ready access by the Owner's operation and maintenance staff. The Owner reserves the right to require minor changes in location of equipment prior to roughing without any additional cost to the Owner.
- I. Meters shall be installed in easily accessible locations and orientated for ease of reading and maintenance, and where shown, for balancing flow. Wherever possible, meters shall be inserted in such a way to comply with the manufacturer's recommendations. Meters, shut-off and balancing valves shall be properly supported. In-line meters shall be installed to ensure full-line flow and not less than the manufacturer's recommended head at all times.

3.02 CONTROL PANEL SIGNAL AND CONTROL CIRCUIT WIRING

- A. Wiring Installation: All wires shall be in plastic wireways except (1) field wiring, (2) wiring between mating blocks in adjacent sections, (3) wiring from components on a swing-out panel to components on the fixed structure, and (4) wiring to panel-mounted components. Wiring from components on a swing-out panel to other components on fixed panels shall be tied into bundles with nylon wire ties, and shall be secured to panels at both sides of the "hinge loop" so that conductors are not strained at the terminals.
- B. Wiring to control devices on the front panels shall be tied together at short intervals with nylon wire ties and secured to the inside face of the panel using adhesive mounts.
- C. Wiring to rear terminals on panel-mount instruments shall be in plastic wireways secured to horizontal brackets above or below the instruments in about the same plane as the rear of the instruments.
- D. Wire Marking: Each signal, control, alarm, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all Shop Drawings. These numbers shall be marked on all conductors at every terminal using white numbered wire markers which shall be permanently marked heat-shrink plastic.

3.03 INSTRUMENT CABLE TESTS

- A. General: The following tests shall be performed on each instrumentation and control system cable. All tests shall be end-to-end tests of installed cables with the ends supported in free air, not adjacent to any grounded object. All test data shall be recorded on forms which are available from the City's representative. Complete records of all tests shall be made and delivered to the City's representative. Each form shall be signed by the City's representative or the City's representative's Representative who witnessed the testing.

- B. Continuity tests shall be performed by measuring wire/shield loop resistance of each signal cable as the wires, taken one at a time, are shorted to the channel shield. No loop resistance measurement shall vary by more than plus or minus 2 ohms from the calculated average loop resistance value.
- C. Insulation resistance tests shall be performed by using a 500-volt megohmmeter to measure the insulation resistance between each channel wire, between each channel wire and the channel shield, between individual channel shields in a multichannel cable, between each individual channel shield and the overall cable shield in a multi-channel cable, between each wire and ground, and between each shield and ground. Values of resistance less than 1 megohm shall be unacceptable.

3.04 INSTALLATION, CALIBRATION, TESTING, PRECOMMISSIONING, STARTUP AND INSTRUCTION

- A. Installation and Connection:
 - 1. The Contractor shall install and connect all field-mounted components and assemblies under the following criteria:
 - a. Process sensing lines and air signal tubing shall be installed to the installation of conduit indicated under Section 26 05 33, Raceway and Boxes. Individual tubes shall be run parallel and near the surfaces from which they are supported. Supports shall be used at intervals not longer than 3 feet of tubing.
 - b. Bends shall be formed with the proper tool and to uniform radii and shall be made without deforming or thinning the walls of the tubing. Plastic clips shall be used to hold individual plastic tubes parallel. Ends of tubing shall be square-cut and cleaned before insertion into fittings. Bulkhead fittings shall be provided at all panels requiring pipe or tubing entries.
 - c. All flexible cables and all capillary tubing shall be provided in flexible conduits. Lengths shall be sufficient to withdraw the cables and tubing for periodic maintenance.
 - d. Thermocouple lead wire shall be provided in dedicated conduit or wireway from the thermocouple to the control panel. Conduit or wireway shall be sized in accordance with the capacity of the instrument.
 - e. All power and all signal wires shall be terminated with spade type lugs.
 - f. All connectors shall be, as a minimum, watertight.

- g. After all installation and connections have been completed, a technical field representative of the Contractor shall check the Work for polarity of electric power and signal connections, leaks at all process connections, and conformance with requirements. The technical field representative shall certify in writing to the Contractor that each loop and system meets requirements.
 - h. All wire and all cable shall be connected from terminal to terminal without splices, arranged in a neat manner and securely supported in cable groups. All wiring shall be protected from sharp edges and corners.
- B. Calibration: All analog instrumentation and all control system equipment shall be calibrated and tested after installation to verify that requirements are satisfied. The Contractor shall provide all necessary labor, tools, and equipment to calibrate and test each instrument in accordance with the manufacturer's instructions. Each instrument shall be calibrated at a minimum of three points using test equipment to simulate inputs and read outputs. All test equipment and all instruments used to simulate inputs and read outputs shall be suitable for the purpose intended and shall have an accuracy better than the required accuracy of the instrument being calibrated. Test equipment shall have accuracies traceable to the NIST as applicable. All analog instruments shall be calibrated and tested in place without removal. Test data, applicable accuracy requirements, all instrument manufacturer published performance specifications and all permissible tolerances at each point of calibration shall be entered on test forms available from the City's representative. These test forms shall verify compliance with all. A report shall be delivered to the City's representative for each instrument, certifying that the instrument has been calibrated in the presence of the City's representative or the City's representative's designated representative and meets contract and system requirements.
- C. Analog Loop Tests: The Contractor shall be responsible for loop checking and testing all instrumentation loops with this Project. The Contractor shall coordinate all loop check functions with the CSP to ensure that a single total loop check is conducted for each device. The intent of the loop checks is to confirm and document each loop's component specification conformance up to and including all field-situated CSP devices. The CSP will have all control room personnel present to witness and confirm loop check results at the CRT level. The Contractor shall provide all necessary labor, tools, and equipment to field test, inspect, and adjust each instrument to its indicated performance requirement in accordance with manufacturer's specifications and instructions. Any instrument which fails to meet any Contract requirement, or any published manufacturer performance specification for functional and operational parameters, whether or not indicated in the Contract Documents,

shall be repaired or replaced, at the discretion of the City's Representative at no additional cost to the Owner.

1. At least 15 working days before installation testing begins, the Contractor shall submit to the City's representative a detailed description, in duplicate, of the installation tests to be conducted to demonstrate correct installation of the instrumentation and control system and the anticipated dates the testing will occur.
 2. Controllers and electronic function modules, shall be tested and exercised by the Contractor to demonstrate correct operation, first individually and then collectively as functional analog networks. Each hardwired analog control network shall be tested to verify proper performance within indicated accuracy tolerances. Accuracy tolerances for each analog network are defined as the root-mean-square-summation of individual component accuracy tolerances. Individual component accuracy tolerances shall be as indicated by contract requirements, or by published manufacturer accuracy specifications, whenever contract accuracy tolerances are not indicated.
 3. Each analog network shall be tested by applying simulated inputs to the first element(s). Simulated sensor inputs corresponding to 10 percent, 50 percent, and 90 percent of span shall be applied, and the resulting outputs read to verify compliance to network accuracy tolerance requirements. All analog test equipment used to simulate or measure current/voltage signals shall be certified accurate within the previous 6 months by a recognized/certified testing facility. Actual equipment listed as customer spares or test equipment may not be used for these tests. Continuously variable analog inputs shall be applied to verify the proper operation of discrete devices. Temporary settings shall be made on controllers, alarms, etc., during analog loop tests. All analog loop test data shall be recorded on test forms, which include calculated root-mean-square-summation system accuracy tolerance requirements for each output.
 4. Air systems shall be tested for leaks in compliance with ISA RP7.1.
 5. When installation tests have been successfully completed for all individual instruments and all separate analog control networks, a certified copy of all test forms signed by the City's Representative as a witness, with test data entered, shall be submitted together with a clear and unequivocal statement that all instrumentation has been successfully calibrated, fully inspected, and fully tested.
- D. System Precommissioning: The Contractor shall responsible for demonstrating the operability of all systems provided under this Specification. The City will assist and coordinate the operability assessment with the Contractor. Precommissioning shall commence after acceptance of all wire, all calibrating and loop tests, and all inspections have been conducted.

Precommissioning shall demonstrate proper operation of all systems with process equipment operating over full operating ranges under actual operating conditions.

1. The Contractor shall develop and submit to the City's representative for approval a Precommissioning Plan which describes detailed test procedures, checklists, blank forms, and data to be recorded, test equipment to be used, and calculated tolerance limits.
2. System precommissioning activities shall include the use of water to establish service conditions that simulate, to the greatest extent possible, normal final control element operating conditions in terms of applied process loads, operating ranges, and environmental conditions. Final control elements, control panels, and ancillary equipment shall be tested under start-up and steady-state operating conditions to verify that proper and stable control is achieved using motor control center and local field mounted control circuits. All hardwired and software control circuit interlocks and alarms shall be operational. The control of final control elements and ancillary equipment shall be tested using both manual and automatic (where provided) control circuits. The stable steady-state operation of final control elements running under the control of field mounted automatic analog controllers or software based controllers shall be assured by adjusting the controllers, as required, to eliminate oscillatory final control element operation. The transient stability of final control elements operating under the control of field mounted, and software based automatic analog controllers shall be verified by applying control signal disturbances, monitoring the amplitude and decay rate of control parameter oscillations (if any) and making necessary controller adjustments, as required, to eliminate excessive oscillatory amplitudes and decay rates.
3. All electronic control stations incorporating proportional, integral or differential control circuits shall be optimally tuned, experimentally, by applying control signal disturbances and adjusting the gain, reset or rate setting(s) as required to achieve a proper response. Measured final control element variable position/speed set point settings shall be compared to measured final control element position/speed values at 10 percent, 50 percent, and 90 percent of span and the results checked against indicated accuracy tolerances. Accuracy tolerances are defined as the root-mean-square summation of individual component accuracy tolerances.
4. Individual component accuracy tolerances shall be as indicated in the Contract Documents or as specified by published manufacturer accuracy specifications whenever not indicated.

5. The Contractor shall submit an instrumentation and control system precommissioning completion report which shall state that all Contract requirements have been met and which shall include a listing of all instrumentation and all control system maintenance and repair activities conducted during the precommissioning testing. The City's representative must accept the instrumentation and control system precommissioning testing before the 7-day operational testing may begin. Final acceptance of the control system shall coincide with final acceptance of the Work.
- E. Instruction: The Contractor shall train the Owner's maintenance personnel in the maintenance, calibration, and repair of all instruments provided under this Contract.
1. The training shall be scheduled a minimum of 3 weeks in advance of the first session. The training shall be performed concurrent with the precommissioning as specified herein.
 2. The training shall be performed by qualified representatives of the instrument manufacturers and shall be specific to each instrument model provided. Instructors shall provide a listing of projects and references in training experience.
 3. Each training class shall be a minimum of 4 hours in duration and shall cover Operational Theory, Maintenance, Trouble Shooting/Repair, and Calibration of the instrument.
 4. Proposed training material, including resumes for the proposed instructors and a detailed outline of each lesson shall be submitted to the City's Representative at least 30 days in advance of when the lesson is to be given. The City's Representative shall review the submitted data for suitability and provide comments which shall be incorporated into the course.
 5. Within 10 days after the completion of each lesson the Contractor shall present to the City's Representative the following:
 - a. A list of all Owner personnel that attended the lesson.
 - b. An evaluation of Owner personnel knowledge through written testing, or equivalent.
 - c. A copy of text utilized during the lesson with all notes, diagrams, and comments.

3.05 INSTRUMENT SUMMARY

- A. General: The Instrument Summary shown in Supplements, itemizes the instrumentation devices, to be furnished under this Contract.

B. Each column on the Instrument Summary is defined as follows:

1. Tag Number: The identifier assigned to a device which performs a function in the control system. The Contractor shall use this identifier in tagging devices in the field.
2. Loop Number: The number assigned to the control loop associated with the device.
3. Description: A process-oriented functional description which defines the measured/monitored/controlled parameter and the associated process/process equipment.
4. P&ID Drawing Number: The Process and Instrumentation drawing upon which the device appears.
5. Component Code: The number associated with the technical specification which describes the requirements associated with the device.
6. Installation Detail Number: The designation of the installation detail defining the installation requirements associated with the device.

3.06 INSTRUMENT DATA SHEETS

A. General: The Instrument Data Sheets shown in Supplements provides specific device requirements for the instrumentation referenced in Instrument Summary such as meter size, ranges, scales, set points, NEMA ratings, flange sizes, pipe connection sizes, material types, probe types, etc.

3.07 CONTROL PANEL SUMMARY

A. General: The Control Panel Summary shown in Supplements, itemizes the control panels to be furnished under this Contract.

B. Each column on the Control Panel Summary is defined as follows:

1. Control Panel Number: The designation of the control panel where the device resides.
2. Control Panel Description: A process-oriented functional description.
3. Control Panel Rating: NEMA rating for control panel.
4. Electrical Drawing Number: The electrical drawing upon which the device appears.

3.08 DCS INPUT/OUTPUT (I/O) SUMMARY

- A. General: The DCS Input/Output List shown in Supplements, itemizes all inputs and outputs to and from the DCS, which are furnished by the Contractor.
1. Highlighted I/O on the DCS Input/Output Summary are new I/O. Items shown in normal text are existing I/O.
- B. Each column on the I/O List is defined as follows:
1. DCU: Distributed Control Unit number.
 2. Cabinet: PCM where I/O resides.
 3. Card Type: DCS module number.
 4. Tag Number: The ISA identifier assigned to a device which performs a function in the control system. The Contractor shall use this identifier in tagging devices in the DCS.
 5. Description: A 30-character process-oriented functional description which defines the measured/monitored/controlled parameter and the associated process/process equipment.
 6. Zero State: The status to be displayed on the alarm summary when a digital point is not activated or returns to its normal state.
 7. One State: The status to be displayed on the alarm summary when a digital point is activated.
 8. I/O Type: The type of I/O required for current and future monitoring and control activities (spare I/O is not included).
 - a. Analog Input (AI): If the tag number generates an AI, the quantity of AIs are listed.
 - b. Analog Output (AO): If the tag number generates an AO, the quantity of AOs are listed.
 - c. Discrete Input (DI): If the tag number generates a DI, the quantity of DIs are listed.
 - d. Discrete Output (DO): If the tag number generates a DO, the quantity of DOs are listed.
 9. Location: DCS address.

3.09 SUPPLEMENTS

A. The supplements listed below, following “End of Section,” are part of this Specification.

1. Instrument Summary.
2. Instrument Data Sheets.
3. Control Panel Summary.
4. DCS Input/Output List.

END OF SECTION

INSTRUMENT SUMMARY

Loop	Tag Number	Loop Title	Code	Code Description	P+ID	Design Detail
12501	12LET501	Flow Equalization Basin 1 Level	L29	Level Element & Transmitter, Radar	PK1-N01-N-111C	4091-260
12521	12LET521	Flow Equalization Basin 2 Level	L29	Level Element & Transmitter, Radar	PK1-N01-N-111D	4091-260
12541	12LET541	Flow Equalization Basin 3 Level	L29	Level Element & Transmitter, Radar	PK1-N01-N-111E	4091-258
12541	12LSH541	Flow Equalization Basin 3 Level	L50	Level Switch, Tuning Fork	PK1-N01-N-111E	4091-266
12501A	12LI501A	Flow Equalization Basin 1 Level	40 90 00	Indicator, Field Mount, NEMA 4X	PK1-N01-N-111C	4091-384
12521A	12LI521A	Flow Equalization Basin 2 Level	40 90 00	Indicator, Field Mount, NEMA 4X	PK1-N01-N-111D	4091-384
12541A	12LI541A	Flow Equalization Basin 3 Level	40 90 00	Indicator, Field Mount, NEMA 4X	PK1-N01-N-111E	4091-384
12541B	12LI541B	Flow Equalization Basin 3 Level	40 90 00	Indicator, Panel Mount	PK1-N01-N-111E	PK1-N-I-103A
12541B	12LLH541B	Flow Equalization Basin 3 Level	40 90 00	Current Alarm Trip	PK1-N01-N-111E	PK1-N-I-103A
12555	12PIT555	Flow Equalization Basins UWHP Pressure	P09	Pressure Transmitter	PK1-N01-N-111E	4091-302 4091-380

L29

LEVEL ELEMENT AND TRANSMITTER - RADAR

GENERAL	1	Tag Number	P&ID	12LET501	PK1-N01-N-111C	
	2	Loop Title			Equalization Tank 1 Level	
	3	Area Classification			Class I - Division II	
	4					
	5	Line Number	Equipment Number			
	6	Line Size	Line Schedule			
	7					
PROCESS CONDITIONS	8	Fluid			Primary Effluent	
	9	Pressure			Atmospheric	
	10	Temperature				
	11	Specific Gravity	Viscosity		1.0	
	12	Conductivity	Density			
	13	Vapor Pressure	Critical Pressure			
	14					
ELEMENT	15	Element Type			3 inch Horn	
	16	Element Length			6.9 inches	
	17	Extension Length			16 inches	
	18	Wetted Materials			316 Stainless Steel	
	19	Process Connection			4-inch Class 150 ANSI Flange	
	20	Measurable Limits			65 Feet	
	21	Beam Angle			10 Degrees	
	22	Antenna Enclosure			NEMA 6P / IP68	
	23	Ambient Temperature Limits			-40 degF to 176 degF	
	24	Process Temperature Limits			-40 degF to 176 degF	
	25					
TRANSMITTER	26					
	27	Mounting			Integral	
	28	Enclosure NEMA Rating			NEMA 4X / IP65	
	29	Power Supply	Voltage		2 - Wire	24 VDC
	30	Output Signal			4 to 20 mdc	
	31	Communication Protocol			HART	
	32	Range			0 - 40 Feet	
CALIBRATION	33	Display			Integral	
	34	Calibrated Range			0 - 32 Feet	
	35	Zero Reference			Elevation 368.00 Feet	
	36	Vendor Calibration			No	
	37					
	38	Accuracy	Resolution		+/- 0.1 Pct of Range	0.04 inch
	39					
OPTIONS	40	Tagging			Stainless Steel Tag with Tag Number	
	41	Sun Shield			Yes	
	42					
	43					
	44					
	45					
PURCHASE	46	Manufacturer		Endress+Hauser	Siemens	
	47	Model Number		FMR51	SITRANS LR250	
	48	Antenna Extension				
	49	Sun Shield				
	50	Purchase Note			1 year warranty	
	51					
	52					
	53					

L29 LEVEL TRANSMITTER - RADAR	SAN DIEGO NCWRP EXPANSION AND NCPWF IPS AND PIPELINE
	12LET501

GENERAL	1	Tag Number	P&ID	12LET521	PK1-N01-N-111D	
	2	Loop Title			Equalization Tank 2 Level	
	3	Area Classification			Class I - Division II	
	4					
	5	Line Number	Equipment Number			
	6	Line Size	Line Schedule			
	7					
PROCESS CONDITIONS	8	Fluid			Primary Effluent	
	9	Pressure			Atmospheric	
	10	Temperature				
	11	Specific Gravity	Viscosity		1.0	
	12	Conductivity	Density			
	13	Vapor Pressure	Critical Pressure			
	14					
ELEMENT	15	Element Type			3 inch Horn	
	16	Element Length			6.9 inches	
	17	Extension Length			16 inches	
	18	Wetted Materials			316 Stainless Steel	
	19	Process Connection			4-inch Class 150 ANSI Flange	
	20	Measurable Limits			65 Feet	
	21	Beam Angle			10 Degrees	
	22	Antenna Enclosure			NEMA 6P / IP68	
	23	Ambient Temperature Limits			-40 degF to 176 degF	
	24	Process Temperature Limits			-40 degF to 176 degF	
	25					
TRANSMITTER	26					
	27	Mounting			Integral	
	28	Enclosure NEMA Rating			NEMA 4X / IP65	
	29	Power Supply	Voltage		2 - Wire	24 VDC
	30	Output Signal			4 to 20 mdc	
	31	Communication Protocol			HART	
	32	Range			0 - 131 Feet	
CALIBRATION	33	Display			Integral	
	34	Calibrated Range			0 - 32 Feet	
	35	Zero Reference			Elevation 368.00 Feet	
	36	Vendor Calibration			No	
	37					
	38	Accuracy	Resolution		+/- 0.1 Pct of Range	0.04 inch
	39					
OPTIONS	40	Tagging			Stainless Steel Tag with Tag Number	
	41	Sun Shield			Yes	
	42					
	43					
	44					
	45					
PURCHASE	46	Manufacturer		Endress+Hauser	Siemens	
	47	Model Number		FMR51	SITRANS LR250	
	48	Antenna Extension				
	49	Sun Shield				
	50	Purchase Note			1 year warranty	
	51					
	52					
	53					

L29 LEVEL TRANSMITTER - RADAR	SAN DIEGO NCWRP EXPANSION AND NCPWF IPS AND PIPELINE
	12LET521

GENERAL	1	Tag Number	P&ID	12LET541	PK1-N01-N-111E	
	2	Loop Title			Equalization Tank 3 Level	
	3	Area Classification			Class I - Division II	
	4					
	5	Line Number	Equipment Number			
	6	Line Size	Line Schedule			
	7					
PROCESS CONDITIONS	8	Fluid			Primary Effluent	
	9	Pressure			Atmospheric	
	10	Temperature				
	11	Specific Gravity	Viscosity		1.0	
	12	Conductivity	Density			
	13	Vapor Pressure	Critical Pressure			
	14					
ELEMENT	15	Element Type			3 inch Horn	
	16	Element Length			6.9 inches	
	17	Extension Length			16 inches	
	18	Wetted Materials			316 Stainless Steel	
	19	Process Connection			4-inch Class 150 ANSI Flange	
	20	Measurable Limits			65 Feet	
	21	Beam Angle			10 Degrees	
	22	Antenna Enclosure			NEMA 6P / IP68	
	23	Ambient Temperature Limits			-40 degF to 176 degF	
	24	Process Temperature Limits			-40 degF to 176 degF	
	25					
26						
TRANSMITTER	27	Mounting			Integral	
	28	Enclosure NEMA Rating			NEMA 4X / IP65	
	29	Power Supply	Voltage		2 - Wire	24 VDC
	30	Output Signal			4 to 20 mdc	
	31	Communication Protocol			HART	
	32	Range			0 - 131 Feet	
	33	Display			Integral	
CALIBRATION	34	Calibrated Range			0 - 32 Feet	
	35	Zero Reference			Elevation 368.00 Feet	
	36	Vendor Calibration			No	
	37					
	38	Accuracy	Resolution		+/- 0.1 Pct of Range	0.04 inch
	39					
OPTIONS	40	Tagging			Stainless Steel Tag with Tag Number	
	41	Sun Shield			Yes	
	42					
	43					
	44					
	45					
PURCHASE	46	Manufacturer		Endress+Hauser	Siemens	
	47	Model Number		FMR51	SITRANS LR250	
	48	Antenna Extension				
	49	Sun Shield				
	50	Purchase Note			1 year warranty	
	51					
	52					
	53					

L29 LEVEL TRANSMITTER - RADAR	SAN DIEGO NCWRP EXPANSION AND NCPWF IPS AND PIPELINE
	12LET541

L50 LEVEL SWITCH TUNING FORK

GENERAL	1	Tag Number	P&ID	12LSH541	PK1-N01-N-111E	
	2	Loop Title				Flow Equalization Tank 3 Level
	3	Area Classification				Class I - Division II
	4					
	5	Line Number	Equipment Number			
	6	Line Size	Line Schedule			
	7					
PROCESS CONDITIONS	8	Fluid				Primary Effluent
	9	Pressure				Atmospheric
	10	Temperature				
	11	Specific Gravity	Viscosity			1.43
	12	Conductivity	Density			
	13	Vapor Pressure	Critical Pressure			
ELEMENT	14					
	15	Element Type				Tuning Fork
	16	Insertion Length				
	17	Process Connection				2 inch - Class 150 ANSI Flange
	18	Wetted Materials				Teflon
	19					
	20	Enclosure NEMA Rating				NEMA 4X
	21					
SWITCH	22	Ambient Temperature Limits				-50 degF to 160 degF
	23	Process Temperature Limits				-50 degF to 300 degF
	24					
	25	Switch Type				Point Level
	26	Set Point				Elev. 399.4 Feet
	27	Set Point Direction				Increasing
	28	Deadband				
TRANSMITTER	29	Failure State				
	30	Voltage				
	31	Contact Arrangement				
	32	Contact Rating				
	33	Communication Protocol				
	34	Power Supply	Voltage			2 - Wire 24 VDC
	35	Output Signal				Isolated 4 to 20 mADC
36	Communication Protocol				HART	
CALIBRATION	37					
	38					
	39					
	40					
	41	Vendor Calibration				No
OPTIONS	42					
	43					
	44	Accuracy	Repeatability			0.04 inches 0.004 inches
PURCHASE	45					
	46	Tagging				Affix stainless steel tag with Tag Number
	47					
PURCHASE	48					
	49					
	50	Manufacturer		Endress+Hauser	Rosemount	
	51	Model Number		M FTL51C	2120	
	52	Purchase Note				1 year warranty
	53					
L50				SAN DIEGO NCWRP EXPANSION AND NCPWF IPS AND PIPELINE		
LEVEL SWITCH - TUNING FORK				12LSH541		

P09

PRESSURE TRANSMITTER

GENERAL	1	Tag Number	P&ID	12PIT555	PK1-N01-N-111E
	2	Loop Title		Flow Equalization Basins UWHP Pressure	
	3	Area Classification		Non-Hazardous	
	4	Line Number	Equipment Number		
	5	Line Size	Line Schedule		
PROCESS CONDITIONS	6	Fluid		Water	
	7	Min Pressure	Max Pressure	60 psig	100 psig
	8	Temperature			
	9	Specific Gravity	Viscosity		
	10	Conductivity	Density		
	11	Vapor Pressure	Critical Prssure		
ELEMENT	12	Element Type		Ceramic Diaphragm	
	13	Element Material			
	14	Body Rating			
	15	Instrument Body Material		AISI 316L	
	16	Wetted Materials		AISI 316L	
	17	Process Connection		0.5 inch NPT	
	18	Measurable Limits			
	19	Ambient Temperature Limits		-40 degF to 175 degF	
	20	Process Temperature Limits		-40 degF to 250 degF	
	21	Wetted O-Ring Material			
	DIAPHRAGM SEAL - ANNULAR SEAL	22	Type		NA
23		Process Connection			
24		Body Material			
25		Diaphragm / Sleeve Material			
26					
27		Calillary Material			
28		Capillary Length			
29		Fill Fluid			
30		Flushing Connection			
31					
32		Manufacturer			
33		Model Number			
TRANSMITTER	34	Mounting		Wall	
	35	Enclosure NEMA Rating		NEMA 4X; Coated Aluminum	
	36	Power Supply	Voltage	2 - Wire	24 VDC
	37	Output Signal		4 to 20 mdc	
	38	Communication Protocol		HART	
	39	Range		0 - 150 psig	
	40				
CALIBRATION	41	Calibrated Range		0 - 120 psig	
	42	Vendor Calibration		Factory calibrate - Provide calibration certificate	
	43	Zero Elevated or Suppressed			
	44	Zero Reference			
	45	Accuracy	Repeatability	+/- 0.1 Pct of Span	
OPTIONS	46	Multi-Valve Manifold		Yes	
	47	Tagging		Stainless steel tag with Tag Number	
	48	Mounting Bracket		2 inch pipe	
	49				
PURCHASE	50	Manufacturer		Endress+Hauser	SMAR
	51	Model Number		Cerabar PMP71	LD291
	52	3-valve SS Manifolds mounted		316 stainless steel	
	53	Purchase Note		1 year warranty	

P09 PRESSURE TRANSMITTER	SAN DIEGO NCWRP EXPANSION AND NCPWF IPS AND PIPELINE
	12PIT555

CONTROL PANEL SUMMARY

ITEM	NAME	DESCRIPTION	PANEL RATING	PANEL ASSEMBLY DRAWINGS		
1	12PNL03	EQUALIZATION TANK 3 WASHDOWN PANEL	NEMA 4			
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

SAN DIEGO NCWRP EXPANSION AND NCPWF
INFLUENT PUMP STATION AND PIPELINE

DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	5A26458G04	N12FV503A	EQUALIZATION BASIN 1 - ZONE 1 WASHDOWN VALVE		OPEN	DO	1.1.1.1
DROP07	55PCM01A	5A26458G04	N12FV503B	EQUALIZATION BASIN 1 - ZONE 1 WASHDOWN VALVE		CLOSE	DO	1.1.1.2
DROP07	55PCM01A	5A26458G04	N12FV504A	EQUALIZATION BASIN 1 - ZONE 2 WASHDOWN VALVE		OPEN	DO	1.1.1.3
DROP07	55PCM01A	5A26458G04	N12FV504B	EQUALIZATION BASIN 1 - ZONE 2 WASHDOWN VALVE		CLOSE	DO	1.1.1.4
DROP07	55PCM01A	5A26458G04	N12FV505A	EQUALIZATION BASIN 1 - ZONE 3 WASHDOWN VALVE		OPEN	DO	1.1.1.5
DROP07	55PCM01A	5A26458G04	N12FV505B	EQUALIZATION BASIN 1 - ZONE 3 WASHDOWN VALVE		CLOSE	DO	1.1.1.6
DROP07	55PCM01A	5A26458G04	N12FV506A	EQUALIZATION BASIN 1 - ZONE 4 WASHDOWN VALVE		OPEN	DO	1.1.1.7
DROP07	55PCM01A	5A26458G04	N12FV506B	EQUALIZATION BASIN 1 - ZONE 4 WASHDOWN VALVE		CLOSE	DO	1.1.1.8
DROP07	55PCM01A	5A26458G04	N12FV507A	EQUALIZATION BASIN 1 - ZONE 5 WASHDOWN VALVE		OPEN	DO	1.1.1.9
DROP07	55PCM01A	5A26458G04	N12FV507B	EQUALIZATION BASIN 1 - ZONE 5 WASHDOWN VALVE		CLOSE	DO	1.1.1.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.1.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.1.12
DROP07	55PCM01A	5A26458G04	N12FV508A	EQUALIZATION BASIN 1 - ZONE 6 WASHDOWN VALVE		OPEN	DO	1.1.2.1
DROP07	55PCM01A	5A26458G04	N12FV508B	EQUALIZATION BASIN 1 - ZONE 6 WASHDOWN VALVE		CLOSE	DO	1.1.2.2
DROP07	55PCM01A	5A26458G04	N12FV509A	EQUALIZATION BASIN 1 - ZONE 7 WASHDOWN VALVE		OPEN	DO	1.1.2.3
DROP07	55PCM01A	5A26458G04	N12FV509B	EQUALIZATION BASIN 1 - ZONE 7 WASHDOWN VALVE		CLOSE	DO	1.1.2.4
DROP07	55PCM01A	5A26458G04	N12FV510A	EQUALIZATION BASIN 1 - ZONE 8 WASHDOWN VALVE		OPEN	DO	1.1.2.5
DROP07	55PCM01A	5A26458G04	N12FV510B	EQUALIZATION BASIN 1 - ZONE 8 WASHDOWN VALVE		CLOSE	DO	1.1.2.6
DROP07	55PCM01A	5A26458G04	N12FV502A	EQUALIZATION BASIN 1 - ISOLATION VALVE		OPEN	DO	1.1.2.7
DROP07	55PCM01A	5A26458G04	N12FV502B	EQUALIZATION BASIN 1 - ISOLATION VALVE		CLOSE	DO	1.1.2.8
DROP07	55PCM01A	5A26458G04	N12FV512A	EQUALIZATION BASIN 1 - DRAIN VALVE		OPEN	DO	1.1.2.9
DROP07	55PCM01A	5A26458G04	N12FV512B	EQUALIZATION BASIN 1 - DRAIN VALVE		CLOSE	DO	1.1.2.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.2.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.2.12
DROP07	55PCM01A	5A26458G04	N12FV523A	EQUALIZATION BASIN 2 - ZONE 1 WASHDOWN VALVE		OPEN	DO	1.1.3.1
DROP07	55PCM01A	5A26458G04	N12FV523B	EQUALIZATION BASIN 2 - ZONE 1 WASHDOWN VALVE		CLOSE	DO	1.1.3.2
DROP07	55PCM01A	5A26458G04	N12FV524A	EQUALIZATION BASIN 2 - ZONE 2 WASHDOWN VALVE		OPEN	DO	1.1.3.3
DROP07	55PCM01A	5A26458G04	N12FV524B	EQUALIZATION BASIN 2 - ZONE 2 WASHDOWN VALVE		CLOSE	DO	1.1.3.4
DROP07	55PCM01A	5A26458G04	N12FV525A	EQUALIZATION BASIN 2 - ZONE 3 WASHDOWN VALVE		OPEN	DO	1.1.3.5
DROP07	55PCM01A	5A26458G04	N12FV525B	EQUALIZATION BASIN 2 - ZONE 3 WASHDOWN VALVE		CLOSE	DO	1.1.3.6
DROP07	55PCM01A	5A26458G04	N12FV526A	EQUALIZATION BASIN 2 - ZONE 4 WASHDOWN VALVE		OPEN	DO	1.1.3.7
DROP07	55PCM01A	5A26458G04	N12FV526B	EQUALIZATION BASIN 2 - ZONE 4 WASHDOWN VALVE		CLOSE	DO	1.1.3.8
DROP07	55PCM01A	5A26458G04	N12FV527A	EQUALIZATION BASIN 2 - ZONE 5 WASHDOWN VALVE		OPEN	DO	1.1.3.9
DROP07	55PCM01A	5A26458G04	N12FV527B	EQUALIZATION BASIN 2 - ZONE 5 WASHDOWN VALVE		CLOSE	DO	1.1.3.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.3.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.1.3.12
DROP07	55PCM01A	5A26458G04	N12FV528A	EQUALIZATION BASIN 2 - ZONE 6 WASHDOWN VALVE		OPEN	DO	1.2.1.1
DROP07	55PCM01A	5A26458G04	N12FV528B	EQUALIZATION BASIN 2 - ZONE 6 WASHDOWN VALVE		CLOSE	DO	1.2.1.2

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MARCH 2019

North City Water Reclamation Plant Flow Equalization Basin
Attachment E - Technicals (Volume 3)

INSTRUMENTATION AND CONTROL
40 90 00 SUPPLEMENT - 1

SAN DIEGO NCWRP EXPANSION AND NCPWF
INFLUENT PUMP STATION AND PIPELINE

DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	5A26458G04	N12FV529A	EQUALIZATION BASIN 2 - ZONE 7 WASHDOWN VALVE		OPEN	DO	1.2.1.3
DROP07	55PCM01A	5A26458G04	N12FV529B	EQUALIZATION BASIN 2 - ZONE 7 WASHDOWN VALVE		CLOSE	DO	1.2.1.4
DROP07	55PCM01A	5A26458G04	N12FV530A	EQUALIZATION BASIN 2 - ZONE 8 WASHDOWN VALVE		OPEN	DO	1.2.1.5
DROP07	55PCM01A	5A26458G04	N12FV530B	EQUALIZATION BASIN 2 - ZONE 8 WASHDOWN VALVE		CLOSE	DO	1.2.1.6
DROP07	55PCM01A	5A26458G04	N12FV522A	EQUALIZATION BASIN 2 - ISOLATION VALVE		OPEN	DO	1.2.1.7
DROP07	55PCM01A	5A26458G04	N12FV522B	EQUALIZATION BASIN 2 - ISOLATION VALVE		CLOSE	DO	1.2.1.8
DROP07	55PCM01A	5A26458G04	N12FV532A	EQUALIZATION BASIN 2 - DRAIN VALVE		OPEN	DO	1.2.1.9
DROP07	55PCM01A	5A26458G04	N12FV532B	EQUALIZATION BASIN 2 - DRAIN VALVE		CLOSE	DO	1.2.1.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.1.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.1.12
DROP07	55PCM01A	5A26458G04	N11P103A	INTERMEDIATE PUMP 3	STOP	START	DO	1.2.2.1
DROP07	55PCM01A	5A26458G04	N11P105A	INTERMEDIATE PUMP 5	STOP	START	DO	1.2.2.2
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.3
DROP07	55PCM01A	5A26458G04	N55P312	SHC TRANSFER PUMP 2	STOP	START	DO	1.2.2.4
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.5
DROP07	55PCM01A	5A26458G04	N11ME110	PRIMARY EFFLUENT SAMPLER		INITIATE	DO	1.2.2.6
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.7
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.8
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.9
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.2.12
DROP07	55PCM01A	5A26458G04	N11P102A	INTERMEDIATE PUMP 2	STOP	START	DO	1.2.3.1
DROP07	55PCM01A	5A26458G04	N11P104A	INTERMEDIATE PUMP 4	STOP	START	DO	1.2.3.2
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.3
DROP07	55PCM01A	5A26458G04	N55P311	SHC TRANSFER PUMP 1	STOP	START	DO	1.2.3.4
DROP07	55PCM01A	5A26458G04	N55FV915A	SHC TRANSFER PUMP ISOLATION VALVE		OPEN	DO	1.2.3.5
DROP07	55PCM01A	5A26458G04	N55FV915B	SHC TRANSFER PUMP ISOLATION VALVE		CLOSE	DO	1.2.3.6
DROP07	55PCM01A	5A26458G04	N15FV801	BIOREACTOR SHC DAY TANK FILL VALVE			DO	1.2.3.7
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.8
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.9
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.2.3.12
DROP07	55PCM01A	5X00106G01	N12LIT521	EQUALIZATION BASIN 2 LEVEL	0	32 Feet	AI - HART	1.3.1.1
DROP07	55PCM01A	5X00106G01	N12LIT501	EQUALIZATION BASIN 1 LEVEL	0	32 Feet	AI - HART	1.3.1.2
DROP07	55PCM01A	5X00106G01	N12LIT541	EQUALIZATION BASIN 3 LEVEL	0	32 Feet	AI - HART	1.3.1.3
DROP07	55PCM01A	5X00106G01	N12LSH541	EQUALIZATION BASIN 3 LEVEL	NORMAL	HIGH	AI - HART	1.3.1.4
DROP07	55PCM01A	5X00106G01	N12PIT555	EQUALIZATION TANKS UWHP PRESSURE	0	120 psig	AI - HART	1.3.1.5

SAN DIEGO NCWRP EXPANSION AND NCPWF
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DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.1.6	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.1.7	
DROP07	55PCM01A	5X00106G01	N11AIT120A	PRIMARY EQUALIZATION pH			AI - HART	1.3.1.8	
DROP07	55PCM01A	5X00106G01	N11ST103	INTERMEDIATE PUMP 3 SPEED	0	100 Percent	AI - HART	1.3.2.1	
DROP07	55PCM01A	5X00106G01	N11ST105	INTERMEDIATE PUMP 5 SPEED	0	100 Percent	AI - HART	1.3.2.2	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.2.3	
DROP07	55PCM01A	5X00106G01	N12FIT550	EQUALIZATION BASIN WASHDOWN WATER FLOW			AI - HART	1.3.2.4	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.2.5	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.2.6	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.2.7	
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.3.2.8	
DROP07	55PCM01A	5X00062G01	N11P103B	INTERMEDIATE PUMP 3	0	100 Percent	AO	1.3.3.1	
DROP07	55PCM01A	5X00062G01	N11FV506	PRIMARY EFFLUENT FLOW	0	100 Percent	AO	1.3.3.2	
DROP07	55PCM01A	5X00062G01	N11P105B	INTERMEDIATE PUMP 5	0	100 Percent	AO	1.3.3.3	
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.3.3.4	
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.3.3.5	
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.3.3.6	
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.3.3.7	
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.3.3.8	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.1	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.2	
DROP07	55PCM01A	5X00119G01	N07DPUTEMP	DPU07 CABINET TEMPERATURE			RTD	1.3.4.3	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.4	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.5	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.6	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.7	
DROP07	55PCM01A	5X00119G01	SPARE				RTD	1.3.4.8	
DROP07	55PCM01A	Spare Module Address							1.3.5
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.1	
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.2	
DROP07	55PCM01A	1C31232G01	N12LSH501	EQUALIZATION BASIN 1 LEVEL	NORMAL	HIGH	DI	1.3.6.3	
DROP07	55PCM01A	1C31232G01	N12ZSHL505B	EQUALIZATION BASIN 1 - ZONE 3 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.3.6.4	
DROP07	55PCM01A	1C31232G01	N12ZSHL509B	EQUALIZATION BASIN 1 - ZONE 7 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.3.6.5	
DROP07	55PCM01A	1C31232G01	N11HK506	PRIMARY EFFLUENT FLOW	LOCAL	DCS	DI	1.3.6.6	
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.7	
DROP07	55PCM01A	1C31232G01	N12ZSHL529A	EQUALIZATION BASIN 2 - ZONE 7 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.6.8	
DROP07	55PCM01A	1C31232G01	N12HS532	EQUALIZATION BASIN 2 - DRAIN VALVE	LOCAL	DCS	DI	1.3.6.9	

SAN DIEGO NCWRP EXPANSION AND NCPWF
INFLUENT PUMP STATION AND PIPELINE

DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	1C31232G01	N12HS527	EQUALIZATION BASIN 2 - ZONE 5 WASHDOWN VALVE	LOCAL	DCS	DI	1.3.6.10
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.11
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.12
DROP07	55PCM01A	1C31232G01	N15YS1104	BIOREACTOR SHC FEED PUMP 2	OFF	ON	DI	1.3.6.13
DROP07	55PCM01A	1C31232G01	N12ZSHL508A	EQUALIZATION BASIN 1 - ZONE 6 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.6.14
DROP07	55PCM01A	1C31232G01	N55ESL02	MLS POWER SUPPLY	NORMAL	FAIL	DI	1.3.6.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.6.16
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.1
DROP07	55PCM01A	1C31232G01	N12YS112	EQUALIZATION BASINS FOUL AIR TRANSFER FAN 2	OFF	ON	DI	1.3.7.2
DROP07	55PCM01A	1C31232G01	N12ZSHL528A	EQUALIZATION BASIN 2 - ZONE 6 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.7.3
DROP07	55PCM01A	1C31232G01	N12HS526	EQUALIZATION BASIN 2 - ZONE 4 WASHDOWN VALVE	LOCAL	DCS	DI	1.3.7.4
DROP07	55PCM01A	1C31232G01	N12ZSHL532A	EQUALIZATION BASIN 2 - DRAIN VALVE	NOT OPENED	OPENED	DI	1.3.7.5
DROP07	55PCM01A	1C31232G01	N12ZSHL525A	EQUALIZATION BASIN 2 - ZONE 3 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.7.6
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.7
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.8
DROP07	55PCM01A	1C31232G01	N12ZSHL503A	EQUALIZATION BASIN 1 - ZONE 1 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.7.9
DROP07	55PCM01A	1C31232G01	N15HS1100B	BIOREACTORS ODOR CONTROL SYSTEM	LOCAL	DCS	DI	1.3.7.10
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.11
DROP07	55PCM01A	1C31232G01	N12ZSHL504B	EQUALIZATION BASIN 1 - ZONE 2 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.3.7.12
DROP07	55PCM01A	1C31232G01	N55YS311	SHC TRANSFER PUMP 1	OFF	ON	DI	1.3.7.13
DROP07	55PCM01A	1C31232G01	N55HS915	SHC TRANSFER PUMP ISOLATION VALVE	LOCAL	DCS	DI	1.3.7.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.7.16
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.8.1
DROP07	55PCM01A	1C31232G01	N12HS523	EQUALIZATION BASIN 2 - ZONE 1 WASHDOWN VALVE	LOCAL	DCS	DI	1.3.8.2
DROP07	55PCM01A	1C31232G01	N12ZSHL502A	EQUALIZATION BASIN 1 - ISOLATION VALVE	NOT OPENED	OPENED	DI	1.3.8.3
DROP07	55PCM01A	1C31232G01	N12ZSHL507A	EQUALIZATION BASIN 1 - ZONE 5 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.3.8.4
DROP07	55PCM01A	1C31232G01	N12HS509	EQUALIZATION BASIN 1 - ZONE 7 WASHDOWN VALVE	LOCAL	DCS	DI	1.3.8.5
DROP07	55PCM01A	1C31232G01	N12ZSHL522B	EQUALIZATION BASIN 2 - ISOLATION VALVE	NOT CLOSED	CLOSED	DI	1.3.8.6
DROP07	55PCM01A	1C31232G01	N12ZSHL525B	EQUALIZATION BASIN 2 - ZONE 3 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.3.8.7
DROP07	55PCM01A	1C31232G01	N11YS120	PRIMARY EFFLUENT SAMPLE PUMP	OFF	ON	DI	1.3.8.8
DROP07	55PCM01A	1C31232G01	N12ZSHL532B	EQUALIZATION BASIN 2 - DRAIN VALVE	NOT CLOSED	CLOSED	DI	1.3.8.9
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.8.10
DROP07	55PCM01A	1C31232G01	N15ZSHL801B	BIOREACTOR SHC DAY TANK FILL VALVE	NOT CLOSED	CLOSED	DI	1.3.8.11
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.3.8.12
DROP07	55PCM01A	1C31232G01	N11HS103A	INTERMEDIATE PUMP 3	LOCAL	DCS	DI	1.3.8.13
DROP07	55PCM01A	1C31232G01	N11HS103B	INTERMEDIATE PUMP 3	LOCAL	REMOTE	DI	1.3.8.14
DROP07	55PCM01A	1C31232G01	N11YS103	INTERMEDIATE PUMP 3	OFF	ON	DI	1.3.8.15
DROP07	55PCM01A	1C31232G01	N11US103	INTERMEDIATE PUMP 3	NORMAL	FAIL	DI	1.3.8.16

SAN DIEGO NCWRP EXPANSION AND NCPWF
INFLUENT PUMP STATION AND PIPELINE

DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.1.1
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.1.2
DROP07	55PCM01A	1C31232G01	N15HS1100D	BIOREACTORS ODOR CONTROL SYSTEM	LOCAL	DCS	DI	1.4.1.3
DROP07	55PCM01A	1C31232G01	N12HS522	EQUALIZATION BASIN 2 - ISOLATION VALVE	LOCAL	DCS	DI	1.4.1.4
DROP07	55PCM01A	1C31232G01	N12HS506	EQUALIZATION BASIN 1 - ZONE 4 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.1.5
DROP07	55PCM01A	1C31232G01	N12HS530	EQUALIZATION BASIN 2 - ZONE 8 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.1.6
DROP07	55PCM01A	1C31232G01	N12LSH521	EQUALIZATION BASIN 2 LEVEL	NORMAL	HIGH	DI	1.4.1.7
DROP07	55PCM01A	1C31232G01	N12ZSHL507B	EQUALIZATION BASIN 1 - ZONE 5 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.1.8
DROP07	55PCM01A	1C31232G01	N12ZSHL508B	EQUALIZATION BASIN 1 - ZONE 6 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.1.9
DROP07	55PCM01A	1C31232G01	N12ZSHL524B	EQUALIZATION BASIN 2 - ZONE 2 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.1.10
DROP07	55PCM01A	1C31232G01	N12HS525	EQUALIZATION BASIN 2 - ZONE 3 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.1.11
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.1.12
DROP07	55PCM01A	1C31232G01	N11HS105A	INTERMEDIATE PUMP 5	LOCAL	DCS	DI	1.4.1.13
DROP07	55PCM01A	1C31232G01	N11HS105B	INTERMEDIATE PUMP 5	LOCAL	REMOTE	DI	1.4.1.14
DROP07	55PCM01A	1C31232G01	N11YS105	INTERMEDIATE PUMP 5	OFF	ON	DI	1.4.1.15
DROP07	55PCM01A	1C31232G01	N11US105	INTERMEDIATE PUMP 5	NORMAL	FAIL	DI	1.4.1.16
DROP07	55PCM01A	1C31232G01	N12ZSHL526A	EQUALIZATION BASIN 2 - ZONE 4 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.4.2.1
DROP07	55PCM01A	1C31232G01	N12HS505	EQUALIZATION BASIN 1 - ZONE 3 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.2.2
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.3
DROP07	55PCM01A	1C31232G01	N12HS512	EQUALIZATION BASIN 1 - DRAIN VALVE	LOCAL	DCS	DI	1.4.2.4
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.5
DROP07	55PCM01A	1C31232G01	N15YS1103	BIOREACTOR SHC METERING PUMP 1	OFF	ON	DI	1.4.2.6
DROP07	55PCM01A	1C31232G01	N11LSL507	INTERMEDIATE PUMP WET WELL LEVEL			DI	1.4.2.7
DROP07	55PCM01A	1C31232G01	N12ZSHL510A	EQUALIZATION BASIN 1 - ZONE 8 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.4.2.8
DROP07	55PCM01A	1C31232G01	N12ZSHL530B	EQUALIZATION BASIN 2 - ZONE 8 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.2.9
DROP07	55PCM01A	1C31232G01	N12ZSHL524A	EQUALIZATION BASIN 2 - ZONE 2 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.4.2.10
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.11
DROP07	55PCM01A	1C31232G01	N12HS507	EQUALIZATION BASIN 1 - ZONE 5 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.2.12
DROP07	55PCM01A	1C31232G01	N55HS312	SHC TRANSFER PUMP 2	LOCAL	DCS	DI	1.4.2.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.2.16
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.1
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.2
DROP07	55PCM01A	1C31232G01	N12ZSHL526B	EQUALIZATION BASIN 2 - ZONE 4 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.3.3
DROP07	55PCM01A	1C31232G01	N11HS104B	INTERMEDIATE PUMP 4	LOCAL	REMOTE	DI	1.4.3.4
DROP07	55PCM01A	1C31232G01	N12ZSHL530A	EQUALIZATION BASIN 2 - ZONE 8 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.4.3.5
DROP07	55PCM01A	1C31232G01	N12ZSHL510B	EQUALIZATION BASIN 1 - ZONE 8 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.3.6
DROP07	55PCM01A	1C31232G01	N12HS504	EQUALIZATION BASIN 1 - ZONE 2 WASHDOWN VALVE	LOCAL	DCS	DI	1.4.3.7
DROP07	55PCM01A	1C31232G01	N12ZSHL503B	EQUALIZATION BASIN 1 - ZONE 1 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.4.3.8

SAN DIEGO NCWRP EXPANSION AND NCPWF
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DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	1C31232G01	N65US501	AREA 65 - SUBSTATION TRANSFORMER	NORMAL	FAIL	DI	1.4.3.9
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.10
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.11
DROP07	55PCM01A	1C31232G01	N55HS311	SHC TRANSFER PUMP 1	LOCAL	DCS	DI	1.4.3.12
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.4.3.16
Spare Module Address								1.4.4
Spare Module Address								1.4.5
Spare Module Address								1.4.6
DROP07	55PCM01A	5X00062G01	N11P102B	INTERMEDIATE PUMP 2	0	100 Percent	AO	1.4.7.1
DROP07	55PCM01A	5X00062G01	N11P104B	INTERMEDIATE PUMP 4	0	100 Percent	AO	1.4.7.2
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.3
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.4
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.5
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.6
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.7
DROP07	55PCM01A	5X00062G01	SPARE				AO	1.4.7.8
DROP07	55PCM01A	5X00106G01	N11FIT506	PRIMARY EFFLUENT FLOW	0	60 mgd	AI - HART	1.4.8.1
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.4.8.2
DROP07	55PCM01A	5X00106G01	N11ZT506	PRIMARY EFFLUENT FLOW	0	100 Percent	AI - HART	1.4.8.3
DROP07	55PCM01A	5X00106G01	N15LT801	BIOREACTOR SHC DAY TANK LEVEL			AI - HART	1.4.8.4
DROP07	55PCM01A	5X00106G01	N11AIT110A	PRIMARY EFFLUENT pH			AI - HART	1.4.8.5
DROP07	55PCM01A	5X00106G01	SPARE				AI - HART	1.4.8.6
DROP07	55PCM01A	5X00106G01	N11ST102	INTERMEDIATE PUMP 2 SPEED	0	100 Percent	AI - HART	1.4.8.7
DROP07	55PCM01A	5X00106G01	N11ST104	INTERMEDIATE PUMP 4 SPEED	0	100 Percent	AI - HART	1.4.8.8
DROP07	55PCM01A	5A26458G04	N12FV543A	EQUALIZATION BASIN 3 - ZONE 1 WASHDOWN VALVE		OPEN	DO	1.5.1.1
DROP07	55PCM01A	5A26458G04	N12FV543B	EQUALIZATION BASIN 3 - ZONE 1 WASHDOWN VALVE		CLOSE	DO	1.5.1.2
DROP07	55PCM01A	5A26458G04	N12FV544A	EQUALIZATION BASIN 3 - ZONE 2 WASHDOWN VALVE		OPEN	DO	1.5.1.3
DROP07	55PCM01A	5A26458G04	N12FV544B	EQUALIZATION BASIN 3 - ZONE 2 WASHDOWN VALVE		CLOSE	DO	1.5.1.4
DROP07	55PCM01A	5A26458G04	N12FV545A	EQUALIZATION BASIN 3 - ZONE 3 WASHDOWN VALVE		OPEN	DO	1.5.1.5
DROP07	55PCM01A	5A26458G04	N12FV545B	EQUALIZATION BASIN 3 - ZONE 3 WASHDOWN VALVE		CLOSE	DO	1.5.1.6
DROP07	55PCM01A	5A26458G04	N12FV546A	EQUALIZATION BASIN 3 - ZONE 4 WASHDOWN VALVE		OPEN	DO	1.5.1.7
DROP07	55PCM01A	5A26458G04	N12FV546B	EQUALIZATION BASIN 3 - ZONE 4 WASHDOWN VALVE		CLOSE	DO	1.5.1.8
DROP07	55PCM01A	5A26458G04	N12FV547A	EQUALIZATION BASIN 3 - ZONE 5 WASHDOWN VALVE		OPEN	DO	1.5.1.9

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MARCH 2019

INSTRUMENTATION AND CONTROL
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INFLUENT PUMP STATION AND PIPELINE

DCS INPUT / OUTPUT LIST

FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	5A26458G04	N12FV547B	EQUALIZATION BASIN 3 - ZONE 5 WASHDOWN VALVE		CLOSE	DO	1.5.1.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.5.1.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.5.1.12
DROP07	55PCM01A	5A26458G04	N12FV548A	EQUALIZATION BASIN 3 - ZONE 6 WASHDOWN VALVE		OPEN	DO	1.5.2.1
DROP07	55PCM01A	5A26458G04	N12FV548B	EQUALIZATION BASIN 3 - ZONE 6 WASHDOWN VALVE		CLOSE	DO	1.5.2.2
DROP07	55PCM01A	5A26458G04	N12FV549A	EQUALIZATION BASIN 3 - ZONE 7 WASHDOWN VALVE		OPEN	DO	1.5.2.3
DROP07	55PCM01A	5A26458G04	N12FV549B	EQUALIZATION BASIN 3 - ZONE 7 WASHDOWN VALVE		CLOSE	DO	1.5.2.4
DROP07	55PCM01A	5A26458G04	N12FV550A	EQUALIZATION BASIN 3 - ZONE 8 WASHDOWN VALVE		OPEN	DO	1.5.2.5
DROP07	55PCM01A	5A26458G04	N12FV550B	EQUALIZATION BASIN 3 - ZONE 8 WASHDOWN VALVE		CLOSE	DO	1.5.2.6
DROP07	55PCM01A	5A26458G04	N12FV542A	EQUALIZATION BASIN 3 - ISOLATION VALVE		OPEN	DO	1.5.2.7
DROP07	55PCM01A	5A26458G04	N12FV542B	EQUALIZATION BASIN 3 - ISOLATION VALVE		CLOSE	DO	1.5.2.8
DROP07	55PCM01A	5A26458G04	N12FV552A	EQUALIZATION BASIN 3 - DRAIN VALVE		OPEN	DO	1.5.2.9
DROP07	55PCM01A	5A26458G04	N12FV552B	EQUALIZATION BASIN 3 - DRAIN VALVE		CLOSE	DO	1.5.2.10
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.5.2.11
DROP07	55PCM01A	5A26458G04	SPARE				DO	1.5.2.12
Spare Module Address								1.5.3
Spare Module Address								1.6.1
Spare Module Address								1.6.2
DROP07	55PCM01A	1C31232G01	N12ZSHL506B	EQUALIZATION BASIN 1 - ZONE 4 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.3.1
DROP07	55PCM01A	1C31232G01	N12ZSHL504A	EQUALIZATION BASIN 1 - ZONE 2 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.3.2
DROP07	55PCM01A	1C31232G01	N12ZSHL522A	EQUALIZATION BASIN 2 - ISOLATION VALVE	NOT OPENED	OPENED	DI	1.6.3.3
DROP07	55PCM01A	1C31232G01	N12HS529	EQUALIZATION BASIN 2 - ZONE 7 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.3.4
DROP07	55PCM01A	1C31232G01	N15HS1100C	BIOREACTOR ODOR CONTROL SYSTEM	LOCAL	DCS	DI	1.6.3.5
DROP07	55PCM01A	1C31232G01	N12HS524	EQUALIZATION BASIN 2 - ZONE 2 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.3.6
DROP07	55PCM01A	1C31232G01	N12ZSHL523B	EQUALIZATION BASIN 2 - ZONE 1 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.3.7
DROP07	55PCM01A	1C31232G01	N12HS510	EQUALIZATION BASIN 1 - ZONE 8 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.3.8
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.3.9
DROP07	55PCM01A	1C31232G01	N12ZSHL502B	EQUALIZATION BASIN 1 - ISOLATION VALVE	NOT CLOSED	CLOSED	DI	1.6.3.10
DROP07	55PCM01A	1C31232G01	N12ZSHL527A	EQUALIZATION BASIN 2 - ZONE 5 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.3.11
DROP07	55PCM01A	1C31232G01	N55YS312	SHC TRANSFER PUMP 2	ON	OFF	DI	1.6.3.12
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.3.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.3.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.3.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.3.16
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.4.1
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.4.2

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FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	1C31232G01	N15HS1100A	BIOREACTOR ODOR CONTROL SYSTEM	LOCAL	DCS	DI	1.6.4.3
DROP07	55PCM01A	1C31232G01	N12HS503	EQUALIZATION BASIN 1 - ZONE 1 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.4.4
DROP07	55PCM01A	1C31232G01	N12HS528	EQUALIZATION BASIN 2 - ZONE 6 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.4.5
DROP07	55PCM01A	1C31232G01	N12ZSHL523A	EQUALIZATION BASIN 2 - ZONE 1 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.4.6
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.4.7
DROP07	55PCM01A	1C31232G01	N12HS502	EQUALIZATION BASIN 1 - ISOLATION VALVE	LOCAL	DCS	DI	1.6.4.8
DROP07	55PCM01A	1C31232G01	N12LSHH410	EQUALIZATION BASIN VALVE VAULT SUMP LEVEL	NORMAL	HIGH	DI	1.6.4.9
DROP07	55PCM01A	1C31232G01	N12ZSHL529B	EQUALIZATION BASIN 2 - ZONE 7 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.4.10
DROP07	55PCM01A	1C31232G01	N12ZSHL506A	EQUALIZATION BASIN 1 - ZONE 4 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.4.11
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.4.12
DROP07	55PCM01A	1C31232G01	N11HS102A	INTERMEDIATE PUMP 2	LOCAL	DCS	DI	1.6.4.13
DROP07	55PCM01A	1C31232G01	N11HS102B	INTERMEDIATE PUMP 2	LOCAL	REMOTE	DI	1.6.4.14
DROP07	55PCM01A	1C31232G01	N11YS102	INTERMEDIATE PUMP 2	OFF	ON	DI	1.6.4.15
DROP07	55PCM01A	1C31232G01	N11US102	INTERMEDIATE PUMP 2	NORMAL	FAIL	DI	1.6.4.16
DROP07	55PCM01A	1C31232G01	N15YS151	BIOREACTOR AGITATION AIR BLOWER 1			DI	1.6.5.1
DROP07	55PCM01A	1C31232G01	N12ZSHL505A	EQUALIZATION BASIN 1 - ZONE 3 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.5.2
DROP07	55PCM01A	1C31232G01	N12ZSHL528B	EQUALIZATION BASIN 2 - ZONE 6 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.5.3
DROP07	55PCM01A	1C31232G01	N12ZSHL512A	EQUALIZATION BASIN 1 - DRAIN VALVE	NOT OPENED	OPENED	DI	1.6.5.4
DROP07	55PCM01A	1C31232G01	N12HS508	EQUALIZATION BASIN 1 - ZONE 6 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.5.5
DROP07	55PCM01A	1C31232G01	N12ZSHL512B	EQUALIZATION BASIN 1 - DRAIN VALVE	NOT OPENED	OPENED	DI	1.6.5.6
DROP07	55PCM01A	1C31232G01	N12ZSHL527B	EQUALIZATION BASIN 2 - ZONE 5 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.5.7
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.5.8
DROP07	55PCM01A	1C31232G01	N12YS111	EQUALIZATION BASIN FOUL AIR TRANSFER FAN 1			DI	1.6.5.9
DROP07	55PCM01A	1C31232G01	N15YS1105	BIOREACTOR SHC METERING PUMP 3			DI	1.6.5.10
DROP07	55PCM01A	1C31232G01	N12ZSHL509A	EQUALIZATION BASIN 1 - ZONE 7 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.5.11
DROP07	55PCM01A	1C31232G01	N15ZSHL801A	BIOREACTOR SHC DAY TANK FILL VALVE	NOT OPENED	OPENED	DI	1.6.5.12
DROP07	55PCM01A	1C31232G01	N11HS104A	INTERMEDIATE PUMP 4	LOCAL	DCS	DI	1.6.5.13
DROP07	55PCM01A	1C31232G01	N11HS104B	INTERMEDIATE PUMP 4	LOCAL	REMOTE	DI	1.6.5.14
DROP07	55PCM01A	1C31232G01	N11YS1104	INTERMEDIATE PUMP 4	OFF	ON	DI	1.6.5.15
DROP07	55PCM01A	1C31232G01	N11US104	INTERMEDIATE PUMP 4	NORMAL	FAIL	DI	1.6.5.16
DROP07	55PCM01A	1C31232G01	N12ZSHL543A	EQUALIZATION BASIN 3 - ZONE 1 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.6.1
DROP07	55PCM01A	1C31232G01	N12ZSHL543B	EQUALIZATION BASIN 3 - ZONE 1 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.6.2
DROP07	55PCM01A	1C31232G01	N12HS543	EQUALIZATION BASIN 3 - ZONE 1 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.6.3
DROP07	55PCM01A	1C31232G01	N12ZSHL544A	EQUALIZATION BASIN 3 - ZONE 2 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.6.4
DROP07	55PCM01A	1C31232G01	N12ZSHL544B	EQUALIZATION BASIN 3 - ZONE 2 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.6.5
DROP07	55PCM01A	1C31232G01	N12HS544	EQUALIZATION BASIN 3 - ZONE 2 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.6.6
DROP07	55PCM01A	1C31232G01	N12ZSHL545A	EQUALIZATION BASIN 3 - ZONE 3 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.6.7
DROP07	55PCM01A	1C31232G01	N12ZSHL545B	EQUALIZATION BASIN 3 - ZONE 3 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.6.8
DROP07	55PCM01A	1C31232G01	N12HS545	EQUALIZATION BASIN 3 - ZONE 3 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.6.9
DROP07	55PCM01A	1C31232G01	N12ZSHL546A	EQUALIZATION BASIN 3 - ZONE 4 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.6.10

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FLOW EQUALIZATION

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	1C31232G01	N12ZSHL546B	EQUALIZATION BASIN 3 - ZONE 4 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.6.11
DROP07	55PCM01A	1C31232G01	N12HS546	EQUALIZATION BASIN 3 - ZONE 4 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.6.12
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.6.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.6.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.6.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.6.16
DROP07	55PCM01A	1C31232G01	N12ZSHL547A	EQUALIZATION BASIN 3 - ZONE 5 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.7.1
DROP07	55PCM01A	1C31232G01	N12ZSHL547B	EQUALIZATION BASIN 3 - ZONE 5 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.7.2
DROP07	55PCM01A	1C31232G01	N12HS547	EQUALIZATION BASIN 3 - ZONE 5 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.7.3
DROP07	55PCM01A	1C31232G01	N12ZSHL548A	EQUALIZATION BASIN 3 - ZONE 6 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.7.4
DROP07	55PCM01A	1C31232G01	N12ZSHL548B	EQUALIZATION BASIN 3 - ZONE 6 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.7.5
DROP07	55PCM01A	1C31232G01	N12HS548	EQUALIZATION BASIN 3 - ZONE 6 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.7.6
DROP07	55PCM01A	1C31232G01	N12ZSHL549A	EQUALIZATION BASIN 3 - ZONE 7 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.7.7
DROP07	55PCM01A	1C31232G01	N12ZSHL549B	EQUALIZATION BASIN 3 - ZONE 7 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.7.8
DROP07	55PCM01A	1C31232G01	N12HS549	EQUALIZATION BASIN 3 - ZONE 7 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.7.9
DROP07	55PCM01A	1C31232G01	N12ZSHL550A	EQUALIZATION BASIN 3 - ZONE 8 WASHDOWN VALVE	NOT OPENED	OPENED	DI	1.6.7.10
DROP07	55PCM01A	1C31232G01	N12ZSHL550B	EQUALIZATION BASIN 3 - ZONE 8 WASHDOWN VALVE	NOT CLOSED	CLOSED	DI	1.6.7.11
DROP07	55PCM01A	1C31232G01	N12HS550	EQUALIZATION BASIN 3 - ZONE 8 WASHDOWN VALVE	LOCAL	DCS	DI	1.6.7.12
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.7.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.7.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.7.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.7.16
DROP07	55PCM01A	1C31232G01	N12ZSHL542A	EQUALIZATION BASIN 3 - ISOLATION VALVE	NOT OPENED	OPENED	DI	1.6.8.1
DROP07	55PCM01A	1C31232G01	N12ZSHL542B	EQUALIZATION BASIN 3 - ISOLATION VALVE	NOT CLOSED	CLOSED	DI	1.6.8.2
DROP07	55PCM01A	1C31232G01	N12HS542	EQUALIZATION BASIN 3 - ISOLATION VALVE	LOCAL	DCS	DI	1.6.8.3
DROP07	55PCM01A	1C31232G01	N12ZSHL552A	EQUALIZATION BASIN 3 - DRAIN VALVE	NOT OPENED	OPENED	DI	1.6.8.4
DROP07	55PCM01A	1C31232G01	N12ZSHL552B	EQUALIZATION BASIN 3 - DRAIN VALVE	NOT CLOSED	CLOSED	DI	1.6.8.5
DROP07	55PCM01A	1C31232G01	N12HS552	EQUALIZATION BASIN 3 - DRAIN VALVE	LOCAL	DCS	DI	1.6.8.6
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.7
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.8
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.9
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.10
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.11
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.12
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.13
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.14
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.15
DROP07	55PCM01A	1C31232G01	SPARE				DI	1.6.8.16
DROP07	55PCM01A	5X00419G01	N11P101	INTERMEDIATE PUMP 1 [FUTURE]			ET	1.7.1

DCU	Cabinet	Card Type	Tag	Loop Title	Zero State	One State	Type	Location
DROP07	55PCM01A	5X00419G01	N11P103	INTERMEDIATE PUMP 3 [FUTURE]			ET	1.7.2
DROP07	55PCM01A	5X00419G01	N11P105	INTERMEDIATE PUMP 5 [FUTURE]			ET	1.7.3
Spare Module Address								1.7.4
Spare Module Address								1.7.5
Spare Module Address								1.7.6
Spare Module Address								1.7.7
Spare Module Address								1.7.8
Spare Module Address								1.8.1
Spare Module Address								1.8.2
Spare Module Address								1.8.3
Spare Module Address								1.8.4
Spare Module Address								1.8.5
DROP07	55PCM01A	5X00419G01		UNIT SUBSTATION 65 [FUTURE]			ET	1.8.6
DROP07	55PCM01A	5X00419G01	N11P104	INTERMEDIATE PUMP 4 [FUTURE]			ET	1.8.7
DROP07	55PCM01A	5X00419G01	N11P102	INTERMEDIATE PUMP 2 [FUTURE]			ET	1.8.8

SECTION 44 42 73.01
THERMOPLASTIC LINER FOR CONCRETE STRUCTURES

PART 1 GENERAL

1.01 REQUIREMENTS

- A. In accordance with Greenbook and additional requirements in this section.

1.02 SUBMITTALS

A. Action Submittals:

1. Scaled Drawings showing surfaces in plan or elevation view for each structure to receive lining, with joints, penetrations, seams, attachments, weep channels and welds fully detailed.
2. Product Data: Manufacturer's catalog for plastic lining system, including product data indicating physical and chemical resistance properties.
3. Qualifications: Statement of qualifications and previous project experience.
 - a. Lining system manufacturer.
 - b. Lining system manufacturer's representative.
 - c. Lining system installer.

B. Informational Submittals:

1. Manufacturer's installation instructions with specific details modified and tailored to each structure and portion of structure to receive liner, including attachments to formwork where applicable.
2. Installer's Information.
 - a. Include list of technical personnel who will perform work on liner.
 - b. Technician certification, indicating that technician has completed required training for welding, fabricating, and installing liner.
 - c. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
 - d. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
3. Written test reports of each test and inspection.

1.03 QUALIFICATIONS

- A. Lining System Manufacturer: Installations of successful use of sheet material similar to this Project. Qualifications shall be submitted by Contractor and

reviewed by Design Engineer prior to mobilization. If qualifications are determined unacceptable by the Engineer, Contractor shall find another manufacturer at no additional cost to the Owner or delay to the project.

- B. Manufacturer's Representative: As specified in Section 01 43 33, Manufacturers' Field Services.
- C. Lining System Installer: Recommended and certified by manufacturer to do the Work. Welders qualified in accordance with Greenbook 311-1.2.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plastic liner and associated materials in accordance with Greenbook 210-2.
- B. Plastic liner shall be flexible PVC liner.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: In accordance with Greenbook 311-1.
- B. Field Joints: In accordance with Greenbook 311-1.5 for flexible liner.
- C. Liner Returns and Terminations: Securely anchored and sealed. Use Type 316 stainless steel batten strips and fasteners for mechanical anchorage of liner at returns and terminations unless otherwise approved by the Construction Manager.

3.02 PROTECTION AND REPAIR

- A. In Accordance with Greenbook 311-1.9.

3.03 TESTS AND INSPECTION

- A. In accordance with Greenbook 311-1.10. Conduct all tests and inspections in presence of Construction Manager unless receiving prior approval.

3.04 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, during installation of liner including placement in formwork, field welding, field testing, repairs, and related activities as required to certify proper installation.

END OF SECTION

SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A

ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT (EIR/EIS)

See link below:

<https://www.sandiego.gov/public-utilities/sustainability/pure-water-sd/reports>

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.) <u>Zip:</u>	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, if so, explain:		
Estimated Duration of Meter Use: <input type="text"/>	<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



APPENDIX F

CONTRACTOR'S DAILY QUALITY CONTROL INSPECTION REPORT

Appendix F

City of San Diego
Asphalt Concrete Overlay

Contractor's Daily Quality Control Inspection Report

Project Title: _____ Date: _____

Locations: 1. _____
2. _____
3. _____

Asphalt Mix Specification: Attached Supplier: _____

Dig out Locations: 1. _____
2. _____
3. _____

Tack Coat Application Rate @ Locations:
1. _____
2. _____
3. _____

Asphalt Temperature at Placement @ Locations:
1. _____
2. _____
3. _____

Asphalt Depth @Locations:
1. _____
2. _____
3. _____

Compaction Test Result @Locations:
1. _____
2. _____
3. _____

Location and nature of defects:

- 1. _____
- 2. _____
- 3. _____

Remedial and Corrective Actions taken or proposed for Engineer's approval:

- 1. _____
- 2. _____
- 3. _____

Date's City Laboratory representative was present:

- 1. _____
- 2. _____
- 3. _____

Verified the following:

- 1. Proper Storage of Materials & Equipment
- 2. Proper Operation of Equipment
- 3. Adherence to Plans and Specs
- 4. Review of QC Tests
- 5. Safety Inspection

Initials:

- _____
- _____
- _____
- _____
- _____

Deviations from QCP _____ (see attached)

Quality Control Plan Administrator's Signature:

Date Signed:

APPENDIX G

MONTHLY DRINKING WATER DISCHARGE MONITORING FORM

DRINKING WATER DISCHARGE MONITORING FORM

(Use for All Discharges to the Storm Drain)

All discharge activities related to this project comply with the State Water Resources Control Board ORDER WQ 2014-0194-DWQ, STATEWIDE GENERAL NPDES PERMIT FOR DRINKING WATER SYSTEMS DISCHARGES as referenced by (http://www.waterboards.ca.gov/water_issues/programs/npdes/docs/drinkingwater/final_statewide_wqo2014_0194_dwq.pdf), and as follows:

Project Name:				WBS No.:				Watershed No.					
Qualified Person Conducting Tests:						signature							
BMPs MUST BE IN PLACE PRIOR TO ANY SCHEDULED DISCHARGE											By signing, I certify that all of the statements and conditions for drinking water discharge events are correct.		
Event #1													
Discharge Location ¹	Category ² (Select one)	Notification ³ (Select all that apply)	BMPs in Place ⁴ (Select all that apply)	Volume ⁵ (gal)	Sampling ⁶ (take samples at 10 mins, 50-60 mins & last 10 mins)				Exceedence ⁷			Notes <small>Report exceedence to RE & complete page 2 of 2</small>	
					Measure	Unit	Time	Result	Limit	No	Yes		
Inlet Location Start Date: Time: End Date: Time:	Superchlorinated <small>(Chlorine added for disinfection)</small>	TSW <small>(All Categories)</small>	Sweep flow path <small>(gutter, street, etc.)</small>	Total	Chlorine	mg/L			0.1 mg/L= Exceedence				
	Large Volume <small>(≥ 325,850 gal)</small>	PUD <small>(All Categories)</small>	Dechlorination <small>(diffusers, chemicals, etc.)</small>				Reused <small>(if any)</small>						
	Well Dev/Rehab <small>(Not Typical)</small>	Water Board <small>(Large Volume Only)</small>	Inlet Protection	Erosion Controls		Turbidity	NTU			20 NTU= Exceedence 225 NTU= Exceedence for Ocean			
	Small Volume/Other <small>(No Sampling Required)</small>	County <small>(≥100,000 gal & within ¼ mile of ocean/bay; or if enters the County's MS4)</small>						Sediment Controls					
					pH	Unit			Range 6.5 to 8.5				
Event #2													
Discharge Location ¹	Category ² (Select one)	Notification ³ (Select all that apply)	BMPs in Place ⁴ (Select all that apply)	Volume ⁵ (gal)	Sampling ⁶ (take samples at 10 mins, 50-60 mins & last 10 mins)				Exceedence ⁷			Notes <small>Report exceedence to RE & complete page 2 of 2</small>	
					Measure	Unit	Time	Result	Limit	No	Yes		
Inlet Location Start Date: Time: End Date: Time:	Superchlorinated <small>(Chlorine added for disinfection)</small>	TSW <small>(All Categories)</small>	Sweep flow path <small>(gutter, street, etc.)</small>	Total	Chlorine	mg/L			0.1 mg/L= Exceedence				
	Large Volume <small>(≥ 325,850 gal)</small>	PUD <small>(All Categories)</small>	Dechlorination <small>(diffusers, chemicals, etc.)</small>				Reused <small>(if any)</small>						
	Well Dev/Rehab <small>(Not Typical)</small>	Water Board <small>(Large Volume Only)</small>	Inlet Protection	Erosion Controls		Turbidity	NTU			20 NTU= Exceedence 225 NTU= Exceedence for Ocean			
	Small Volume/Other <small>(No Sampling Required)</small>	County <small>(≥100,000 gal & within ¼ mile of ocean/bay; or if enters the County's MS4)</small>						Sediment Controls					
					pH	Unit			Range 6.5 to 8.5				

Submit completed Form to RE

Instructional Notes found on the Page 2 of 2

Receiving Water Monitoring

(Complete only if limits exceed on Page 1 of 2)

Event #1	
1) Go to the location where the discharge enters the receiving water.	
<input type="checkbox"/> Accessible <input type="checkbox"/> Unable to Determine <input type="checkbox"/> No Safe Access	
2) If accessible, take photos and complete the visual monitoring below. If unable to determine, stop here. If no safe access, stop here.	
3) Visual Monitoring: Is the discharge into the receiving water...	
...causing erosion	<input type="checkbox"/> Yes <input type="checkbox"/> No
...carrying floating or suspended matter	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing discoloration	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing and impact to the aquatic life present	<input type="checkbox"/> Yes <input type="checkbox"/> No
...observed with visible film	<input type="checkbox"/> Yes <input type="checkbox"/> No
...observed with an sheen or coating	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing potential nuisance conditions	<input type="checkbox"/> Yes <input type="checkbox"/> No
3) If all answers are NO, stop here.	
4) If any answers are YES, Notify the RE immediately for further action	

Event #2	
1) Go to the location where the discharge enters the receiving water.	
<input type="checkbox"/> Accessible <input type="checkbox"/> Unable to Determine <input type="checkbox"/> No Safe Access	
2) If accessible, take photos and complete the visual monitoring below. If unable to determine, stop here. If no safe access, stop here.	
3) Visual Monitoring: Is the discharge into the receiving water...	
...causing erosion	<input type="checkbox"/> Yes <input type="checkbox"/> No
...carrying floating or suspended matter	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing discoloration	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing and impact to the aquatic life present	<input type="checkbox"/> Yes <input type="checkbox"/> No
...observed with visible film	<input type="checkbox"/> Yes <input type="checkbox"/> No
...observed with an sheen or coating	<input type="checkbox"/> Yes <input type="checkbox"/> No
...causing potential nuisance conditions	<input type="checkbox"/> Yes <input type="checkbox"/> No
3) If all answers are NO, stop here.	
4) If any answers are YES, Notify the RE immediately for further action	

Instructional Notes

- 1) Log the location of the inlet or discharge point. For example: Albatross St & 5th Av. Log the start date and time and the end date and time of the discharge.
- 2) Log the discharge category. "Superchlorinated" are discharges where additional chlorine is added in order to adequately disinfect and sanitize drinking water system facilities. This does NOT include potable water containing residual chlorine from the water treatment process. "Large Volume" discharges are greater than 325,850 gallons of total volume for one event. "Well Dev/Rehab" are discharges of potable ground water from a well. This is not typical. If none of these categories apply, then select "Small Volume/Other."
- 3) Notifications of the location, date, time, category, and estimated volume of discharge must be made to the contacts and per the requirements below:

Contact	When to Notify	Email
TSW	3 days prior to all discharges	SWPPP@SanDiego.gov
PUD	3 days prior to all discharges	CompReports@SanDiego.gov Rdavenport@SanDiego.gov
San Diego Water Board	3 days prior to Large Volume discharges	SanDiego@WaterBoards.ca.gov Ben.Neill@WaterBoards.ca.gov
County of San Diego	3 days prior if 100,000 gal and within 1/4 mile of ocean/bay	DEH: Joseph.Palmer@SDCounty.ca.gov Dominique.Edwards@SDCounty.ca.gov
	3 days prior if enter county MS4 or unincorporated County	WPP: Nicholas.DeValle@SDCounty.ca.gov LUEG.Watersheds@sdcounty.ca.gov

- 4) At a minimum, sweep gutters prior to starting discharge and use dechlorination BMPs. The contractor and RE must monitor and determine if BMPs need to be removed or modified. For example if inlet protection is causing flooding at a storm drain inlet, contractor may elect to remove BMPs. Document any modification to BMPs in the notes
- 5) Total volume must be logged for all discharges. If discharge water is reused for other purposes such as watering a golf course, log that volume under "Reused"
- 6) Sampling is required for categories per the following table:

Category	Measure	Sample Frequency
Superchlorinated	Chlorine, Turbidity, pH	first 10 min, 50-60 min, last 10 min
Large Volume	Chlorine Turbidity	first 10 min, 50-60 min, last 10 min
Well Dev/Rehab	Chlorine Turbidity	first 10 min, 50-60 min, last 10 min
Small Volume/Other	None required	N/A

- 7) Effluent limitations must be monitored not to exceed per the following table:

Measure	Method	Limit
Chlorine	Field Measure	0.10 mg/L-Cl
Turbidity	Visual Estimate	20 NTU for inland waters
		225 NTU for ocean 100 NTU for wells
pH	Field Measure	6.5 - 8.5

APPENDIX H
AIS SAMPLE CERTIFICATION LETTER

SAMPLE CERTIFICATION LETTER

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

APPENDIX I
SWPPP CONSTRUCTION BMP MAINTENANCE LOG

SWPPP Construction BMP Maintenance Log

Examples of construction BMP maintenance activities include but are not limited to tasks listed below. The contractor is ultimately responsible for compliance with the Storm Water Standards Manual and/or the Construction General Permit, and for ensuring all BMPs function per manufacturer's specifications. Use the attached log to schedule and document maintenance activities. The log shall be kept with the project SWPPP document at all times.

Construction BMP Maintenance Activities

- Maintain stabilized construction entrances/exits
- Redress gravel/rock to full coverage and remove any sediment accumulation
- Remove and replace geotextile/compost blanket/plastic with holes or tears
- Redress and restabilize erosion or rilling greater than 1-inch deep
- Reapply hydraulic stabilization products to full coverage
- Remove and replace silt fence/fiber roll/gravel bags/etc. with holes or tears
- Reinstall or replace silt fence/fiber roll/etc. with sags
- Remove sediment accumulation from perimeter controls
- Remove sediment accumulation from storm drain inlet protection and check dams
- Remove sediment accumulation from energy dissipators
- Repair or remove any vehicle/equipment that leaks
- Remove any accumulation in drip pans or containment
- Empty concrete washouts when they reach 75% capacity
- Empty waste disposal containers when they reach 95% capacity

Construction BMP Maintenance Log

Project Title:

WBS/IO No:

WDID:

Scheduled Date/Time	Completion Date/Time	Location	Maintenance Tasks Performed	Logged By

APPENDIX J
HAZARDOUS WASTE 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 K
SAMPLE OF PUBLIC NOTICE



CONSTRUCTION NOTICE

PROJECT TITLE

Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

- Saw-cutting and trench work on Ingulf Street from Morena Boulevard to Galveston Street to install new water mains, water laterals and fire hydrants.
- Streets where trenching takes place will be resurfaced and curb ramps will be upgraded to facilitate access for persons with disabilities where required.
- This work is anticipated to be complete in your community by December 2016.

How your neighborhood may be impacted:

- Water service to some properties during construction will be provided by a two-inch highline pipe that will run along the curb. To report a highline leak call 619-515-3525.
- Temporary water service disruptions are planned. If planned disruptions impact your property, you will receive advance notice.
- Parking restrictions will exist because of the presence of construction equipment and materials.
- "No Parking" signs will be displayed 72 hours in advance of the work.
- Cars parked in violation of signs will be TOWED.

Hours and Days of Operation:

Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:

Company Name, XXX-XXX-XXXX



CONSTRUCTION NOTICE

PROJECT TITLE

Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

- Saw-cutting and trench work on Ingulf Street from Morena Boulevard to Galveston Street to install new water mains, water laterals and fire hydrants.
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- 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

APPENDIX L

ADVANCED METERING INFRASTRUCTURE (AMI) DEVICE PROTECTION

Protecting AMI Devices in Meter Boxes and on Street Lights

The Public Utilities Department (PUD) has begun the installation of the Advanced Metering Infrastructure (AMI) technology as a new tool to enhance water meter reading accuracy and efficiency, customer service and billing, and to be used by individual accounts to better manage the efficient use of water. **All AMI devices shall be protected per Section 402-2, "Protection", of the 2018 Whitebook.**

AMI technology allows water meters to be read electronically rather than through direct visual inspection by PUD field staff. This will assist PUD staff and customers in managing unusual consumption patterns which could indicate leaks or meter tampering on a customer's property.

Three of the main components of an AMI system are the:

- A. Endpoints, see Photo 1:

Photo 1



B. AMI Antenna attached to Endpoint (antenna not always required), see Photo 2:



Network Devices, see Photo 3:

Photo 3



AMI endpoints transmit meter information to the AMI system and will soon be on the vast majority of meters in San Diego. These AMI devices provide interval consumption data to the PUD's Customer Support Division. If these devices are damaged or communication is interrupted, this Division will be alerted of the situation. The endpoints are installed in water meter boxes, coffins, and vaults adjacent to the meter. A separate flat round antenna may also be installed through the meter box lid. This antenna is connected to the endpoint via cable. The following proper installation shall be implemented when removing the lid to avoid damaging the antenna, cable, and/or endpoint. Photo 4 below demonstrates a diagram of the connection:

Photo 4



The AMI device ERT/Endpoint/Transmitter shall be positioned and installed as discussed in this Appendix. If the ERT/Endpoint/Transmitter is disturbed, it shall be re-installed and returned to its original installation with the end points pointed upwards as shown below in Photo 5.

The PUD's code compliance staff will issue citations and invoices to you for any damaged AMI devices that are not re-installed as discussed in the Contract Document

Photo 5 below shows a typical installation of an AMI endpoint on a water meter.

Photo 5

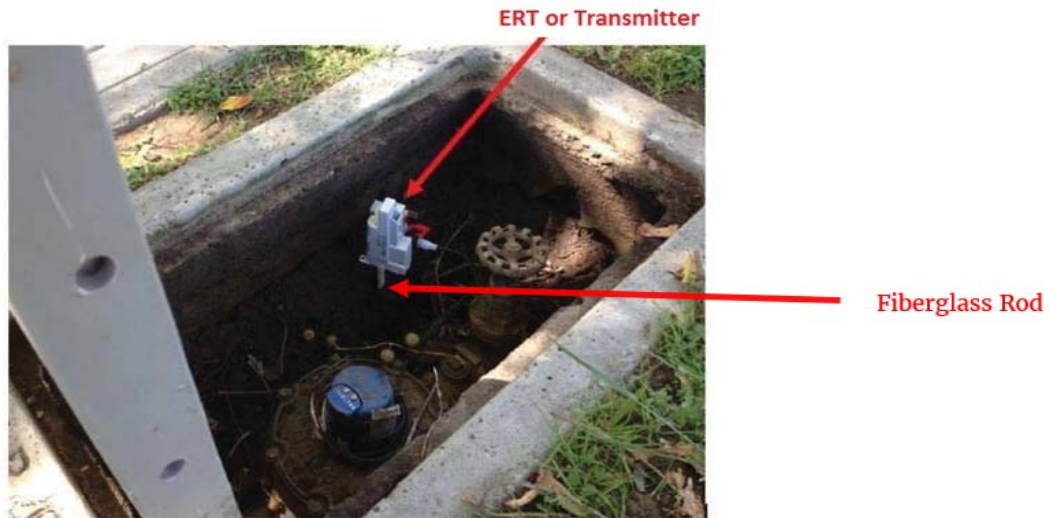


Photo 6 below is an example of disturbance that shall be avoided:

Photo 6



You are responsible when working in and around meter boxes. If you encounter these endpoints, use proper care and do not disconnect them from the registers on top of the water meter. If the lid has an antenna drilled through, do not change or tamper with the lid and inform the Resident Engineer immediately about the location of that lid. Refer to Photo 7 below:

Photo 7



Another component of the AMI system are the Network Devices. The Network Devices are strategically placed units (mainly on street light poles) that collect interval meter reading data from multiple meters for transmission to the Department Control Computer. **If you come across any of these devices on street lights that will be removed or replaced (refer to Photos 8 and 9 below), notify AMI Project Manager Arwa Sayed at (619) 362-0121 immediately.**

Photo 8 shows an installed network device on a street light. On the back of each Network Device is a sticker with contact information. See Photo 9. **Call PUD Water Emergency Repairs at 619-515-3525 if your work will impact these street lights.** These are assets that belong to the City of San Diego and you shall be responsible for any costs of disruption of this network.

Photo 8



Network Device

Photo 9



If you encounter any bad installations, disconnected/broken/buried endpoints, or inadvertently damage any AMI devices or cables, notify the Resident Engineer immediately. The Resident Engineer will then immediately contact the AMI Project Manager, Arwa Sayed, at (619) 362-0121.

ATTACHMENT F
RESERVED

ATTACHMENT G
CONTRACT AGREEMENT

**ATTACHMENT G
CONTRACT AGREEMENT**

CONSTRUCTION CONTRACT

This Phase-Funded contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and Kiewit Infrastructure West Co., herein called "Contractor" for construction of **North City Water Reclamation Plant Flow Equalization Basin**; Bid No. **K-21-1791-DBB-3-A**; in the total amount of Eleven Million Eight Hundred Eighty Six Thousand Dollars and Zero Cents (\$11,886,000.00), which is comprised of the Base Bid, consisting of an amount not to exceed \$7,001,882.00 for Phase I and \$4,884,118.00 for Phase II.

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) Phase Funding Schedule Agreement.
 - (e) That certain documents entitled **North City Water Reclamation Plant Flow Equalization Basin**, on file in the office of the City Clerk Department as Document No. **B-21059**, as well as all matters referenced therein.
2. The City wishes to construct this Project on a Phase- Funded basis. In accordance with Whitebook section 7-3.10, the City is only obligated to pay for Phase I; Contractor cannot begin, nor is the City financially liable for any additional Phases, unless and until Contractor is issued a Notice to Proceed for each additional Phase by the City.
3. 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 **North City Water Reclamation Plant Flow Equalization Basin, K-21-1791-DBB-3-A**, San Diego, California.
4. 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 (See WHITEBOOK, Section 7-3.10, Phased Funding Compensation).
5. 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

CONTRACT AGREEMENT (continued)

connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.

6. This contract is effective as of the date that the Mayor or designee signs the agreement and is approved by the City Attorney in accordance with San Diego Charter Section 40.

IN WITNESS WHEREOF, this Agreement is signed by the City of San Diego, acting by and through its Mayor or designee, pursuant to Resolution No. R-312062 authorizing such execution.

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By 

By 

Print Name: Claudia C. Abarca
Director
Purchasing & Contracting Department

Print Name: Bonny Hou
Deputy City Attorney

Date: November 17, 2021

Date: 11/17/21

CONTRACTOR

By 

Print Name: Terrence L. Robinson

Title: Senior Vice President

Date: November 2, 2021

City of San Diego License No.: B2021007366

State Contractor's License No.: 433176

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000001147

CALIFORNIA 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 Los Angeles }

On November 2, 2021 before me, Rozita Ah Kiong, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Terrence L. Robinson, Senior Vice President
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 *Rozita Ah Kiong*
Signature of Notary Public

Place Notary Seal and/or Stamp Above

OPTIONAL

Completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: Attachment G - Contract Agreement - NCWRPF Equalization Basin

Document Date: Nov. 2, 2021 Number of Pages: 1

Signer(s) Other Than Named Above: No other signer(s)

Capacity(ies) Claimed by Signer(s)

Signer's Name: Terrence L. Robinson
 Corporate Officer – Title(s): Senior Vice President
 Partner – Limited General
 Individual Attorney in Fact
 Trustee Guardian of Conservator
 Other: _____

Signer's Name: _____
 Corporate Officer – Title(s): _____
 Partner – Limited General
 Individual Attorney in Fact
 Trustee Guardian of Conservator
 Other: _____

Signer is Representing: Kiewit Infrastructure West Co.

Signer is Representing: _____

ATTACHMENT H
ESCROW BID DOCUMENTS

1. ESCROW BID DOCUMENTS

1.1. Definition and Purpose

The Escrow Bid Documents (EBD) are a compilation of all the documentary information generated in preparation of bid prices for this project. EBDs will be used to assist in the negotiation of price adjustments and variations and in the settlement of disputes, claims and other controversies. They will not be used for pre-award evaluation of the Contractor's anticipated methods of construction or to assess the Contractor's qualifications for performing the Work.

1.2. General

1.2.1. All bidders shall submit a copy of the EBD within 4 working days of the bid opening.

1.2.2. The successful bidder agrees, as a condition of award of the Contract, that the Escrow Bid Documents constitute the only complete documentary information used in preparation of his bid. No other bid preparation information shall be considered in resolving disputes.

1.2.3. Nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract.

1.3. Ownership

1.3.1. The EBDs are and shall always remain the property of the Contractor subject only to joint review by the City and the Contractor, except as provided for herein.

1.3.2. The City stipulates and expressly acknowledges that the EBDs, as defined herein, constitute trade secrets. This acknowledgment is based on the City's express understanding that the information contained in the EBDs is not known outside the Contractor's business, is known only to a limited extent and only by a limited number of employees of the Contractor, is safeguarded while in the Contractor's possession, and is extremely valuable to competitors by virtue of its reflecting the Contractor's contemplated techniques of construction.

1.3.3. The City acknowledges that EBDs and the information contained therein are made available to the City only because such action is an express prerequisite to award of the Contract. The City acknowledges that the EBDs include a compilation of information used in the Contractor's business, intended to give the Contractor an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. The City agrees to safeguard the EBDs and all information contained therein to the fullest extent permitted by law.

- 1.3.4. The City agrees to safeguard the EBDs and all information contained therein from any California Public Act Request to the fullest extent permitted by law.

1.4. Format and Contents

- 1.4.1. Bidders may submit EBDs in their usual cost estimating format. It is not intended that extra work is required in preparing the bid but to ensure that the EBDs will be adequate to enable complete and proper understanding and proper interpretation for their intended use. The EBDs shall be in the English language only.
- 1.4.2. The EBDs shall clearly itemize the estimated costs of performing the work of each item contained in the Bid Schedule. Items should be separated into sub-items as required to present a complete and detailed cost estimate and allow a detailed cost review. The EBDs shall include all quantity take-offs, crews, equipment, calculations of rates of production and progress, copies of quotations from sub-contractors and suppliers, and memoranda, narratives, consultants reports, add/deduct sheets and all other information used by the Contractor to arrive at the prices contained in the bid. Estimated costs shall be broken down into the Contractor's usual estimate categories such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent material and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of plant and equipment, indirect costs, contingencies, mark-up and other items to each bid item shall be clearly indicated.
- 1.4.3. The EBDs shall clearly show in calculations, text, or both, the relationship between baseline indications presented in the Contract Documents and assumptions that form the basis for the Contractor's means, methods, equipment selection, rates of production, and costs.
- 1.4.4. All costs shall be identified. For bid items where the extended amount is less than \$10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and mark-up, as applicable, are allocated.
- 1.4.5. Bid Documents provided by the City should not be included in the EBDs unless needed to comply with the above requirements.

1.5. Submittal

- 1.5.1. All bidders shall submit their EBDs within 4 working days of the bid opening. The EBDs shall be submitted in a sealed container (e.g., sealed envelope, box or carton sealed with tape, locked strongbox, etc.), and the container shall be clearly marked on the outside with the Bidder's name, date of submittal,

project name, Contract Number and the words "Escrow Bid Documents". The EBDs shall be submitted to:

Engineering & Capital Projects Department, Contracts Division
525 B Street, Suite 750 (7th Floor)
San Diego, California, 92101
Attention: Juan E. Espindola

- 1.5.2.** The EBDs shall be signed by an individual authorized by the bidder to execute the bid, stating that the material in the Escrow Bid Documentation constitutes all the documentary information used in the preparation of the bid and that he or she has personally examined the contents of the EBDs submission and has found that the documents are complete:

"ESCROW BID DOCUMENT CERTIFICATION"

THE UNDERSIGNED HEREBY CERTIFIES THAT THE BID DOCUMENTATION CONTAINED HEREIN CONSTITUTES ALL THE INFORMATION USED IN PREPARATION OF THE BID AND THAT I HAVE PERSONALLY EXAMINED THESE CONTENTS AND HAVE FOUND THAT THIS BID DOCUMENTATION IS COMPLETE.

SIGNATURE: _____

NAME: _____
(Print)

TITLE: _____

FIRM: _____

DATE: _____

- 1.5.3.** Prior to award of the contract, the EBDs of the apparent low bidder will be examined, organized and inventoried by representatives of the City, and members of the Contractor's staff who are knowledgeable in how the bid was prepared. This examination is to ensure that the EBDs are authentic, legible, and complete (as defined in 1.4). It will not include review of and will not constitute approval of proposed construction methods, estimating assumptions, or interpretations of the contract documents. Examination will not alter any condition(s) or term(s) of the Contract.
- 1.5.4.** If the Contract is not awarded to the apparent low bidder, the EBDs of the next apparent low bidder to be considered for award shall be processed, as described above.
- 1.5.5.** The City may reject the bid as non-responsive and ineligible for further consideration if the necessary EBDs are not submitted.

1.5.6. If the bidder's proposal is based on subcontracting any part of the Work, each subcontractor whose total subcontract price exceeds five percent of the total contract price proposed by the bidder, shall provide separate EBDs to be included with those of the bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent successful bidder. The failure to submit subcontractor EBDs may render contractor's bid non-responsive. If the Contractor wishes to substitute a subcontractor for a portion of the Work which exceeds five percent of the total contract price proposed by the bidder after award, the City retains the right to require the Contractor to submit EBDs from the subcontractor before the subcontract is approved. This section is not intended to and shall not be interpreted as a waiver by the City of any of the requirements or provisions of public contract code section 4100 et seq. known as the Subletting and Subcontracting Fair Practices Act.

1.6. Storage

1.6.1. Absent a request from the Contractor to place the EBDs in possession of a third-party escrow agent the EBDs will be stored by the City of San Diego, Engineering & Capital Projects Department, Contracts Division. Upon written request from the Contractor, the EBDs shall be placed in escrow with a mutually agreeable institution for the life of the Contract, unless examination is required, which shall be conducted in accordance with this section. The cost of storage by third-party escrow agent will be borne by the Contractor.

1.7. Examination

1.7.1. The EBDs shall be examined by both the City and the Contractor, at any time deemed necessary by either the City or the Contractor, to assist in the negotiation of price adjustments and change orders, or the settlement of disputes.

1.7.2. Examination of the EBDs is subject to the following conditions:

1.7.2.1. As trade secrets, the EBDs are proprietary and confidential as described above

1.7.2.2. The City and the Contractor shall each designate, in writing to the other party a minimum of ten days prior to examination, representatives who are authorized to examine the EBDs. No other person shall have access to examine the EBDs.

1.7.2.3. Examination of the EBDs will take place only in the presence of duly designated representatives of both the City and the Contractor.

1.7.2.4. As escrow bid documents shall be examined by both the City and the Contractor to assist in the negotiation of price adjustments and change orders or the settlement of disputes as either party sees fit.

1.8. Final Disposition

- 1.8.1.** The EBDs will be returned to the awarded Contractor upon completion and final settlement of the contract.
- 1.8.2.** The EBDs submitted by unsuccessful bidders will be returned unopened, unless opened as provided for above, following execution of the Contract.

ATTACHMENT I
PROJECT LABOR AGREEMENT (PLA)

CITY OF SAN DIEGO
PROJECT LABOR AGREEMENT
FOR CONSTRUCTION OF PURE WATER PROGRAM
PHASE I PROJECTS

Effective Date: June 16, 2020

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CITY OF SAN DIEGO
PROJECT LABOR AGREEMENT
FOR CONSTRUCTION OF PURE WATER PROGRAM
PHASE I COVERED PROJECTS

This Project Labor Agreement (hereinafter, “PLA” or “Agreement”) is entered into this 16th day of June, 2020 by and between the San Diego Building and Construction Trades Council (hereinafter “Council”), and the signatory Craft Unions (hereinafter, together with the Council, collectively, the “Union” or “Unions”), and the Contractors performing work on Covered Projects that are subject to this Agreement. The City of San Diego is not a signatory Party to this Agreement, but shall be considered a “negotiating party” and will be responsible for implementing and administering the Agreement as described herein together with the Council, Unions and Contractors.

ARTICLE 1

RECITALS

WHEREAS, the City desires the completion of the Pure Water Program Phase I Projects in a professional, safe, efficient, and economical manner, without undue delay or work stoppage; and

WHEREAS, the successful completion of the City’s Pure Water Program Phase I Projects are of the utmost importance to the rate payers and the City; and

WHEREAS, the Parties have pledged their full commitment to work towards a mutually satisfactory completion of the Pure Water Program Phase I Projects; and

WHEREAS, large numbers of workers of various skills will be required in the performance of the construction work on the Pure Water Program Phase I Projects, including workers affiliated with and/or represented by the Unions; and

WHEREAS, it is recognized that on construction projects with multiple contractors and bargaining units on the job site at the same time over an extended period of time, the potential for work disruption is substantial without an overriding commitment to maintain continuity of work; and

WHEREAS, the Parties agree that by establishing and stabilizing wages, hours, and working conditions for the workers employed on the Pure Water Program Phase I Projects, a

satisfactory, continuous, and harmonious relationship will exist among labor and management that will lead to the efficient and economical completion of Covered Projects; and

WHEREAS, in recognition of the special needs of the Project Work and to maintain a spirit of harmony, labor-management relations, peace, and stability during the term of this PLA, the Parties agree to establish effective and binding methods for the settlement of all misunderstandings, disputes and grievances without any strikes, slowdowns, work interruptions, or disruption of Project Work, and the Contractors agree not to engage in any lockout.

WHEREAS, the City places high priority upon the development of comprehensive programs for the recruitment, training, and employment of City Residents and Targeted Workers, and also recognizes the ability of local Apprenticeship Programs to provide meaningful and sustainable careers in the building and construction industry. The Parties will encourage City Residents and Targeted Workers to participate in Project Work through programs and procedures jointly developed to prepare and encourage such individuals for entrance into Apprenticeship Programs and formal employment on the Project Work through the referral programs sponsored and/or supported by the Parties to this PLA.; and

WHEREAS, the Project Work will provide opportunities for Disadvantaged Business Enterprises to participate as Contractors, subcontractors, or suppliers, and the Parties therefore agree that they will cooperate with all efforts of the City, the Project Labor Coordinator, and other organizations retained by the City for this purpose, to encourage and assist the participation of Disadvantaged Business Enterprises in the Project Work. Specifically, all Parties understand that the City has established and quantified goals which place a strong emphasis on the utilization of Disadvantaged Business Enterprises on the Project. Each Party agrees that it shall participate in outreach programs and provide education, and assistance to businesses not familiar with working on projects of this scope. Further, the Parties shall ensure that the provisions of this PLA do not inadvertently establish impediments to participation of such Disadvantaged Business Enterprises, City Residents and Targeted Workers.

WHEREAS, it is further understood that the City is a real party in interest to this Agreement and shall actively administer and enforce the obligations of this PLA to ensure that the benefits of this Agreement flow to all signatory Parties, craft persons working under it, and the rate payers and residents of the City. The City will send a letter to the Council to signify that the City will be performing its obligation under this Agreement and will designate a "Project Labor Coordinator," either from its own staff and/or an independent contractor acting on behalf of the City, to monitor and enforce compliance with this PLA. In addition, this letter will state that the City will include and incorporate this Agreement into each Covered Project's construction documents. The Project Labor Coordinator, as the authorized representative of the City, will assist with the development and implementation of the programs referenced in this PLA, all of which are critical to fulfilling the intent and purposes of the Parties and this PLA.

NOW, THEREFORE, IT IS AGREED BETWEEN AND AMONG THE PARTIES AS FOLLOWS:

ARTICLE 2

DEFINITIONS

Capitalized terms utilized in this PLA which are not otherwise defined herein shall have the meanings ascribed to said terms below.

“Agreement” means this Project Labor Agreement (PLA).

“Applicable Prevailing Determination” means the prevailing wage determinations applicable to Project Work pursuant to the State of California Labor Code.

“Apprentice” means an apprentice properly registered in an Apprenticeship Program for the entire time they are employed on a Covered Project.

“Apprenticeship Program” as used in this PLA shall be defined as an apprenticeship program certified by the State of California.

“City” means the City of San Diego and its departments delivering the Covered Projects.

“City Resident” means a City of San Diego permanent resident at the time of initial employment on a Covered Project or a Veteran residing anywhere.

“Contractor” means any contractor to whom the City awards a Construction Contract for Project Work and all subcontractors utilized by such Contractors for Project Work. The term “Contractor” includes any individual, firm, partnership, corporation, owner operator, or combination thereof, including joint ventures, that has entered into a contract with the City for Project Work, or any subcontractor who has signed a contract with a Contractor or another subcontractor for Project Work.

“Core Employees” are defined in Article 4, Section 4.6 (e).

“Council” means the San Diego County Building & Construction Trades Council.

“Covered Contract” means a contract awarded to a Contractor by the City for a Pure Water Program Phase I Project identified in Appendix A.

“Covered Project” or “Project Work” means a Pure Water Program Phase I Project that is identified in Appendix A and is limited to the construction site of work.

“Disadvantaged Business Enterprise” means a firm that has been certified via the Department of Transportation, but also includes: Minority Business Enterprises or Woman Business Enterprises certified by the Department of Transportation or the California Public Utilities Commission; and Small Local Business Enterprises or Emerging Local Business Enterprises certified by the City.

“Prime Contractor” means the prime Contractor awarded a Covered Contract in privity directly with the City.

“Project Labor Coordinator” means the designee of the City, either from its own staff and/or an independent entity acting on behalf of the City, to monitor compliance with this Agreement and assist with developing, implementing and administering the requirements, policies and programs referenced herein.

“Schedule A’s” means the local master labor agreements of the Unions.

“Targeted Worker” means any individual qualifying for one (1) or more of the following Targeted Worker categories:

- (a) Is a Veteran, or is the eligible spouse of a “Veteran of the United States armed forces, under Section 2(a) of the Jobs for Veterans Act (38 United States Code [U.S.C.] 4215[a]);
- (b) At initial time of employment on a Covered Project, is an Apprentice with less than ten (10) percent of the work hours required for graduation to become a Journeyman;
- (c) Has no high school diploma or general education diploma (GED);
- (d) Is homeless or has been homeless within the last year;
- (e) Is a former foster youth;
- (f) Is a custodial single parent;
- (g) Is experiencing protracted unemployment (receiving unemployment benefits for at least three [3] months);
- (h) Is a current recipient of government cash or food assistance benefits;
- (i) Has a documented income at or below 100 percent of the Federal Poverty Level;

(j) Is formerly incarcerated with a history of involvement with the criminal justice system.

“Union” or “Unions” means any labor organization signatory to this Agreement acting in their own behalf and on behalf of their respective affiliates and member organizations whose names are subscribed hereto and who have, through their officers, executed this Agreement.

“Veteran” means a veteran or the eligible spouse of a veteran of the United States armed forces, under Section 2(a) of the Jobs for Veterans Act (38 U.S.C. 4215[a]);

ARTICLE 3

SCOPE OF THE AGREEMENT

Section 3.1 This PLA is limited to covering all onsite construction work within the scope of each Covered Contract.

Section 3.2 Exclusions. Items specifically excluded from the scope of this PLA include the following:

(a) Work of non-manual employees including but not limited to, superintendents, supervisors, staff engineers, quality control and quality assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards, safety personnel, emergency medical and first aid technicians, and other professional, engineering, administrative, supervisory, and management employees; and

(b) All offsite manufacturing, fabrication, deliveries, maintenance, and handling of materials, equipment, or machinery, and the offsite hauling of materials of any kind to or from the Covered Project site. However, any lay down or storage areas for equipment or material and manufacturing (i.e. prefabrication) sites dedicated solely for the project, and the movement of materials or goods between locations on a Covered Project site are within the scope of the PLA. On-site fabrication work includes work done for the Project in temporary yards or areas near the Project. On-site construction shall also include the site of any batch plant constructed solely to supply materials to the Project; and

(c) All employees of the City, Project Labor Coordinator, design teams (including, but not limited to, architects, engineers, and master planners), or any other consultants for the City (including, but not limited to, project managers and

construction managers and their employees where not engaged in Project Work) and their subconsultants, and other employees of professional service organizations, not performing manual labor within the scope of this PLA. Notwithstanding the foregoing, however, this exclusion shall not apply to the classifications for Surveyors and/or Building/Construction Inspectors and/or Field Soils and Material Testers (Inspectors) unless they are City employees. This inclusion applies to the scope of work defined in the State of California Wage Determination for Surveyors and/or Building/Construction Inspectors and/or Field Soils and Material Testers (Inspectors). This shall also specifically include such work where it is referred to by utilization of such terms as “quality control” or “quality assurance.” Every Inspector performing under these classifications on Covered Projects pursuant to a professional services agreement, a contract entered into directly with the City, or a contract with a Contractor shall be bound to all applicable requirements of this Agreement; and

(d) Any work performed on or near or leading to or into a site of work covered by this PLA and undertaken by state, county, city, or other governmental bodies, or their contractors (other than work within the scope of this PLA undertaken by contractors to the City); or by private utilities, or their contractors; and

(e) Work performed by employees of a manufacturer or vendor on the manufacturer’s or vendor’s equipment, if required by the warranty agreement in order to maintain the warranty or guarantee, and provided that the warranty agreement is the manufacturer’s or vendor’s usual and customary warranty agreement for such equipment and is consistent with industry practice; and

(f) Specialized or technical work requiring specialized training, unique skills, or a level of specific technical experience which employees represented by the Union do not possess. At least ten (10) working days notice shall be given to the Council before any work is performed pursuant to this exemption.; and

(g) Laboratory work for testing; and

(h) Non-construction support services contracted by the City, Project Labor Coordinator, or Contractor in connection with this Project.

Section 3.3 Awarding of Contracts.

(a) The City has the absolute right to bid or award Covered Contracts regardless of delivery method to any Contractor notwithstanding the existence or non-existence of any agreements between such Contractor and any Union Parties,

provided only that such Contractor is willing, ready, and able to execute and comply with this PLA should such Contractor be awarded work covered by this PLA.

(b) It is agreed that all Contractors who have been awarded a contract for Project Work shall be required to accept and be bound by the terms and conditions of this PLA. Contractors shall evidence their acceptance of this Agreement by executing a Letter of Assent as set forth in Attachment A hereto. The Prime Contractor must sign and submit the Letter of Assent as a condition of award prior to the execution of a Covered Contract. No Contractor shall commence Project Work without first providing a copy of the signed Letter of Assent to the Project Labor Coordinator.

(c) The City and Prime Contractors agree that to the extent permitted by law and consistent with the economy and efficiency of construction and operation, it will use its best efforts to purchase materials, equipment, and supplies that will not create labor strife. Under all circumstances, however, the City and Prime Contractors shall retain the absolute right to select the lowest responsive and responsible bidder for the award of contracts on all Covered Projects.

Section 3.4 Coverage Exception. The Parties agree and understand that this PLA shall not apply to any work that would otherwise be covered Project Work if a governmental agency or granting authority partially or fully funding such work determines that it will not fund the Project Work if it is covered by this PLA. The City agrees that it will make every effort to establish the inclusion of this PLA with any governmental agency or granting authority funding a Covered Project.

Section 3.5 Schedule A's.

(a) The provisions of this PLA, including the Schedule A's (which are the local Master Labor Agreements of the signatory Unions having jurisdiction over the work on the Project, as such may be changed from time to time consistent with Section 21.3, and which are incorporated herein by reference), shall apply to the work covered by this PLA, notwithstanding the provisions of any other local, area and/or national agreement that may conflict with or differ from the terms of this PLA. Where a subject covered by the provisions of this PLA is also covered by a Schedule A, the provisions of this PLA shall prevail. Where a subject is covered by a provision of a Schedule A and not covered by this PLA, the provisions of the Schedule A shall prevail. Any dispute as to the applicable source between this PLA and any Schedule A shall be resolved under the procedures established in Article 10.

(b) It is understood that this PLA, together with the referenced Schedule A's, constitutes a self-contained, stand-alone agreement and, by virtue of having become bound to this PLA, the Contractor will not be obligated to sign any other local, area, or national collective bargaining agreement as a condition of performing work within the scope of this PLA (provided, however, that the Contractor may be required to sign a uniformly applied non-discriminatory Participation or Subscription Agreement at the request of the trustees or administrator of a trust fund established pursuant to Section 302 of the Labor Management Relations Act, and to which such Contractor may be bound to make contributions under this PLA, provided that such Participation or Subscription Agreement does not purport to bind the Contractor beyond the terms and conditions of this PLA and/or expand its obligation to make contributions pursuant thereto). It shall be the responsibility of the Prime Contractor to have each of its Contractors of any tier sign the documents with the appropriate Union prior to the Contractor beginning Project Work.

Section 3.6 The Parties agree that this PLA will be made available to, and will fully apply to, any successful bidder for Project Work, without regard to whether that successful bidder performs work at other sites on either a Union or non-Union basis. This PLA shall not apply to any work of any Contractor other than that on Project Work specifically covered by this PLA.

Section 3.7 Binding Signatories Only. This PLA and Letter of Assent shall only be binding on the signatory Parties hereto, and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such Party.

Section 3.8 Other City Work. Nothing contained herein shall be interpreted to prohibit, restrict, or interfere with the performance of any other operation, work, or function not covered by this PLA, which may be performed by City employees or contracted for by the City for its own account, on its property, or in and around a project site.

Section 3.9 Separate Liability. It is understood that the liability of the Contractor(s) and the liability of the separate Unions under this PLA shall be several and not joint. The Unions agree that this PLA does not have the effect of creating any joint employment status between or among the City or Project Labor Coordinator and/or any Contractor.

Section 3.10 Completed Project Work. As areas of Project Work are accepted by the City, this PLA shall have no further force or effect on such items or areas except where the Contractor is directed by the City or its representatives to engage in repairs, modification and/or check-out functions required by its contract(s) with the City.

Section 3.11 Except for all work performed under the NTL Articles of Agreement, the National Stack/Chimney Agreement, and the National Cooling Tower Agreement, all instrument calibrations work and loop checking shall be performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Article 7 (Work Stoppages and Lockouts), Article 8 (Work Assignments and Jurisdictional Disputes) and Article 10 (Settlement of Grievances and Disputes) of this PLA, which shall apply to such work.

ARTICLE 4

UNION RECOGNITION AND EMPLOYMENT

Section 4.1 **Recognition.** The Contractor recognizes the Unions as the exclusive bargaining representative for the employees engaged in Project Work. Such recognition does not extend beyond the period when the employee is engaged in Project Work.

Section 4.2 **Contractor Selection of Employees.** The Contractor shall have the right to determine the competency of all employees, the number of employees required, the duties of such employees within their craft jurisdiction, and shall have the sole responsibility for selecting employees to be laid off, consistent with this Article. The Contractor shall also have the right to reject any applicant referred by a Union for any reason, subject to any reporting time requirements of the applicable Schedule A; provided, however, that such right is exercised in good faith and not for the purpose of avoiding the Contractor's commitment to employ qualified workers through the procedures endorsed in this PLA.

Section 4.3 **Referral Procedures.**

(a) For signatory Unions to this Agreement having a job referral system contained in a Schedule A, the Contractor agrees to comply with such system and it shall be used exclusively by such Contractor, except as modified by this PLA. Such job referral system will be operated in a nondiscriminatory manner and in full compliance with federal, state, and local laws and regulations that require equal employment opportunities and non-discrimination. All of the foregoing hiring procedures, including related practices affecting apprenticeship, shall be operated so as to consider the goals of the City to encourage employment of City Residents, Targeted Workers, and utilization of Disadvantaged Business Enterprises on the Project Work, and to facilitate the ability of all Contractors to meet their employment needs.

(b) The local Unions will exert their best efforts to recruit and refer sufficient numbers of skilled craft workers to fulfill the labor requirements of the Contractor, including specific employment obligations to which the Contractor may be legally and/or contractually obligated; and to refer Apprentices as requested to develop a larger, skilled workforce. The Unions will work with the Project Labor Coordinator and others designated by the City, to identify and refer competent craft persons as needed for Project Work, and to identify individuals, particularly City Residents and Targeted Workers, for entrance into Apprenticeship Programs, or participation in other identified programs and procedures to assist individuals in qualifying and becoming eligible for such Apprenticeship Programs, all maintained to increase the available supply of skilled craft personnel for Project Work and future construction work to be undertaken by the City.

(c) The Union shall not knowingly refer an employee currently employed by a Contractor on Project Work to any other Contractor.

Section 4.4 Non-Discrimination in Referral, Employment, and Contracting. The Unions and Contractors agree that they will not discriminate against any employee or applicant for employment on the basis of race, color, religion, gender, national origin, age, Union status, sex, sexual orientation, marital status, political affiliation, or disability. Further, it is recognized that the City has certain policies, programs, and goals for the utilization of Disadvantaged Business Enterprises. The Parties shall jointly endeavor to assure that these commitments are fully met, and that any provisions of this PLA that may appear to interfere with Disadvantaged Business Enterprises successfully bidding for work on Covered Projects shall be carefully reviewed, and adjustments made as may be appropriate and agreed upon among the Parties, to ensure full compliance with the spirit and letter of the City's policies and commitment to its goals for the significant utilization of Disadvantaged Business Enterprises as Contractors, vendors or suppliers on Project Work.

Section 4.5 Employment of City Residents and Targeted Workers.

(a) In recognition of the City's mission to serve the City and its residents, the Unions and Contractors agree that, to the extent allowed by law, and as long as they possess the requisite skills and qualifications, residents of the City of San Diego, hereafter "City Residents", shall be first referred for Project Work. A "City Resident" is defined as a City of San Diego permanent resident at the time of initial employment on a Covered Project or a Veteran residing anywhere. The

list of qualifying zip codes for City Residents is included within Attachment B-1, Workforce Dispatch Request Form.

(b) The Contractors and Unions agree to work together to achieve a goal of at least thirty-five (35) percent of the total construction craft hours worked on each Covered Project be performed by City Residents.

(c) The Contractors and Unions agree to work together to achieve a goal of at least ten (10) percent of the total construction craft hours worked on each Covered Project be performed by Targeted Workers. Hours worked by Targeted Workers who are also City Residents may be applied to the City Resident participation goal.

(d) Professional services agreements entered into by the City for covered surveying or inspection services, which are separate and apart from the Construction Contract for a Covered Project, are exempt from the foregoing City Resident and Targeted Worker hiring goals.

(e) To facilitate the dispatch of City Residents, as well as all Contractor requests for referral and dispatch of workers from the applicable Union referral system, all Contractors are required to utilize the Workforce Dispatch Request Form for Covered Projects, a sample of which is attached as Attachment B-1.

(f) The Project Labor Coordinator shall work with the Unions and Contractors in the administration, monitoring, and the reporting of the foregoing City Resident and Targeted Worker hiring goals.

(g) The Parties recognize that the Pure Water Program Phase I Projects have multiple funding sources. If a particular funding source applied by the City to a Covered Project does not allow geographic preference for hiring local craft workers, the foregoing City Resident participation requirement will not be applicable to that Covered Project. The City reserves the right to apply Pure Water Program Phase I funding as it chooses and will make every effort to fund the Covered Projects to encourage inclusivity of City Residents.

Section 4.6 Core Employees. This Section only applies to Contractors who are not directly signatory to an applicable Schedule A.

(a) Disadvantaged Business Enterprise. The Parties recognize the City's interest in promoting competition and inclusion of Disadvantaged Business Enterprises, which may not be signatory to a current Schedule A. In order to promote participation and attract Disadvantaged Business Enterprises to work

under this Agreement, and subject to the limitations set forth below, each Contractor that is a Disadvantaged Business Enterprise may first employ three (3) of its core employees per craft on each Covered Project prior to employing an employee through the appropriate Union hiring hall. The next (fourth) employee shall be hired from the appropriate Union hiring hall and thereafter, such Contractor may employ, as needed, two (2) additional Core Employees in an alternating manner with Union referrals, up to a total of five (5) Core Employees. Thereafter, all additional employees in the affected trade or craft shall be requested and referred from the appropriate Union hiring hall.

The foregoing Core Employee hiring procedure for Disadvantaged Business Enterprises is subject to the following limitations:

(1) Disadvantaged Business Enterprises with an individual subcontract value of \$500,000 or less and;

(2) Disadvantaged Business Enterprises are limited to utilizing the foregoing Core Employee hiring procedure to one (1) subcontract per Covered Project and;

(3) The total value of all subcontracts utilizing the foregoing Core Employee hiring procedure shall not exceed ten (10) percent of the total value of each Covered Project; and

(4) In order to assist the Project Labor Coordinator monitor compliance with this Section, each Prime Contractor will be responsible for tracking, reporting and providing notice to the Project Labor Coordinator describing each Disadvantaged Business Enterprise subcontract that qualifies for the foregoing hiring procedure prior to work commencing.

(b) Employers who do not qualify for the hiring procedure set forth in Section 4.6(a), and who are not otherwise signatory to a current Schedule A, may employ, as needed, first, a Core Employee, then an employee through a referral from the appropriate Union hiring hall, then a second Core Employee, then a second employee through the referral system, and so on until a maximum of three (3) Core Employees are employed per craft on each Covered Project. Thereafter, all additional employees in the affected trade or craft shall be requested and referred from the appropriate Union hiring hall in accordance with this Article. Contractors employing more than fifty (50) craft workers at the same time in a specific trade on a Covered Project may hire an additional two (2) Core Employees.

(c) Section 4.6 only applies to Contractors who are not directly signatory to a current Schedule A for the craft worker in its employ and is not intended to limit the transfer provisions of the Schedule A of any trade. As part of this process, and in order to facilitate the contract administration procedures, as well as appropriate fringe benefit fund coverage, all Contractors shall require their Core Employees and any other persons employed other than through the referral process, to register with the appropriate Union hiring hall, if any, prior to their first day of employment working under the Construction Contract at the project site.

(d) Prior to each Contractor performing any work on a Covered Project, each Contractor shall provide a list of Core Employees to the Project Labor Coordinator and the Council. After submitting the Core Employee list prior to commencing work, Contractors shall not make any changes or substitutions to the Core Employee list for the duration of the Covered Project. Failure to submit the Core Employee list prior to work commencing will prohibit the Contractor from using any Core Employees for 30 calendar days after the list is provided to the Project Labor Coordinator and Council.

(e) Upon request by any Party to this Agreement, the Contractor hiring any Core Employee shall provide satisfactory proof (i.e., payroll records, quarterly tax records, and such other documentation) evidencing the Core Employee's qualification as a Core Employee to the Project Labor Coordinator and the Council.

(f) Core Employees must meet the following eligibility requirements to qualify for employment on Covered Projects:

(1) A Core Employee must be either a journeyman or Apprentice and appear on the Contractor's active payroll for at least ninety (90) of the last one-hundred-eighty (180) working days prior to being designated as a Core Employee. The date a Core Employee is designated is the date the Core Employee list is submitted to the Project Labor Coordinator and Council prior to the Contractor commencing work; and

(2) A Core Employee must possess any license required by state or federal law for the Project Work to be performed; and

(3) A Core Employee must have the ability to safely perform the basic functions of the applicable trade.

(g) In addition to the core employee provisions set forth herein, all Contractors may avail themselves of any opportunity provided for in the applicable Schedule A's to call for specific employees by name.

(h) During any layoffs or reductions in workforce, Contractors shall layoff employees in an order and manner consistent with the Core Employee hiring procedures and maintain the required Core Employee-to-Union referral ratios required by this Section for the duration of each Covered Project.

Section 4.7 Time for Referral. If any Union's registration and referral system does not fulfill the requirements for specific classifications of covered employees (including City Residents) requested by any Contractor within forty-eight (48) hours (excluding Saturdays, Sundays, and holidays), that Contractor may employ Core Employees without reference to the ratio requirements in Section 4.6 or use employment sources other than the Union registration and referral services, and may employ applicants from any other available source. The Contractor should promptly inform the Union of any applicants hired from other sources, and such applicants shall register with the appropriate hiring hall, if any.

Section 4.8 Lack of Referral Procedure. If a signatory local Union does not have a job referral system as set forth in Section 4.3 above, the Contractors shall give the Union equal opportunity to refer applicants. The Contractors shall notify the Union of employees so hired, as set forth in Section 4.7.

Section 4.9 Union Membership. Employees are not required to become or remain union members as a condition of performing Covered Work under this Agreement. Employers shall make and transmit all deductions for union dues, fees, and assessments that have been authorized by employees in writing in accordance with the applicable Schedule A. Nothing in this Section 4.9 is intended to supersede the requirements of the applicable Schedule A's as to those Employers otherwise signatory to such Schedule A and as to the employees of those Employers who are performing Covered Work.

Section 4.10 Foremen. The selection and number of craft foremen and/or general foremen shall be the responsibility of the Contractor, consistent with the Schedule A's. All foremen shall take orders exclusively from the designated Contractor representatives. Craft foremen shall be designated as working foreman at the request of the Contractors.

Section 4.11 Skilled and Trained Workforce. All Contractors performing Project Work are required to provide the City with an enforceable commitment that a skilled and

trained workforce will be used to complete the construction contract or project, in accordance with City Council Resolution Number R-312062.

ARTICLE 5

UNION ACCESS AND STEWARDS

Section 5.1 Access to Project Sites. Authorized representatives of the Union shall have access to Project Work, provided that they do not interfere with the work of employees and further provided that such representatives fully comply with posted visitor, security, and safety rules.

Section 5.2 Stewards.

(a) Each signatory local Union shall have the right to dispatch a working journeyman as a steward for each shift, and shall notify the Contractor in writing of the identity of the designated steward or stewards prior to the assumption of such person's duties as steward. Such designated steward or stewards shall not exercise any supervisory functions. There will be no non-working stewards. Stewards will receive the regular rate of pay for their respective crafts.

(b) In addition to his/her work as an employee, the steward should have the right to receive, but not to solicit, complaints or grievances and to discuss and assist in the adjustment of the same with the employee's appropriate supervisor. Each steward should be concerned only with the employees of the steward's Contractor and not with the employees of any other Contractor. The Contractor will not discriminate against the steward in the proper performance of his/her Union duties.

(c) When a Contractor has multiple, non-contiguous work locations at one site, the Contractor may request and the Union shall appoint such additional working stewards as the Contractor requests to provide independent coverage of one or more such locations. In such cases, a steward may not service more than one work location without the approval of the Contractor.

(d) The stewards shall not have the right to determine when overtime shall be worked or who shall work overtime.

Section 5.3 Steward Layoff/Discharge. The Contractor agrees to notify the appropriate Union twenty-four (24) hours before the layoff of a steward, except in the case of

disciplinary discharge for just cause. If the steward is protected against such layoff by the provisions of the applicable Schedule A, such provisions shall be recognized when the steward possesses the necessary qualifications to perform the remaining work. In any case in which the steward is discharged or disciplined for just cause, the appropriate Union will be notified immediately by the Contractor, and such discharge or discipline shall not become final (subject to any later filed grievance) until twenty-four (24) hours after such notice has been given.

Section 5.4 Employees on Non-Project Work. On work where the personnel of the City may be working in close proximity to the construction activities covered by this PLA, the Union agrees that the Union representatives, stewards, and individual workers will not interfere with the City personnel, or with personnel employed by any other employer not a Party to this PLA.

ARTICLE 6

WAGES AND BENEFITS

Section 6.1 Wages. At a minimum, all employees covered by this PLA shall be classified in accordance with work performed and paid the hourly wage rates for those classifications in compliance with the Applicable Prevailing Wage Determination established pursuant to the California Labor Code by the California Department of Industrial Relations.

Section 6.2 Benefits.

(a) Subject to the exception set forth below for Disadvantaged Business Enterprises, otherwise, for all employees performing Project Work, Contractors shall pay all fringe benefits and other required employer contributions to the established Union employee benefit funds in the amounts required by the applicable Schedule A. In addition, the Contractors and Unions agree that only such bona fide employee benefits that accrue to the direct benefit of the employees (such as pension and annuity, health and welfare, vacation, apprenticeship, and training funds) shall be included in this requirement and required to be paid by the Contractor on Covered Projects. These Contractor contributions shall not exceed the contribution amounts set forth in the Applicable Prevailing Wage Determination.

Union Benefit Fund Contributions for Disadvantaged Business Enterprises. Disadvantaged Business Enterprises are exempt from paying fringe benefits and

other required employer contributions on behalf of their Core Employees to the Union employee benefit funds, subject to the following exemption limitations:

(1) The exemption is only applicable to Disadvantaged Business Enterprises with an individual subcontract value of \$500,000 or less and;

(2) Disadvantaged Business Enterprises are limited to utilizing this exemption for one subcontract per Covered Project and;

(3) The total value of all subcontracts utilizing this exemption shall not exceed ten (10) percent of the total value of each Covered Project; and

(4) Disadvantaged Business Enterprises utilizing this exemption are still required to pay all fringe benefits and other required employer contributions to the established Union employee benefit funds for all employees other than their Core Employees, and must comply with the applicable prevailing wage requirements, including the payment of fringe benefits, for all employees performing Project Work; and

(5) In order to assist the Project Labor Coordinator monitor utilization of this exemption, each Prime Contractor will be responsible for tracking, reporting and providing notice to the Project Labor Coordinator about each Disadvantaged Business Enterprise subcontract that qualifies and intends to utilize this exemption prior to work commencing.

(b) Where applicable, the Contractor adopts and agrees to be bound by the written terms of the applicable, legally established, Union trust agreement(s) specifying the detailed basis how payments will be made into, and benefits paid out of, such trust funds for its employees. The Contractor authorizes the Parties to such trust funds to appoint trustees and successors' trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor. The Contractor obligations to the applicable Union benefit fund(s) and trust agreement(s) are limited to work performed on a Covered Project. The applicable Union benefit funds and trust agreement(s) to each Contractor are determined by the pre-job conference and Union work assignment process described in Articles 8 and 16.

(c) Each Contractor is required to certify to the Project Labor Coordinator that it has paid all benefit contributions due and owing to the appropriate Union trust(s) and benefit funds prior to the receipt of its final payment and/or retention. Further, upon timely notification by a Union to the Project Labor Coordinator, the Project Labor Coordinator shall work with any Contractor who is delinquent in

payments to assure that proper benefit contributions are made, to the extent of requesting the City or the prime Contractor to withhold payments otherwise due such Contractor, until such contributions have been made or otherwise guaranteed.

(d) Notwithstanding any other provisions, this Agreement is an agreement under Section 8(f) of the National Labor Relations Act (NLRA), which covers work performed in the building and construction industry. In addition, the work performed under this Agreement qualifies for the Construction Industry Exemption under the Employee Retirement and Income Security Act of 1974 (“ERISA”), as amended as well. If any Union Pension Trust Fund (“Fund”) covered by the terms and conditions of this Agreement does not qualify for the Construction Industry Exemption authorized by Section 4203 (B)(1)(i), of the Employee Retirement Income Security Act of 1974 (“ERISA”) as amended, 29 U.S.C. 1383(b)(1)(i), or has not taken the necessary steps to amend the Fund documents to qualify for the Construction Industry Exemption as authorized by Section 4203(B)(1)(ii) of ERISA, as amended, 29 U.S.C. 1383(b)(1)(B)(ii); and to recognize the work performed under this Agreement to qualify for the Construction Industry Exemption, the Contractors signatory to this Agreement will not be obligated to make pension fund contributions to that Fund. In such an event, the Contractor shall pay all required amounts otherwise allocated for payment toward the non-exempt Fund to the employees’ wages or other bona fide retirement plan program pursuant to applicable prevailing wage requirements.

Section 6.3 Wage Premiums. Wage premiums, including, but not limited to, pay based on height of work, shift premiums, hazard pay, scaffold pay, and special skills shall not be applicable to work under this PLA, except to the extent provided for in any applicable prevailing wage determination.

Section 6.4 Compliance with Prevailing Wage Laws. All complaints regarding possible prevailing wage violations may be referred to the Project Labor Coordinator or Labor Compliance Program, if any, for processing, investigation and resolution, and if not resolved within thirty (30) calendar days, may be referred by any Party to the State Labor Commissioner. To facilitate compliance with applicable prevailing wage laws, the City and each Contractor agree to provide copies of certified payroll reports, redacted only to the extent required by law, to the Unions (or to any Labor Management Cooperation Committee in which a Union or its affiliate participates) within ten (10) days of their request.

ARTICLE 7

WORK STOPPAGES AND LOCKOUTS

Section 7.1 No Work Stoppages or Disruptive Activity. The Council and the Unions signatory hereto agree that they, nor their respective officers, or agents or representatives, shall incite or encourage, condone or participate in any strike, walk-out, slowdown, picketing, observation of picket lines, or other activity of any nature or kind whatsoever, for any cause or dispute whatsoever with respect to or any way related to Project Work, or which interferes with or otherwise disrupts Project Work, or with respect to or related to the City or Contractors or subcontractors, including, but not limited to, economic strikes, unfair labor practice strikes, safety strikes, sympathy strikes, and jurisdictional strikes whether or not the underlying dispute is arbitrable. Any such actions by the Council, or Unions, or their members, agents, representatives, or the employees they represent shall constitute a material violation of this PLA. The Council and the Union shall take all steps necessary to obtain compliance with this Article.

Section 7.2 Employee Violations. The Contractor may discharge any employee violating Section 7.1 above, and any such employee will not be eligible for rehire under this PLA.

Section 7.3 Standing to Enforce. The City, the Project Labor Coordinator, or any Contractor affected by an alleged violation of Section 7.1 shall have standing and the right to enforce the obligations established therein.

Section 7.4 Expiration of Schedule A's. If a collective bargaining agreement between a signatory Contractor and one or more of the Union(s) expires before the Contractor completes the performance of a Covered Contract for a Covered Project, and the Union or the Contractor gives notice of demand for a new or modified collective bargaining agreement, the Unions agree that they will not strike the Contractor on any Covered Project, and the Union and the Contractor agree that the expired collective bargaining agreement will continue in full force and effect for the Project Work until a new or modified collective bargaining agreement is reached between the Union and the Contractor. If the new or modified collective bargaining agreement reached between the Union and the Contractor provides that any terms of the collective bargaining agreement shall be retroactive, the Contractor agrees to comply, consistent with the terms of this PLA and the Prevailing Wage Statute, with any retroactive terms of the new or modified collective bargaining agreement which are applicable to employees of said Contractor that are employed on a Covered Project within seven (7) days at

no cost to the City. All employees shall continue to work and to perform all their obligations with respect to Project Work despite the expiration of a Schedule A agreement. Should a Contractor engaged in Project Work enter into an interim agreement with the Unions for work being performed elsewhere after the expiration, and before the renewal of a local collective bargaining agreement forming the basis for Schedule A, such interim agreement shall be utilized by that Contractor for Project Work, subject to the provisions of Section 21.3.

Section 7.5 No Lock Outs. Contractors shall not cause, incite, encourage, condone or participate in any lock-out of employees with respect to Project Work during the term of this PLA. The term “lock-out” refers only to a Contractor's exclusion of employees in order to secure collective bargaining advantage, and does not refer to the discharge, termination, or layoff of employees by the Contractor for any reason in the exercise of rights pursuant to any provision of this PLA, or any other agreement, nor does “lock-out” include the City's decision to stop, suspend, or discontinue any Project Work or any portion thereof for any reason.

Section 7.6 Best Efforts to End Violations.

(a) If a Contractor contends that there is any violation of this Article, it shall, at least twenty-four (24) hours prior to invoking the procedures of Section 7.7, provide written notification to the Council of the involved Union(s) and to the Project Labor Coordinator, setting forth the facts which the Contractor contends violates this Article. The Council and the leadership of the involved Union(s) will immediately instruct, order, and use their best efforts to cause the cessation of any violation of the Article.

(b) If the Union contends that any Contractor has violated this Article, it will notify the Contractor and the Project Labor Coordinator, setting forth the facts which the Union contends violate this Article, at least twenty-four (24) hours prior to invoking the procedures of Section 7.7. The Project Labor Coordinator shall promptly order the involved Contractor(s) to cease any violation of the Article.

Section 7.7 Expedited Enforcement Procedure. Any Party, including the City, which is an intended beneficiary of this Article, or the Project Labor Coordinator, may institute the following procedures, in lieu of or in addition to any other action at law or equity, when a breach of this Article is alleged.

(a) The Party invoking this procedure shall notify Thomas Pagan, who has been selected by the negotiating Parties, and whom the Parties agree shall be the permanent arbitrator under this procedure, or Barry Winograd, as the alternate

arbitrator under this procedure. If the permanent arbitrator is unavailable at any time, the alternate will be contacted. If neither is available, then a selection shall be made from the list of arbitrators as set forth in Article 10. Notice to the arbitrator shall be by the most expeditious means available, with notices to the Parties alleged to be in violation, and to the Project Labor Coordinator and Council. For purposes of this Article, written notice may be given by email, facsimile, hand delivery, or overnight mail and will be deemed effective upon receipt.

(b) Upon receipt of said notice, the arbitrator named above or his/her alternate shall sit and hold a hearing within twenty-four (24) hours if it is contended that the violation still exists, but not sooner than twenty-four (24) hours after notice has been dispatched to the Council of the involved Union(s) and/or Contractor as required by Section 7.6, above.

(c) The arbitrator shall notify the Parties of the place and time chosen for this hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the arbitrator's discretion, shall not exceed twenty-four (24) hours unless otherwise agreed upon by all Parties. A failure of any Party or Parties to attend said hearings shall not delay the hearing of evidence or the issuance of any award by the arbitrator.

(d) The sole issue at the hearing shall be whether or not a violation of this Article has in fact occurred. The arbitrator shall have no authority to consider any matter in justification, explanation, or mitigation of such violation or to award damages, (except for damages as set forth in Section 7.8 below) which issue is reserved for court proceedings, if any. The award shall be issued in writing within three (3) hours after the close of the hearing and may be issued without an opinion. If any Party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the award. The arbitrator may order cessation of the violation of the Article and other appropriate relief, and such award shall be served on all Parties by hand or registered mail upon issuance.

(e) Such award shall be final and binding on all Parties and may be enforced by any court of competent jurisdiction upon the filing of this PLA and all other relevant documents referred to herein above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the other Party. In any judicial proceeding to obtain a temporary order enforcing the arbitrator's award as issued under Section 7.7(d) of this Article, all Parties waive the right to a hearing and agree that such proceedings may be ex parte. Such

agreement does not waive any Party's right to participate in a hearing for a final order of enforcement. The court's order or orders enforcing the arbitrator's award shall be served on all Parties by hand or by delivery to their address as shown on this PLA (for a Union), as shown on their business contract for work under this PLA (for a Contractor) and to the representing Union (for an employee), by certified mail by the Party or Parties first alleging the violation.

(f) Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance hereto are hereby waived by the Parties to whom they accrue.

(g) The fees and expenses of the arbitrator shall be equally divided between the Party or Parties initiating this procedure and the respondent Party or Parties.

Section 7.8 Liquidated Damages.

(a) If the arbitrator determines in accordance with Section 7.7 above that a work stoppage has occurred, the respondent Union(s) shall, within eight (8) hours of receipt of the Award, direct all the employees they represent on the project to immediately return to work. If the craft(s) involved do not return to work by the beginning of the next regularly scheduled shift following such eight (8) hour period after receipt of the arbitrator's Award, and the respondent Union(s) have not complied with their obligations to immediately instruct, order, and use their best efforts to cause a cessation of the violation and return the employees they represent to work, then the non-complying Union(s) shall each pay a sum as liquidated damages to the City, and each will pay an additional sum per shift, as set forth in (c), below, for each shift thereafter on which the craft(s) has not returned to work.

(b) If the arbitrator determines in accordance with Section 7.7 above that a lock out has occurred, the respondent Contractor(s) shall, within eight (8) hours after receipt of the award, return all the affected employees to work on the Project, or otherwise correct the violations found by the arbitrator. If the respondent Contractor(s) do not take such action by the beginning of the next regular scheduled shift following the eight (8) hour period, each non-complying respondent Contractor shall pay or give as liquidated damages, to the affected Union(s) (to be apportioned among the affected employees and the benefit funds to which contributions are made on their behalf, as designated by the arbitrator) and each shall pay an additional sum per shift, as set forth in (c), below, for each shift thereafter in which compliance by the respondent Contractor(s) has not been completed.

(c) The Parties agree that project delays caused by violations of this Article will cause the City to sustain damages. They agree that it would be impractical or extremely difficult to fix the amount of such damages. Therefore, the Parties agree that, in the event of a breach of either of these provisions, the Party in breach shall pay to the City the sum of not less than \$10,000.00 and no more than \$20,000.00 per shift from the time the arbitrator determines that a delay has occurred until the arbitrator determines that the project is again on construction schedule. The payment, when made, shall constitute a damages remedy of the City for the delay specified, but shall not prevent the City from seeking an injunctive or other monetary relief, including termination of this PLA. Payment of these sums as liquidated damages is not intended as a forfeiture or penalty within the meaning of California Civil Code sections 3275 or 3369, but instead, is intended to constitute liquidated damages to the City pursuant to section 1671 of the California Civil Code.

ARTICLE 8

WORK ASSIGNMENTS AND JURISDICTIONAL DISPUTES

Section 8.1 No Jobsite Disruption. There will be no strikes, work stoppages, picketing, sympathy strikes, slowdowns, or other interferences with the work because of jurisdictional disputes between Unions. The assignment of work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for Settlement of Jurisdictional Disputes in the Construction Industry (the “Plan”) or any successor Plan.

Section 8.2 All jurisdictional disputes on this project shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted by the Building and Construction Trades Department. Decisions rendered shall be final and binding and conclusive on the Contractors and Unions parties to this PLA.

All jurisdictional disputes shall be resolved without the occurrence of any of the activities prohibited in Article 7 (Work Stoppages and Lockouts), and the Contractor’s assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

Section 8.2.1 If a dispute arising under this Article involves the Southwest Regional Council of Carpenters or any of its subordinate bodies, an arbitrator shall be chosen by the procedures specified in Article V, Section 5, of the Plan from a list composed of Thomas Pagan, Thomas Angelo, Robert Hirsch, and John Kagel, and the

arbitrator's hearing on the dispute shall be held at the offices of the Council within fourteen (14) days of the selection of the arbitrator. All other procedures shall be as specified in the Plan.

Section 8.3 Failure to Comply. If any Union or Contractor fails to immediately and fully comply with the final decision rendered by the Plan, affected Union(s) or Contractor(s) may seek legal redress for such conduct, including, but not limited to, injunctive relief and/or damages.

Section 8.4 Pre-job Conference. It is required that a pre-job conference be held not later than fourteen (14) calendar days prior to the start of work by each Contractor for the Covered Project in accordance with the procedure described in Article 16.

ARTICLE 9

MANAGEMENT RIGHTS

Section 9.1 Contractor and City Rights. The Contractors and the City have the sole and exclusive right and authority to oversee and manage construction operations on Project Work without any limitations unless expressly limited by a specific provision of this PLA. In addition to the following and other rights of the Contractors enumerated in this PLA, the Contractors expressly reserve their management rights and all the rights conferred upon them by law. The Contractor's rights include, but are not limited to, the right to:

- (a) Plan, direct, and control operations of all work; and
- (b) Hire, promote, transfer, and layoff their own employees, respectively, as deemed appropriate to satisfy work and/or skill requirements; and
- (c) Promulgate and require all employees to observe reasonable job rules and security and safety regulations; and
- (d) Discharge, suspend, or discipline their own employees for just cause; and
- (e) Utilize, in accordance with City approval, any work methods, procedures, or techniques, and select, use, and install any types or kinds of materials, apparatus, or equipment, regardless of source of manufacture or construction; and
- (f) Assign and schedule work at their discretion; and

(g) Assign overtime, determine when it will be worked and the number and identity of employees engaged in such work, subject to such provisions in the applicable Schedule A(s) requiring such assignments be equalized or otherwise made in a nondiscriminatory manner.

Section 9.2 Specific City Rights. In addition to the following and other rights of the City enumerated in this PLA, the City expressly reserves its management rights and all the rights conferred on it by law and contract. The City's rights (and those of the Project Labor Coordinator on its behalf) include, but are not limited to the right to:

(a) Inspect any construction site or facility to ensure that the Contractor follows the applicable safety and other work requirements; and

(b) At its sole option, terminate, delay, and/or suspend any and all portions of the Project Work at any time; prohibit some or all work on certain days or during certain hours of the day to accommodate the ongoing operations of the City and/or to mitigate the effect of ongoing Project Work on businesses and residents in the neighborhood of the Project sites; and/or require any other operational or schedule changes it deems necessary, in its sole judgment, to meet Project deadlines and remain a good neighbor to those in the area of the Covered Projects. (In order to permit the Contractors and Unions to make appropriate scheduling plans, the City will provide the Project Labor Coordinator, and the affected Contractor[s] and Union[s] with reasonable notice of any changes it requires pursuant to this section); and

(c) Approve any work methods, procedures, and techniques used by Contractors whether or not these methods, procedures, or techniques are part of industry practices or customs; and

(d) Investigate and process complaints or disagreements, through its Project Labor Coordinator.

Section 9.3 Use of Materials. There should be no limitations or restrictions by the Union upon a Contractor's choice of materials or design, nor, regardless of source or location, upon the full use and utilization of equipment, machinery, packaging, precast, prefabricated, prefinished, or preassembled materials, tools, or other labor-saving devices, subject to the application of the California Public Contract and Labor Codes. Generally, the onsite installation or application of such items shall be performed by the craft having jurisdiction over such work.

Section 9.4 Special Equipment, Warranties, and Guaranties.

(a) It is recognized that certain equipment of a highly technical and specialized nature may be installed at Covered Project sites. The nature of the equipment, together with the requirements for manufacturer's warranties, may dictate that it be prefabricated, pre-piped, and/or pre-wired and that it be installed under the supervision and direction of the City's and/or manufacturer's personnel. The Unions agree that such equipment is to be installed without incident.

(b) The Parties recognize that the Contractor will initiate from time to time the use of new technology, equipment, machinery, tools, and other labor-savings devices and methods of performing Project Work. The Unions agree that they will not restrict the implementation of such devices or work methods. The Unions will accept and will not refuse to handle, install, or work with any standardized and/or catalogue parts, assemblies, accessories, prefabricated items, preassembled items, partially assembled items, or materials whatever their source of manufacture or construction.

(c) If any disagreement between the Contractor and the Unions concerning the methods of implementation or installation of any equipment, device, or item, or method of work arises, or whether a particular part or pre-assembled item is a standardized or catalog part or item, the work will proceed as directed by the Contractor, and the Parties shall immediately consult over the matter. If the disagreement is not resolved, the affected Union(s) shall have the right to proceed through the procedures set forth in Article 10.

ARTICLE 10

SETTLEMENT OF GRIEVANCES AND DISPUTES

Section 10.1 Cooperation and Harmony on Site.

(a) This PLA is intended to establish and foster continued close cooperation between management and labor. The Council shall assign a representative to this Project for the purpose of assisting the local Unions, and working with the Project Labor Coordinator, together with the Contractors, to complete construction of the Project Work economically, efficiently, continuously, and without any interruption, delays, or work stoppages.

(b) The Project Labor Coordinator, the Contractors, Unions, and employees collectively and individually, realize the importance to all Parties of maintaining continuous and uninterrupted performance of Project Work, and agree to resolve

disputes in accordance with the grievance provisions set forth in this Article or, as appropriate, those of Article 7 or 8.

(c) The Project Labor Coordinator shall observe the processing of grievances under this Article and Articles 7 and 8, including the scheduling and arrangements of facilities for meetings, selection of the arbitrator from the agreed-upon panel to hear the case, and any other administrative matters necessary to facilitate the timely resolution of any dispute; provided, however, it is the responsibility of the principal Parties to any pending grievance to ensure the time limits and deadlines are met.

Section 10.2 Processing Grievances. Any questions arising out of and during the term of this PLA involving its interpretation and application, which includes applicable provisions of the Schedule A's, but not alleged violations of Articles 7 or 8, shall be considered a grievance and subject to resolution under the following procedures.

Step 1. (a) Employee Grievances. When any employee subject to the provisions of this PLA feels aggrieved by an alleged violation of this PLA, the employee shall, through his local Union business representative or job steward, within ten (10) working days after the occurrence of the violation, give notice to the work site representative of the involved Contractor stating the provision(s) alleged to have been violated, the details of the alleged violation and the remedy sought to resolve the matter. A grievance shall be considered null and void if notice of the grievance is not given within the ten (10) day period. A business representative of the local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to adjust the matter within ten (10) working days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving Party may, within ten (10) working days thereafter, pursue Step 2 of this grievance procedure provided the grievance is reduced to writing, setting forth the relevant information, including a short description thereof, the date on which the alleged violation occurred, and the provision(s) of the applicable agreement alleged to have been violated. Grievances and disputes settled at Step 1 shall be non-precedential except as to the Parties directly involved.

(b) Union or Contractor Grievances. Should the Union(s) or any Contractor have a dispute with the other Party(ies) and, if after conferring within ten (10) working days after the disputing Party knew or should have known of the facts or occurrence giving rise to the dispute, a settlement is not reached within five (5) working days, the dispute shall be reduced to writing and processed to Step 2 in

the same manner as outlined in Step 1(a) above for the adjustment of an employee complaint.

Step 2. The business manager of the involved local Union or his designee, together with the site representative of the involved Contractor, and the labor relations representative of the Project Labor Coordinator shall meet within seven (7) working days of the referral of the dispute to this second step to arrive at a satisfactory settlement thereof. If the Parties fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within seven (7) calendar days after the initial meeting at Step 2.

Step 3. (a) If the grievance shall have been submitted but not resolved under Step 2, either the Union or Contractor Party may request in writing to the Project Labor Coordinator (with copy[ies] to the other Party[ies]) within seven (7) calendar days after the initial Step 2 meeting, that the grievance be submitted to an arbitrator selected from the agreed-upon list below, on a rotational basis in the order listed. Those arbitrators are: (1) Thomas Pagan; (2) David Hart; (3) Edna Francis; (4) Mike Rappaport; (5) Michael Prihar; (6) Fred Horowitz; and (7) Sara Adler. The decision of the arbitrator shall be final and binding on all Parties, and the fee and expenses of such arbitrations shall be borne equally by the involved Contractor(s) and the involved Union(s).

(b) Failure of the grieving Party to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by written consent of the Parties involved at the particular step where the extension is agreed upon. The arbitrator shall have the authority to make decisions only on issues presented and shall not have the authority to change, amend, add to, or detract from any of the provisions of this PLA.

Section 10.3 Limit on Use of Procedures. Procedures contained in this Article shall not be applicable to any alleged violation of Article 7 or 8, with a single exception that any employee discharged for violation of Section 7.2 may resort to the procedures of this Article to determine only if he/she was, in fact, engaged in that violation.

Section 10.4 Notice. The Project Labor Coordinator (and the City, in the case of any grievance regarding the Scope of this PLA), shall be notified by the involved Contractor of all actions at Steps 2 and 3, and further, the Project Labor Coordinator shall, upon its own request, be permitted to participate fully in all proceedings at such steps.

ARTICLE 11

COMPLIANCE

Section 11.1 Compliance with All Laws. The Council and all Unions, Contractors, and their employees shall comply with all applicable federal and state laws, ordinances, and regulations including, but not limited to, those relating to safety and health, employment, and applications for employment. All employees shall comply with the safety regulations established by the City, the Project Labor Coordinator, and the Contractor. Employees must promptly report any injuries or accidents to a supervisor.

Section 11.2 Monitoring Compliance. The Parties agree that the City shall require, and that the Project Labor Coordinator and Council shall monitor, compliance by all Contractors with all federal and state laws and regulations that, from time to time may apply to Project Work. It shall be the responsibility of both the Council and the Project Labor Coordinator (on behalf of the City) to investigate or monitor compliance with these various laws and regulations. The Council may recommend to the Project Labor Coordinator and/or the City procedures to encourage compliance with these laws and regulations.

Section 11.3 Prevailing Wage Compliance. The Council or Union may refer all complaints regarding any potential prevailing wage violation to the Project Labor Coordinator, who may process, investigate, and resolve such complaints. The Council or Union, as appropriate, shall be advised in a timely manner with regard to the facts and resolution, if any, of any complaint. It is understood that this Section does not restrict any individual rights as established under the State Labor Code, including the rights of an individual to file a complaint with the State Labor Commissioner.

Section 11.4 Violations of Law. Based upon a finding of violation by the City of a federal and state law, and upon notice to the Contractor that it is in such violation, the City, in the absence of the Contractor remedying such violation, shall take such action as it is permitted by law or contract to encourage the Contractor to come into compliance, including, but not limited to, assessing fines and penalties and/or removing the offending Contractor from Project Work.

ARTICLE 12

SAFETY AND PROTECTION OF PERSON AND PROPERTY

Section 12.1 Safety.

(a) It shall be the responsibility of each Contractor to ensure safe working conditions and employee compliance with all applicable safety laws and regulations and any safety rules contained herein or established by the City, the Project Labor Coordinator, or the Contractor. It is understood that employees have an individual obligation to use diligent care to perform their work in a safe manner and to protect themselves and the property of the Contractor and the City.

(b) All Parties and Contractor employees shall be bound by the safety, security, and visitor rules established by the Contractor, the Project Labor Coordinator, and the City. These rules will be published and posted. An employee's failure to satisfy his/her obligations under this Section will subject him/her to discipline, up to and including discharge.

Section 12.2 Drug and Alcohol Testing Policy. The Parties agree to adopt the Drug and Alcohol Testing Policy attached hereto as Attachment C, which is the exclusive Drug and Alcohol Testing Policy for Covered Projects.

Section 12.3 Inspection. The inspection of shipments of equipment, machinery, and construction materials of every kind shall be performed at the discretion of the Contractor by individuals of its choice.

ARTICLE 13

TRAVEL AND SUBSISTENCE

Section 13.1 Travel expenses, travel time, subsistence allowances and/or zone rates, and parking reimbursements shall not be applicable to work under this PLA, except to the extent provided for in any applicable prevailing wage determination. Parking for employees covered by this PLA shall be provided by the Contractor(s) according to the provision of the Schedule A(s) existing on the Effective Date of this PLA and upon presentation of proof of any expense incurred.

ARTICLE 14

APPRENTICES

Section 14.1 Importance of Training. The Parties recognize the need to maintain continuing support of the programs designed to develop adequate numbers of competent workers in the construction industry, the obligation to capitalize on the availability of the local work force in the area served by the City, and the opportunities to provide continuing work on Covered Projects for City Residents and Targeted Workers. To these ends, and consistent with any laws or regulations, the Parties will facilitate, encourage, and assist City Residents and Targeted Workers commence and progress in Apprenticeship Programs and/or apprenticeship readiness programs in the construction industry leading to participation in such Apprenticeship Programs. The City, the Project Labor Coordinator, other City consultants, the Contractors, and the Council and Unions, will work cooperatively to identify, or establish and maintain, effective programs and procedures for persons interested in entering the construction industry and which will help prepare them for the entry into Apprenticeship Programs. Apprentices, if utilized, must be enrolled in a California Apprenticeship Council-approved Apprenticeship Program.

Section 14.2 Use of Apprentices.

(a) The Unions and Contractors agree to cooperate in referring and employing Apprentices up to the maximum percentage allowed by the State Labor Code and the standards of each State-Approved Apprenticeship Program. The minimum ratios for Apprentice to journey person hours worked shall be in compliance, at a minimum, with the applicable provisions of the State Labor Code relating to utilization of Apprentices. The City, unless otherwise required by law, shall encourage such utilization, and, both as to Apprentices and the overall supply of experienced workers, the Project Labor Coordinator will work with the Council, Apprenticeship Programs, and Contractors to assure appropriate and maximum utilization of Apprentices and the continuing availability of both Apprentices and journey persons.

(b) The Parties agree that all Contractors will comply with all applicable laws and regulations in the request for dispatch and employment of Apprentices.

(c) The Parties agree that Apprentices will not be dispatched to Contractors working under this PLA unless there is a journeyman or other Contractor employee working on the Project where the Apprentice is to be employed who is

qualified to assist and oversee the Apprentice's progress through the program in which he/she is participating.

ARTICLE 15

LEGAL ACTION

Section 15.1 Legal Action. The City, Council and Unions recognize the substantial legal costs (including all attorney's fees and associated disbursements) that might accrue with regard to any legal challenge over the adoption by the City of this PLA, and related to claims directly challenging the legality of this PLA, or a particular section or language that has been adopted herein. In the event of a legal challenge, the Council, on behalf of itself and affiliated Unions, agrees to seek to intervene in the legal action and actively participate in the litigation or other action to defend the legality of this PLA, or a particular section or language herein. The failure of the Council to seek to intervene in the legal action and actively participate to defend the legality of this PLA will constitute a material breach of this PLA. In the event the Council is denied leave to intervene in the legal action, the Council shall have its counsel coordinate with the City's counsel, at the Council's own expense, regarding how the Council can best support the City's legal position.

ARTICLE 16

PRE-JOB CONFERENCE

Section 16.1 Each Contractor is required to conduct a pre-job conference with the Unions not later than fourteen (14) calendar days prior to commencing work. The purpose of the conference will be to, among other things, convey craft manpower needs, the schedule of work for the Covered Project, project work rules, and propose preliminary Union work assignments. The Project Labor Coordinator may work with the Prime Contractor and Council to facilitate the scheduling of all pre-job conferences, but ensuring each Contractor conducts a pre-job conference in accordance with this Agreement is the responsibility of the Prime Contractor. All preliminary Union work assignments shall be disclosed by each Contractor at a pre-job conference. Should there be work within the scope of a Construction Contract for a Covered Project that was not previously assigned at a pre-job conference, or additional work be added to the scope of the Covered Project, the Contractor(s) performing such work will conduct a separate pre-job conference.

Any Union in disagreement with a proposed assignment shall notify the affected Contractor of its position in writing, with a copy sent to the Project Labor Coordinator, within seven (7) calendar days after the pre-job conference occurred. Within seven (7) calendar days after the period allowed for Union notices of disagreement with the Employer's proposed assignments, but prior to the commencement of any work, the Employer shall make final assignments in writing with copies sent to the Project Labor Coordinator and Council.

ARTICLE 17

LABOR/MANAGEMENT AND COOPERATION

Section 17.1 Joint Committee. The Parties to this PLA will form a joint committee consisting of three (3) representatives selected by the Council and three (3) representatives selected by the Project Labor Coordinator, to be chaired jointly by a representative of the Project Labor Coordinator and the Council. The purpose of the Committee shall be to promote harmonious and stable labor management relations on this Project, to ensure effective and constructive communication between labor and management Parties, to advance the proficiency of work in the industry, and to evaluate and ensure an adequate supply of skilled labor for all Project Work. Representatives of the City may participate upon its request, and all Parties will be invited to attend.

Section 17.2 Functions of Joint Committee. The Committee shall meet on a schedule to be determined by the Committee or at the call of the joint chairs, to discuss the administration of the PLA, the progress of the project, general labor management problems that may arise, and any other matters consistent with this PLA. Substantive grievances or disputes arising under Articles 7, 8, or 10 shall not be reviewed or discussed by this Committee, but shall be processed pursuant to the provisions of the appropriate Article.

The Project Labor Coordinator shall be responsible for scheduling of the meetings and the preparation of the agenda topics for the meetings, with input from the Unions, the Contractors, and the City. Notice of the date, time and place of meetings, shall be given to the Committee members at least three (3) days prior to the meeting. The City shall be notified of the meetings and invited to send a representative(s) to participate.

The Project Labor Coordinator shall prepare quarterly reports on Apprentice utilization and the training and employment of City Residents, and a schedule of Project work and estimated number of craft workers needed. The Committee, or

an appropriate subcommittee, may review such reports and make any recommendations for improvement, if necessary, including increasing the availability of skilled trades, and the employment of local residents or other individuals who should be assisted with appropriate training to qualify for Apprenticeship Programs.

Section 17.3 Subcommittees. The Committee may form subcommittees to consider and advise the full Committee with regard to safety and health issues affecting the Project and other similar issues affecting the overall Project, including any workers' compensation program initiated under this PLA.

ARTICLE 18

SAVINGS AND SEPARABILITY

Section 18.1 Savings Clause. It is not the intention of the City, the Project Labor Coordinator, Contractor, or the Union Parties to violate any laws governing the subject matter of this PLA. The Parties hereto agree that in the event any provision of this PLA is finally held or determined to be illegal or void as being in contravention of any applicable law or regulation, the remainder of the PLA shall remain in full force and effect unless the part or parts so found to be void are wholly inseparable from the remaining portions of this PLA. Further, the Parties agree that if and when any provision(s) of this PLA is finally held or determined to be illegal or void by a court of competent jurisdiction, the Parties will promptly enter into negotiations concerning the substantive effect of such decision for the purposes of achieving conformity with the requirements of any applicable laws and the intent of the Parties hereto. If the legality of this PLA is challenged and any form of injunctive relief is granted by any court, suspending temporarily or permanently the implementation of this PLA, then the Parties agree that all Project Work that would otherwise be covered by this PLA should be continued to be bid and constructed without application of this PLA so that there is no delay or interference with the ongoing planning, bidding, and construction of any Project Work.

Section 18.2 Effect of Injunctions or Other Court Orders. The Parties recognize the right of the City to withdraw, at its absolute discretion, the utilization of the PLA as part of any bid specification should a court of competent jurisdiction issue any order, or any applicable statute that could result, temporarily or permanently, in delay of the bidding, awarding, and/or construction on the Project.

ARTICLE 19

WAIVER

Section 19.1 Waiver. A waiver of or a failure to assert any provisions of this PLA by any or all of the Parties hereto shall not constitute a waiver of such provision for the future. Any such waiver shall not constitute a modification of the PLA or change in the terms and conditions of the PLA and shall not relieve, excuse or release any of the Parties from any of their rights, duties, or obligations hereunder.

ARTICLE 20

AMENDMENTS

Section 20.1 Amendments. The provisions of this PLA can be renegotiated, supplemented, rescinded, or otherwise altered only by mutual agreement in writing, hereafter signed by the Parties.

ARTICLE 21

DURATION OF THE PLA

Section 21.1 Duration. This Agreement shall be effective on June 16, 2020, provided that the Council has signed the Agreement. The Agreement shall continue in full force and effect until all of the work within the scope of a Covered Contract is completed and accepted by the City.

Section 21.2 Turnover and Final Acceptance of Completed Work.

(a) Construction of any phase, portion, section, or segment of Project Work shall be deemed complete when such phase, portion, section or segment has been turned over to the City by the Contractor and the City has accepted such phase, portion, section, or segment. As areas and systems of the Project are inspected and construction-tested and/or approved and accepted by the City or third parties with approval of the City, the PLA shall have no further force or effect on such items or areas, except when the Contractor is directed by the City to engage in repairs or modifications required by its Contract(s) with the City.

(b) Notice of each final acceptance received by the Contractor will be provided to the Council with the description of what portion, segment, etc. has

been accepted. Final acceptance may be subject to a “punch” list, and in such case, the PLA will continue to apply to each such item on the list until it is completed to the satisfaction of the City and Notice of Acceptance is given by the City or its representative to the Contractor.

Section 21.3 Continuation of Schedule A’s. Schedule A's incorporated as part of this PLA shall continue in full force and effect, as previously stated, until the Contractor and Union Parties to the collective bargaining agreement(s), which are the basis for such Schedule A's, notify the Project Labor Coordinator of the mutually agreed upon changes in such agreements and their effective date(s).

The Parties agree to recognize and implement all applicable changes on their effective dates, except as otherwise provided by this PLA; provided, however, that any such provisions negotiated in said collective bargaining agreements will not apply to work covered by this PLA if such provisions are less favorable to the Contractor under the PLA than those uniformly required of Contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied if it may be construed to apply exclusively or predominantly to work covered by this PLA. Any disagreement between the Parties over the incorporation into a Schedule A of any such provision agreed upon in a negotiation of the local collective bargaining agreement that is the basis for a Schedule A shall be resolved under the procedures established in Article 10.

Section 21.4 Final Termination. Final termination of all obligations, rights, and liabilities, and disagreements shall occur upon receipt by the Council of a Notice from the City saying that no work remains within the scope of the PLA.

Section 21.5 Pure Water Program Phase II Projects. The City and the Unions intend to have this Agreement or a succeeding Agreement include all construction projects in Pure Water Program Phase II. The Pure Water Program Phase II Projects are in the early development stage and cannot be specifically identified at this time to be included in the scope of this Agreement. Therefore, to reopen negotiations to include Pure Water Program Phase II Projects into this Agreement, the Council shall send written notice to the City’s Project Labor Coordinator after the City has approved Pure Water Program Phase II Projects' Environmental Impact Report and no later than ninety (90) days after the City’s final approval of the Environmental Impact Report.

ARTICLE 22

WORK AND ECONOMIC OPPORTUNITY

Section 22.1 The magnitude, duration, and complexity of the Pure Water Program Phase I Projects will require large numbers of skilled craft personnel and create significant economic opportunities for City Residents, Targeted Workers, Disadvantaged Business Enterprises and other businesses. It is therefore the understanding and intention of the Parties to use the opportunities provided by the extensive amount of work to collaborate and implement programs and procedures, which may include, for example, North America's Building Trades Unions Multi-Craft Core Curriculum (MC3) apprenticeship readiness programs, to prepare persons, especially City Residents and Targeted Workers, for entrance into Apprenticeship Programs to begin or continue their construction careers on Covered Projects. Further, the Parties agree to maximize the inclusion of Disadvantage Business Enterprises through outreach, training, and subcontracting for Covered Projects. With assistance from the Project Labor Coordinator, the City, the Contractors, the Unions and their affiliated regional and national organizations will work jointly to promptly develop and implement procedures for the identification of craft needs, the scheduling of work to facilitate the utilization of available craft workers, and the securing of services of craft workers in sufficient numbers to meet the high demands of the Project Work to be undertaken.

Section 22.2 The City, together with the Parties, supports the development of increased numbers of skilled construction workers who are City Residents and Targeted Workers to meet the labor needs of Covered Projects. Towards that end, the Parties, together with the City and its Project Labor Coordinator, agree to develop and implement a work opportunities program for City Residents and Targeted Workers to maximize construction career opportunities and create a construction career pipeline to becoming employed on Covered Projects. Further, the City together with the Parties, will create opportunities for Disadvantaged Business Enterprises consistent with the City's goals and inclusion programs for such businesses. In furtherance of the foregoing, the Council and Unions specifically agree to work with the City and the Project Labor Coordinator to:

- (a) Collaborate with existing or newly created MC3 apprenticeship readiness programs in San Diego to offer opportunities for City Residents and Targeted Workers, including students, to enroll in free short-term construction apprenticeship readiness training to prepare them to enter into Apprenticeship Programs and become employed by a Contractor on a Covered Project. The

Project Labor Coordinator, with the assistance of the Parties, will assist with the recruitment, career placement, and tracking of such City Residents and Targeted Workers who graduate from these apprenticeship readiness programs; and

(b) The Parties will cooperate and collaborate with the City and Project Labor Coordinator to conduct outreach to and include City Residents and Targeted Workers from traditionally underrepresented segments of the City's population in the construction craft workforce for each Covered Project; and

(c) The Council will provide accurate data on a quarterly basis to the City and Project Labor Coordinator pertaining to their level of economic support provided to meet these objectives. Further, the Project Labor Coordinator shall produce detailed quarterly reports for the City and Council to measure and report the outcomes of the policies, requirements, and programs established in this Agreement; and

(d) The Unions will partner with the City and Project Labor Coordinator to conduct outreach and recruitment activities by establishing or continuing to maintain existing centers, programs, and events to facilitate the entry of City Residents and Targeted Workers into the building and construction trades. These programs shall serve as a resource for preliminary orientation, assessment of construction aptitude, referral to MC3 apprenticeship readiness programs or Apprenticeship Programs, referral to hiring halls, and provide tailored orientation and mentoring for women and Targeted Workers; and

(e) The Unions shall assist City Residents and Targeted Workers with contacting the Apprenticeship Programs for the crafts and trades they are interested in. The Unions shall assist City Residents and Targeted Workers who are seeking employment on Covered Projects and provide opportunities for Union membership by assessing their work experience and giving them credit for provable past experience in their relevant craft or trade, including experience gained working for non-Union Contractors. The Unions shall put on their rolls qualified bona fide City Residents and Targeted Workers for employment on Covered Projects.

Section 22.3 Joint Subcommittee on Work and Economic Opportunity. To carry out the intent and purpose of this Article, a subcommittee of the Labor Management Committee established pursuant to Article 17 shall be established, jointly chaired by a designee of the City and a designee of the Council, to oversee the effective development and implementation of the programs and policies described herein, and to work with representatives of each apprenticeship committee and representatives of the MC3 apprenticeship readiness programs to maximize

employment opportunities for City Residents and Targeted workers who reflect the diversity of the communities surrounding each Covered Project and who may not be previously qualified for the construction career opportunities created by the Covered Projects. The subcommittee will meet as necessary at the call of the joint chairs to promptly facilitate its purposes in an expeditious manner as soon as this PLA becomes effective. In addition to the joint chairs, the membership of the committee will consist of at least three (3) representatives of the signatory local Unions and three (3) representatives of Contractors (or organization to which the Contractors belong) signatory to this PLA and experienced in overseeing and participating in Apprenticeship Programs.

ARTICLE 23

HELMETS TO HARDHATS


Section 23.1 Veterans Entry into Building and Construction Trades. The Parties recognize a desire to facilitate the entry into the building and construction trades of Veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter “Center”) and the Center’s “Helmets to Hardhats” program to serve as a resource for preliminary orientation, assessment, and construction aptitude, referral to Apprenticeship Programs or hiring halls, counseling and mentoring, support network, employment opportunities, and other needs as identified by the Parties.

Section 23.2 Integrated Database. The Unions and Contractors agree to coordinate with the Center to create and maintain an integrated database of Veterans interested in working on this Covered Project and of apprenticeship and employment opportunities for this Covered Project.

In witness whereof, the Parties have caused this Project Labor Agreement for City of San Diego Pure Water Program Phase I Projects to be executed as of the date and year above stated.

Dated: July 9, 2020

SAN DIEGO BUILDING AND CONSTRUCTION
TRADES COUNCIL

DocuSigned by:

ADB86106CE1E414...

By:

Tom Lemmon, Business Manager

SIGNATORY UNIONS AND
(See Attached)

SIGNATORY UNIONS

DocuSigned by:
Michael Patterson
38B4C81867E341A...
By: Allied Workers Local 5

By: Chad Boggio Chad Boggio
Bricklayer & Allied Crafts Local 4

DocuSigned by:
[Signature]
4111C0A1543D4C8...
By: Electrical Workers Local 569

DocuSigned by:
[Signature]
3380E1140A31459...
By: Glaziers, Floor Coverings & Painters Local 1399

DocuSigned by:
Valentine R. Macedo
AC5993278764412...
By: Laborers Local 89

DocuSigned by:
James Preciado
[Signature]
By: Plasterer Tenders Local 1414

By: [Signature]
Operating Engineers Local 12

DocuSigned by:
Mike Hartley
363A0846720A48F...
By: Plumbers & Pipefitters Local 230

DocuSigned by:
Paul Colmenero
97581004B0E0439...
By: Roofers & Waterproofers Local 45

DocuSigned by:
[Signature]
B569A3D2C62940C...
By: Laborers Local 1184

DocuSigned by:
Ed Uarn
AEBFEA548C4F413...
By: Laborers Local 345

DocuSigned by:
Ricardo Perez
8C144FFD6F5F464...
By: UA Local 345

DocuSigned by:
Stephen Ariza
B66C6F62284F439...
By: Southwest Regional Council of Carpenters

DocuSigned by:
Luis Miramontes
997D1F49D5364AD...
By: Boilermakers Local 92

DocuSigned by:
Jack Alvarado
5C661A00E44B47F...
By: Cement Masons Local 500 / Area 744

By: Frank Belio, Jr. For BM Gazzaniga
Elevator Constructors Local 18

DocuSigned by:
David Osborne
0679DF11AEC94C3...
By: Iron Workers Local 229

DocuSigned by:
Tom Castleman
D99E7C175E1E4A7...
By: Plasterers Local 200

By: Ronald A. [Signature]
Operating Engineers Local 12

By: [Signature]
Operating Engineers Local 12

DocuSigned by:
Todd Barry
B9584FD2117949F...
By: Road Sprinkler Fitters Local 669

DocuSigned by:
Dave Gauthier
D3C0E4114ADC482...
By: Sheet Metal Workers Local 206

DocuSigned by:
Douglas R Tracy
[Signature]
By: Sheet Metal Workers Local 206

DocuSigned by:
Jose Estrada
530AF0ECACB1492...
By: Teamsters Local 166

DocuSigned by:
[Signature]
3380E1140A31459...
By: Tradeshow & Sign Craft Local 831

DocuSigned by:
[Signature]
By: Laborers Local 300

ATTACHMENT A – LETTER OF ASSENT

To be signed by all Contractors awarded work covered by the Project Labor Agreement prior to commencing work.

[CONTRACTOR’S LETTERHEAD]

DATE

Project Labor Coordinator

Address

Address

Address

Attention: _____

**Re: City of San Diego Project Labor Agreement for
Pure Water Program Phase I Project**

Dear Sir:

This is to confirm [Name of Company] agrees to be party to and bound by the City of San Diego Project Labor Agreement for Construction of Pure Water Program Phase I Projects, effective May 1, 2020, as such Agreement may from time to time be amended by the negotiating Parties or interpreted pursuant to its terms. Such obligation to be a Party and bound by this Agreement shall extend to all work covered by the Agreement undertaken by this Company on the Project pursuant to [City Contract No. _____ and Name of Covered Project], and this Company shall require all of its subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical Letter of Assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By:

[Name and Title of Authorized Executive]

[Copies of this Letter must be submitted to the Project Labor Coordinator and to the Council consistent with Article 3, Section 3.3(b)]

ATTACHMENT B-1 – WORKFORCE DISPATCH REQUEST FORM

The City of San Diego’s Project Labor Agreement for Pure Water Program Phase I Projects establishes a goal of at least thirty-five percent (35%) of the total craft hours on each Covered Project be performed by City Residents. The Unions and Contractors agree that, to the extent allowed by law, and as long as they possess the requisite skills and qualifications, City Residents shall be first referred for Project Work. A “City Resident” is defined as a City of San Diego permanent resident at the time of initial employment on a Covered Project or a Veteran residing anywhere.

*The list of qualifying zip codes for City Residents includes: 92014, 92037, 92038, 92067, 92093, 92101, 92102, 92103, 92104, 92105, 92106, 92107, 92108, 92109, 92110, 92111, 92113, 92114, 92115, 92116, 92117, 92119, 92120, 92121, 92122, 92123, 92124, 92126, 92127, 92128, 92129, 92130, 92131, 92132, 92134, 92137, 92138, 92139, 92145, 92154, 92166, 92167, 92169, 92171, 92173, 92177.

C O N T R A C T O R U S E O N L Y

Please complete and fax or email this form to the applicable union to request craft workers that fulfill the hiring requirements for this project. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax or Email Transmission Verification Reports and keep copies for your records.

TO:	Local Union and #	
	Email	
	Fax	

CC:	City of San Diego Project Labor Coordinator	
	Email	
	Fax	

FROM:	Contractor	
	Issued by	
	Email	
	Phone	
	Fax	

UNION CRAFT WORKER REQUEST:

Craft Classification	Journey person or Apprentice	City Resident and/or Veteran	# of Workers
	<input type="checkbox"/> JM <input type="checkbox"/> APP	YES*	
	<input type="checkbox"/> JM <input type="checkbox"/> APP	YES*	
	<input type="checkbox"/> JM <input type="checkbox"/> APP	YES*	
	<input type="checkbox"/> JM <input type="checkbox"/> APP	YES*	

WORKER REPORTING INSTRUCTIONS:

Reporting Date:	
Reporting Time:	
Project Name:	
Project Location:	
Reporting To:	
On Site Phone:	
Special Instructions:	

U N I O N U S E O N L Y

Please complete the “Union Use Only” section and fax or email both pages to the requesting Contractor and Project Labor Coordinator.

Date Dispatch Received:	
Dispatch Received by:	

Date Worker(s) Dispatched:			
Name	Veteran (Y/N)	Zip Code	JM or App
			<input checked="" type="checkbox"/> JM <input type="checkbox"/> APP
			<input type="checkbox"/> JM <input type="checkbox"/> APP
			<input type="checkbox"/> JM <input checked="" type="checkbox"/> APP
			<input type="checkbox"/> JM <input type="checkbox"/> APP

ATTACHMENT B-2 – CONTRACTOR CORE WORKFORCE FORM

C O N T R A C T O R I N F O R M A T I O N			
Project Name:			
Contractor/Firm Name:			
Prime Tier:			
Submitted by:			
Email:		Phone:	

In accordance with the Project Labor Agreement, Article 4, Section 4.6 (f), a Core Employee must be either a journeyman or Apprentice and appear on the Contractor’s active payroll for at least ninety (90) of the last one-hundred-eighty (180) working days prior to being designated as a Core Employee; and must possess any license required by state or federal law for the Project Work to be performed; and must have the ability to safely perform the basic functions of the applicable.

Prior to each Contractor performing any work on a Covered Project, each Contractor shall provide a list of Core Employees to the Project Labor Coordinator and the Council. After submitting the Core Employee list prior to commencing work, Contractors shall not make any changes or substitutions to the Core Employee list for the duration of the Covered Project. Failure to submit the Core Employee list prior to work commencing will prohibit the Contractor from using any Core Employees for 30 calendar days after the list is provided to the Project Labor Coordinator and Council.

Please check all that apply:

Our firm will not be self-performing any work on this project.
We will be subcontracting our work to: _____

PLA Section 4.6 regarding Core Employees is not applicable to Contractors that are signatory to one or more Schedule As, which are the Master Labor Agreements of the Unions. If your company is signatory, please list the union and local number below. For crafts that you are not signatory, please complete the core employee list below.

Indicate Signatory Union Trade: _____ Local # _____
 Indicate Signatory Union Trade: _____ Local # _____
 Indicate Signatory Union Trade: _____ Local # _____

We are not a union signatory contractor and will be using core employees on this project as indicated below:

Craft/Trade	Employee Name	MC3 Apprentice Y/N?	Last 4 SSN	Hire Date	Date Last Employed

ATTACHMENT C – DRUG AND ALCOHOL TESTING POLICY

The Parties recognize the problems that drug and alcohol abuse have created in the construction industry and the need to develop drug and alcohol abuse prevention programs. Accordingly, the Parties agree that in order to enhance the safety of the workplace and to maintain a drug and alcohol-free work environment, individual Contractors shall require applicants or employees to undergo drug and alcohol testing in accordance with this PLA and this policy, Attachment C – Drug and Alcohol Testing Policy, hereafter “Policy.”

1. It is understood that the use, possession, transfer, or sale of illegal drugs, narcotics, or other unlawful substances, as well as being under the influence of alcohol and the possession of or consuming alcohol is absolutely prohibited while employees are on the Contractor’s job premises or while working on any jobsite in connection with work performed under the PLA.
2. No Contractor may implement a drug and alcohol testing program that does not conform in all respects to the provisions of this Policy.
3. No Contractor may implement drug and alcohol testing at any jobsite unless written notice is given to the Union setting forth the location of the jobsite, a description of the project under construction, and the name and telephone number of the Prime Contractor's project manager. Said notice shall be provided at the pre-job conferences for each Covered Project. Failure to give such notice shall make any drug and alcohol testing engaged in by the Contractor a violation of the Agreement and subject to the Article 10 grievance procedure.
4. A Contractor who elects to implement drug and alcohol testing pursuant to this Policy shall require all craft employees on the Covered Project to be tested. With respect to individuals who become employed on the Covered Project subsequent to the proper implementation of a valid drug and alcohol testing program, such test shall be administered upon the commencement of employment on the project, whether by referral from a Union Dispatch Office, transfer from another project, or another method. Individuals who were employed on the project prior to proper implementation of a valid drug and alcohol testing program may only be subjected to testing for the reasons set forth in paragraphs 5(g)(1) through 5(g)(3) and paragraphs 6(a) through 6(e) of this Policy. Refusal to undergo such testing shall be considered sufficient grounds to deny employment on the project.
5. The following procedure shall apply to all drug and alcohol testing:
 - a. The Contractor may request urine samples only. The applicant or employee shall not be observed when the urine specimen is given. An applicant or employee, at his or her sole option, shall, upon request, receive a blood test in lieu of a urine test. No employee of the Contractor shall draw blood from a bargaining unit employee, touch

- or handle urine specimens, or in any way become involved in the chain of custody of urine or blood specimens. A Union Business Representative, subject to the approval of the individual applicant or employee, shall be permitted to accompany the applicant or employee to the collection facility to observe the collection, bottling, and sealing of the specimen.
- b. A Contractor may request an applicant or employee promptly, within four (4) hours of the Contractor's request, perform an alcohol breathalyzer test at a certified laboratory only, and cutoff levels shall be those mandated by applicable state or federal law.
 - c. The testing shall be done by a laboratory approved by the Substance Abuse & Mental Health Services Administration (SAMHSA), which is chosen by the Contractor and the Union.
 - d. An initial test shall be performed using the Enzyme Multiplied Immunoassay Technique (EMIT). In the event a question or positive result arises from the initial test, a confirmation test must be utilized before action can be taken against the applicant or employee. The confirmation test will be by Gas Chromatography/Mass Spectrometry (GC/MS). Cutoff levels for both the initial test and confirmation test will be those established by SAMHSA and this Policy. Should these SAMHSA levels be changed during the course of the PLA or new testing procedures are approved, then these new regulations will be deemed as part of this existing PLA. Confirmed positive samples will be retained by the testing laboratory in secured long-term frozen storage for a minimum of one (1) year. Handling and transportation of each sample must be documented through strict chain-of-custody procedures.
 - e. In the event of a confirmed positive test result, the applicant or employee may request, within forty-eight (48) hours, a sample of his/her specimen from the testing laboratory for purposes of a second test to be performed at a second laboratory, designated by the Union and approved by SAMHSA. The retest must be performed within ten (10) days of the request. Chain of custody for this sample shall be maintained by the Contractor between the original testing laboratory and the Union's designated laboratory. Retesting shall be performed at the applicant's or employee's expense. In the event of conflicting test results, the Contractor may require a third test, at the Contractor's expense.
 - f. If, as a result of the above testing procedure, it is determined that an applicant or employee has tested positive, this shall be considered sufficient grounds to deny the applicant or employee his/her employment on the project.
 - g. No individual who tests negative for drugs and alcohol pursuant to the above procedure and becomes employed on the project shall again be subjected to drug and alcohol testing with the following exceptions:
 - 1) Employees who are involved in industrial accidents resulting in damage to plant, property, or equipment or injury to him/her or others may be tested for drugs or alcohol pursuant to the procedures stated hereinabove.

- 2) The Contractor may test employees following thirty (30) days' advance written notice to the employee(s) to be tested and to the applicable Union. Notice to the applicable Union shall be sent by certified mail to the affected Union with a copy to the Project Labor Coordinator. Such testing shall be pursuant to the procedures stated hereinabove.
 - 3) The Contractor may test an employee where the Contractor has reasonable cause to believe that the employee is impaired from performing his/her job. Reasonable cause shall be defined as being aberrant or unusual behavior, the type of which is a recognized and accepted symptom of impairment (e.g., slurred speech, unusual lack of muscular coordination). Such behavior must be actually observed by at least two (2) persons, one (1) of whom shall be a supervisor who has been trained to recognize the symptoms of drug and alcohol abuse or impairment and the other of whom shall be the Job Steward. If the Job Steward is unavailable or there is no Job Steward on the Covered Project, the other person shall be a member of the applicable Union's bargaining unit. Testing shall be pursuant to the procedures stated hereinabove. Employees who are tested pursuant to the exceptions set forth in this paragraph and who test positive will be removed from the Contractor's payroll.
 - h. Applicants or employees who do not test positive shall be paid for all time lost while undergoing drug and alcohol testing. Payment shall be at the applicable wage and benefit rates set forth in the applicable Union's Master Labor Agreement. Applicants who have been dispatched from the Union and who are not put to work pending the results of a test will be paid waiting time until such time as they are put to work. It is understood that an applicant must pass the test as a condition of employment. Applicants who are put to work pending the results of a test will be considered probationary employees.
6. The Contractors will be allowed to conduct periodic jobsite drug and alcohol testing on the Project under the following conditions:
- a. The entire jobsite must be tested, including any employee or subcontractor's employee who worked on that project three (3) working days before or after the date of the test;
 - b. Jobsite testing cannot commence sooner than fifteen (15) days after start of the work on the project;
 - c. Prior to start of periodic testing, a Business Representative will be allowed to conduct an educational period on company time to explain periodic jobsite testing program to affected employees;
 - d. Testing shall be conducted by an SAMHSA-certified laboratory, pursuant to the provisions set forth in paragraph 5 hereinabove.
 - e. Only two (2) periodic tests may be performed in a twelve (12)-month period.

7. It is understood that the unsafe use of prescribed medication, or where the use of prescribed medication impairs the employee's ability to perform work, is a basis for the Contractor to remove the employee from the jobsite.
8. Any grievance or dispute that may arise out of the application of this Policy shall be subject to the grievance and arbitration procedures set forth in the PLA.
9. The establishment or operation of this Policy shall not curtail any right of any employee found in any law, rule, or regulation. Should any part of this Policy be found unlawful by a court of competent jurisdiction or a public agency having jurisdiction over the Parties, the remaining portions of the Agreement shall be unaffected, and the Parties shall enter negotiations to replace the affected provision.
10. Present employees, if tested positive, shall have the prerogative for rehabilitation program at the employee's expense. When such program has been successfully completed, the Contractor shall not discriminate in any way against the employee. If work for which the employee is qualified exists, he/she may be reinstated.
11. The Contractor agrees that results of urine and blood tests performed hereunder will be considered medical records held confidential to the extent permitted or required by law. Such records shall not be released to any persons or entities other than designated Contractor representatives and the applicable Union. Such release to the applicable Union shall only be allowed upon the signing of a written release by the employee, and the information contained therein shall not be used to discourage the employment of the individual applicant or employee on any subsequent occasion.
12. Employees who seek voluntary assistance for substance abuse may not be disciplined for seeking such assistance. Requests from employees for such assistance shall remain confidential and shall not be revealed to other employees or management personnel without the employee's consent. Employees enrolled in substance abuse programs will be subject to all Contractor rules, regulations, and job performance standards with the understanding that an employee enrolled in such a program is receiving treatment for an illness.
13. The Contractor shall indemnify and hold the Union harmless against any and all claims, demands, suits, or liabilities that may arise out of the application of this Policy.
14. This Policy shall constitute the only Policy in effect between the Parties concerning drug and alcohol abuse, prevention, and testing. Any modifications thereto must be accomplished pursuant to collective bargaining negotiations between the Parties.

SPECIMEN REPORTING CRITERIA

Initial Test Analyte	Initial Test Cutoff ¹	Confirmatory Test Analyte	Confirmatory Test Cutoff Concentration
Marijuana metabolites (THCA) ²	50 ng/ml ³	THCA	15 ng/ml
Cocaine metabolite (Benzoylecgonine)	150 ng/ml ³	Benzoylecgonine	100 ng/ml
Codeine/ Morphine	2000 ng/ml	Codeine Morphine	2000 ng/ml 2000 ng/ml
Hydrocodone/ Hydromorphone	300 ng/ml	Hydrocodone Hydromorphone	100 ng/ml 100 ng/ml
Alcohol	0.02%	Ethanol	0.02%
Oxycodone/ Oxymorphone	100 ng/ml	Oxycodone Oxymorphone	100 ng/ml 100 ng/ml
6-Acetylmorphine	10 ng/ml	6-Acetylmorphine	10 ng/ml
Phencyclidine	25 ng/ml	Phencyclidine	25 ng/ml
Amphetamine/ Methamphetamine	500 ng/ml	Amphetamine Methamphetamine	250 ng/ml 250 ng/ml
MDMA ⁴ /MDA ⁵	500 ng/ml	MDMA MDA	250 ng/ml 250 ng/ml
Initial Test Analyte	Initial Test Cutoff	Confirmatory Test Analyte	Confirmatory Test Cutoff Concentration
Barbiturates	300 ng/ml	Barbiturates	200 ng/ml
Benzodiazepines	300 ng/ml	Benzodiazepines	300 ng/ml
Methadone ⁶	300 ng/ml	Methadone	100 ng/ml
Methaqualone	300 ng/ml	Methaqualone	300 ng/ml
Propoxyphene	300 ng/ml	Propoxyphene	100 ng/ml

¹ For grouped analytes (i.e., two or more analytes that are in the same drug class and have the same initial test cutoff):

Immunoassay: The test must be calibrated with one analyte from the group identified as the target analyte. The cross-reactivity of the immunoassay to the other analyte(s) within the group must be 80 percent or greater; if not, separate immunoassays must be used for the analytes within the group.

Alternate technology: Either one analyte or all analytes from the group must be used for calibration, depending on the technology. At least one analyte within the group must have a concentration equal to or greater than the initial test cutoff or, alternatively, the sum of the analytes present (i.e., equal to or greater than the laboratory's validated limit of quantification) must be equal to or greater than the initial test cutoff.

² An immunoassay must be calibrated with the target analyte, 9-tetrahydrocannabinol-9- carboxylic acid (THCA).

³ **Alternate technology (THCA and benzoylecgonine):** The confirmatory test cutoff must be used for an alternate technology initial test that is specific for the target analyte (i.e., 15 ng/ml for THCA, 100 ng/ml for benzoylecgonine).

⁴ Methylenedioxyamphetamine (MDMA)

⁵ Methylenedioxymphetamine (MDA)

⁶ Employees with a prescription for methadone who are using the medication as prescribed, and are not impaired and can safely perform their work, will not be considered to have violated this Policy.

**MEMORANDUM OF UNDERSTANDING REGARDING
“QUICK” DRUG SCREENING TESTS PURSUANT TO
ATTACHMENT C – DRUG AND ALCOHOL TESTING POLICY**

It is hereby agreed between the Parties hereto that a Contractor who has otherwise properly implemented drug and alcohol testing, as set forth in the Policy, shall have the right to offer an applicant or employee a "quick" drug screening test. This “quick” screen test shall consist either of the “ICUP” urine screen or similar test or an oral screen test. The applicant or employee shall have the absolute right to select either of the two “quick” screen tests, or to reject both and request a full drug test.

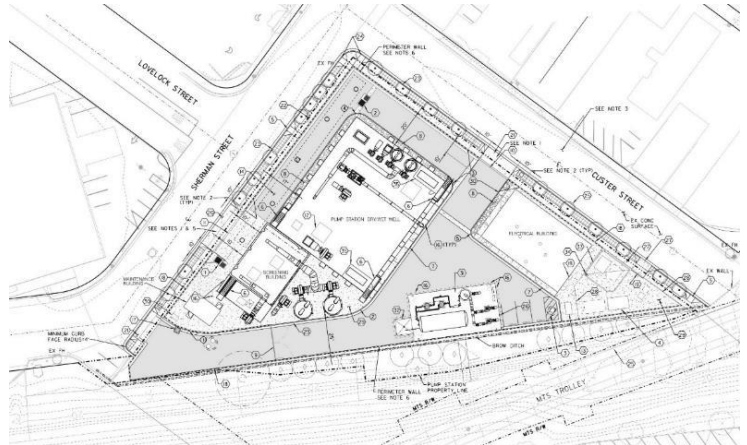
An applicant or employee who selects one of the "quick" screen tests, and who passes the test, shall be put to work immediately. An applicant or employee who fails the "quick" screen test, or who rejects the "quick" screen tests, shall be tested pursuant to the procedures set forth in the Policy. The sample used for the "quick" screen test shall be discarded immediately upon conclusion of the test. An applicant or employee shall not be deprived of any rights granted to them by the Policy as a result of any occurrence related to the “quick” screen test.

APPENDIX A – SAN DIEGO PURE WATER PROGRAM PHASE I COVERED PROJECTS

1. Morena PS/PL Construction Package 1: Morena Pump Station

- **Associated Pure Water Project:** Morena PS/PL Project
- **Summary:** The package is the construction of a new pump station that will transport approximately 32 mgd of wastewater to the NCWRP, where it will be treated before being sent to the NCPWF for further purification. Construction of the pump station will be on Sherman Street.
- **Summary of Major Construction Package Components**
 - 4+1 Dual Stage Sewer Pump Station
 - Screening Facility
 - High Purity Oxygen System
 - 48-inch to 60-inch diameter influent diversion sewers in Friars Road
 - 66-inch Overflow Sewer
 - Electrical and Instrumentation

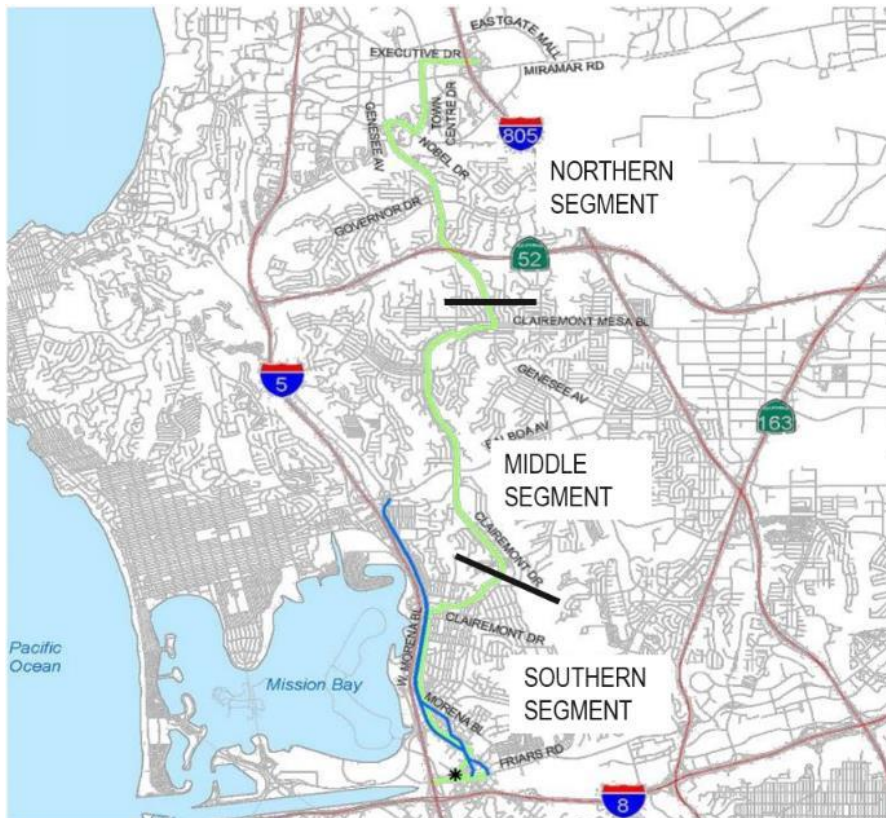
Morena Pump Station Rendering and Site Plan



2. Morena PS/PL Construction Package 2: Morena Northern Alignment and Tunnels

- **Associated Pure Water Project:** Morena PS/PL Project
- **Summary:** Two pipelines that will start at approximately Genesee Avenue/Highway 52, and will continue through University City to the NCWRP. Three short length tunnels are included in this section, each approximately 1000 feet; one at Highway 52, one at Rose Creek in University City and one at Interstate 805. One pipeline will transport wastewater to the NCWRP, while the other will transport salt and contaminants removed from the water at the NCPWF to the Point Loma Wastewater Treatment Plant.
- **Summary of Major Construction Package Components**
 - 4 miles of 48-inch force main
 - 4 miles of 36-inch brine/centrate pipeline
 - Tunnel crossing of I-805
 - Tunnel crossing of MTS/NCTD railroad at Rose Creek Canyon
 - Tunnel crossing at San Clemente Creek

Morena Conveyance Northern, Middle and Southern Segments Site Plan



3. Morena PS/PL Construction Package 3: Morena Middle Alignment

- **Associated Pure Water Project:** Morena PS/PL Project
- **Summary:** Two pipelines will start at Iroquois Avenue and will terminate at Genesee Avenue/Highway 52. One pipeline will transport wastewater to the NCWRP, while the other will transport salt and contaminants removed from the water at the NCPWF to the Point Loma Wastewater Treatment Plant.
- **Summary of Major Construction Package Components**
 - 3.6 miles of 48-inch welded steel force main
 - 3.6 miles of 36-inch brine/centrate high density polyethylene pipeline

4. Morena PS/PL Construction Package 4: Morena Southern Alignment

- **Associated Pure Water Project:** Morena PS/PL Project
- **Summary:** Two pipelines will start at Sherman Street, follow West Morena Boulevard and terminate at Iroquois Avenue. One pipeline will transport wastewater to the NCWRP, while the other will transport salt and contaminants removed from the water at the NCPWF to the Point Loma Wastewater Treatment Plant. A 36-inch diameter welded steel water transmission main will be constructed and a 16 inch steel water distribution main will be replaced by 16 inch PVC in this package.
- **Summary of Major Construction Package Components**
 - 3.2 miles of 48-inch force main
 - 3.2 miles of 30-inch brine/centrate pipeline
 - Brine/centrate pressure reducing station
 - 3.2 Miles of existing 16-inch steel water distribution main replacement with PVC
 - 3.3 miles of new 36-inch water transmission main

5. NCWRP Expansion Construction Package 1: NCWRP Flow Equalization Basin

- **Associated Pure Water Project:** NCWRP Expansion
- **Summary:** This package includes the construction of one concrete equalization tank that will balance high/low wastewater flows from primary effluent and will provide for consistent flow to the biological treatment basins.
- **Summary of Major Construction Package Components**
 - 2.35-million-gallon flow equalization basin
 - Grading, yard piping and stormwater basin
 - Electrical and instrumentation

NCWRP Equalization Basin Package 1 Rendering



6. NCWRP Construction Packages 2 and 3: NCWRP Expansion and NCPWF Influent Conveyance

- **Associated Pure Water Project:** NCWRP Expansion
- **Summary:** This package will increase the amount of recycled water that the plant produces to meet the needs of both the non-potable reuse recycled water system and the new NCPWF. Plant expansion includes the construction of a 42.5 mgd pump station that will convey water to the NCPWF across Eastgate Mall Road.
- **Summary of Major Construction Package Components**
 - Plant expansion from 30 mgd to 52 mgd
 - 42-mgd Influent Pump Station and pipeline to the NCPWF
 - New primary clarifiers, new bioreactor basins and retrofit of existing basins, secondary clarifiers, new tertiary filter, chemical facilities, and yard piping
 - Equipment and electrical substation replacements
 - Electrical and instrumentation

NCWRP Expansion Rendering



7. NCPWF Construction Package 1: NCPWF and NCPW Pump Station

- **Associated Pure Water Project:** NCWPF
- **Summary:** A new Pure Water Facility will be built on Eastgate Mall across the street from the existing NCWRP to clean the recycled water further and produce 30 mgd of a safe, high-quality drinking water source. A new pump station will be constructed adjacent to the NCPWF on Eastgate Mall Road to pump an annual average of 30 mgd to Miramar Reservoir. The package includes widening a portion of Eastgate Mall Road.
- **Summary of Major Construction Package Components**
 - New 34-mgd Pure Water Facility, including:
 - Ozone Generation and Contactor
 - Biologically Active Carbon (BAC) Filters
 - Membrane Filtration (MF) System
 - Reverse Osmosis (RO)
 - Ultraviolet Disinfection and Advanced Oxidation (UV/AOP)
 - Chemical Feed Systems
 - Operations Building
 - 30-mgd Pump Station (3 + 1 vertical turbine pumps)
 - Electrical and instrumentation

NCPWF and NCPW Pump Station Rendering



8. NCPW PS/PL Construction Package 1: NCPW Pipeline and Dechlorination Facility

- **Associated Pure Water Project:** NCPW PS/PL
- **Summary:** This package includes infrastructure to convey 30 mgd of purified water produced by the NCPWF to Miramar Reservoir. The pipeline will start on Eastgate Mall, follow Miramar Road, continue through Scripps Ranch and end at Miramar Reservoir. The package includes the replacement of 6.4 miles of asbestos cement watermains with PVC.
- **Summary of Major Construction Package Components**
 - 8 Miles of 48-inch welded steel pipe transmission main (purified water pipeline)
 - Dechlorination Facility
 - Standpipe
 - 6.4 miles of watermain replacement of 6, 12 and 16-inch asbestos cement (AC) pipe with 16-inch polyvinylchloride (PVC) pipe.

Pure Water Pipeline Alignment



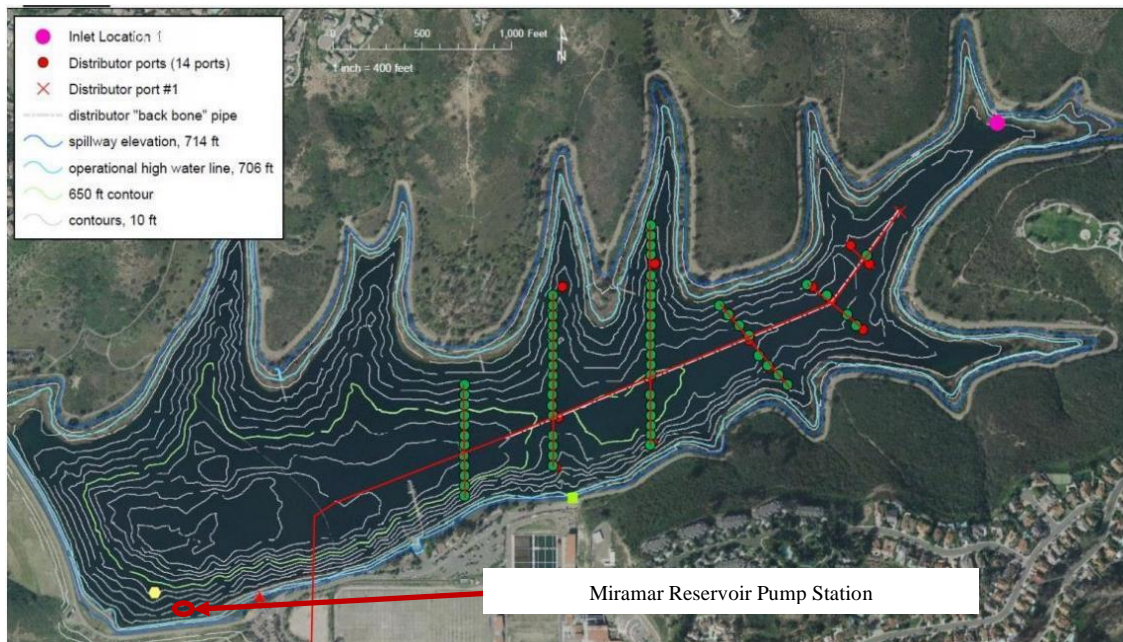
Dechlorination Facility Rendering



9. NCPW PS/PL Construction Package 2: Subaqueous Pipeline and Miramar Reservoir Pump Station Improvements

- **Associated Pure Water Project:** NCPW PS/PL
- **Summary:** This package includes 0.9 miles of pipeline with duckbill outlets placed at the bottom of Miramar Reservoir together with the rehabilitation of a 100 mgd pump station that delivers raw water from Miramar Reservoir to the Miramar Water Treatment Plant.
- **Summary of Major Construction Package Components**
 - 54-inch to 8-inch Subaqueous pipe
 - 94 Dual duckbill valve outlet ports
 - Miramar Reservoir Pump Station Improvements
 - Electrical and instrumentation

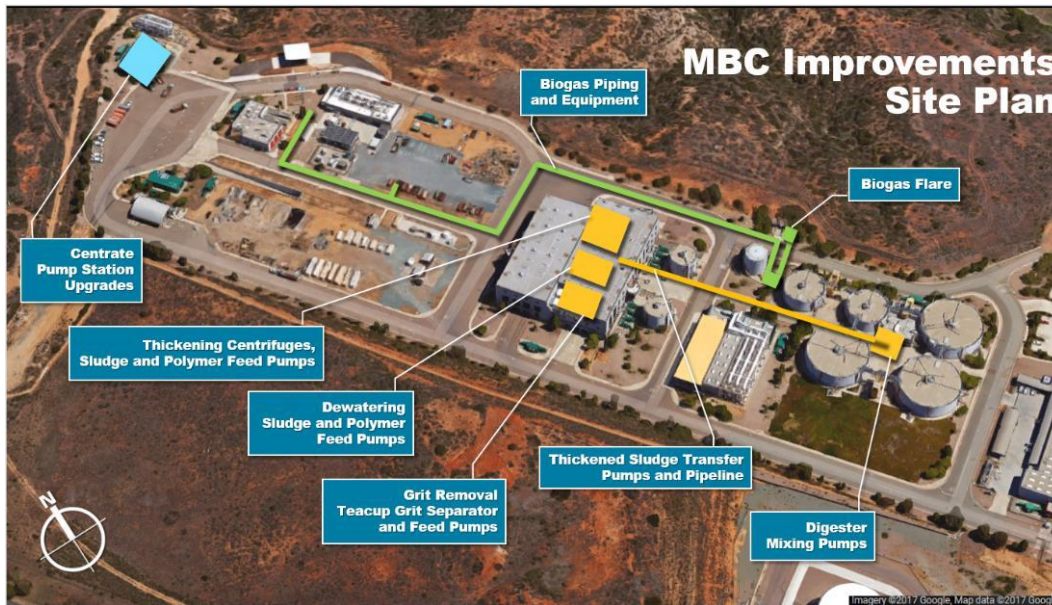
Subaqueous Pipeline Site Plan



10. MBC Construction Package 1: Metropolitan Biosolids Center Improvements

- **Associated Pure Water Project:** MBC Improvements
- **Summary:** This package will consist of improvements to the existing City biosolids center.
- **Summary of Major Construction Package Components**
 - Thickening centrifuges, sludge feed and polymer pumps, transfer pumps and supply pipeline
 - Digester mixing pump replacements, nozzles, overflow lines, biogas compressors, flare and biogas pipeline
 - Dewatering sludge feed pumps and polymer pumps
 - Centrate Pump Station pump and VFD replacements
 - Electrical and instrumentation

Metropolitan Biosolids Center Improvements Site Plan



APPENDIX B

MEMORANDUM OF UNDERSTANDING #1

PROJECT LABOR AGREEMENT SECTION 3.1

The City and the Parties agree that Project Work includes all onsite physical craft work that is part of startup and commissioning, including, but not limited to, system flushes and testing, loop checks, rework and modifications, and functional and operational testing up to and including the final running test. It is understood that the City's personnel and/or its representatives, together with the manufacturer's and/or vendor's representatives, and/or plant operating personnel may supervise and direct the startup, commissioning, rework, and modification activity, and that the onsite physical craft work is typically performed as part of a joint effort with these representatives and personnel. A manufacturer or its representatives may perform industry standard startup and commissioning work to satisfy its guarantee or warranty on a piece of equipment, and such work will be exempt from the Project Labor Agreement to the extent the work is excluded by Section 3.2(e) and/or Section 3.2(f).

MEMORANDUM OF UNDERSTANDING #2

NO DISCRIMINATION AND HARASSMENT

The City hereby provides notice that the City and its Contractors must not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, sexual orientation, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, denial of family care leave, or genetic information, gender, gender identity, gender expression, or military and veteran status. The City and Contractors will ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. The City and Contractors must comply with the provisions of the Fair Employment and Housing Act and the applicable regulations promulgated thereunder. (Govt. Code §12990, subs. (a)-(f) et seq.; Cal. Code Regs., tit. 2 §7285, et seq.) These terms will be incorporated into every contract and subcontract for the Covered Project.

Dated: 9-18-20

SAN DIEGO BUILDING AND CONSTRUCTION
TRADES COUNCIL



By: _____
Tom Lemmon, Business Manager

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:

North City Water Reclamation Plant Flow Equalization Basin

(Project Title)

as particularly described in said contract and identified as Bid No. **K-21-1791-DBB-3-A**; SAP No. (WBS) **B-21059**, 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 SDVOSB①	WHERE CERTIFIED②	CHECK IF JOINT VENTURE PARTNERSHIP
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

- ① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):
- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |
- ② As appropriate, Bidder shall indicate if Subcontractor is certified by:
- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

NAMED EQUIPMENT/MATERIAL SUPPLIER LIST

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS FOR FURTHER INFORMATION**

NAME, ADDRESS AND TELEPHONE NUMBER OF VENDOR/SUPPLIER	MATERIALS OR SUPPLIES	DOLLAR VALUE OF MATERIAL OR SUPPLIES	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

FAILURE TO FULLY COMPLETE AND SUBMIT ANY OF THE FOLLOWING FORMS WILL DEEM YOUR BID NON-RESPONSIVE.

PLANETBIDS WILL NOT ALLOW FOR BID SUBMISSIONS WITHOUT THE ATTACHMENT OF THESE FORMS

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 (PRIME CONTRACTOR)**
- E. **DEBARMENT AND SUSPENSION CERTIFICATION (SUBCONTRACTORS/SUPPLIERS/MANUFACTURERS)**
- F. **DISCLOSURE OF LOBBYING ACTIVITIES**
- G. **FORM 4500-3: DBE SUBCONTRACTOR PERFORMANCE FORM**
- H. **FORM 4500-4: DBE SUBCONTRACTOR UTILIZATION FORM**
- I. **COMMITMENT TO COMPLY WITH SKILLED AND TRAINED WORKFORCE CERTIFICATION FORMS**

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That Kiewit Infrastructure West Co. as Principal,
and Travelers Casualty and Surety Company of America 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

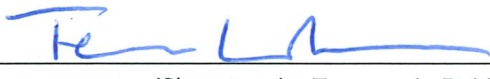
North City Water Reclamation Plant Flow Equalization Basin

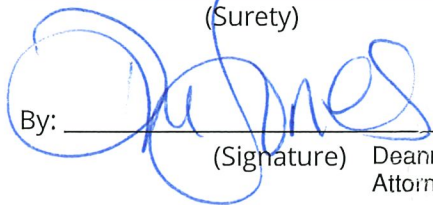
NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in
the manner required in the "Notice Inviting Bids" enters into a written Agreement on the form of
agreement bound with said Contract Documents, furnishes the required certificates of insurance, and
furnishes 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 18th day of June, 2021

Kiewit Infrastructure West Co. (SEAL)
(Principal)

Travelers Casualty and Surety Company of America
A.M. Best Rating A++, XV (SEAL)
(Surety)

By: 
(Signature) Terrence L. Robinson
Senior Vice President

By: 
(Signature) Deanne Jones
Attorney-in-Fact

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)



**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Philip G. Dehn, Tammy Pike, Paul A. Foss, Marie Huggins, Traci Sutton, and Deanne Jones** of Omaha, Nebraska their true and lawful Attorney-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **3rd** day of **February, 2017**.



State of Connecticut

City of Hartford ss.

By:
Robert L. Raney, Senior Vice President

On this the **3rd** day of **February, 2017**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2021**



Marie C. Tetreault, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 18th day of June, 2021



Kevin E. Hughes, Assistant Secretary

**To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney-in-Fact and the details of the bond to which the power is attached.**

NOTARY ACKNOWLEDGMENT

STATE OF NEBRASKA

COUNTY OF DOUGLAS

I, Traci L. Sutton, a Notary Public in and for said County and State, do hereby certify that Deanne Jones, Attorney-in-Fact of Travelers Casualty and Surety Company of America, proved to me on the basis of satisfactory evidence to be the person who appeared before me, and acknowledged that she signed, sealed and delivered a said instrument, for and on behalf of Travelers Casualty and Surety Company of America for the uses and purposes therein set forth.

Given under my hand and notarial seal, the 18th day of

June, 2021.



Traci L. Sutton

Traci L. Sutton, Notary Public

CALIFORNIA 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 Los Angeles }

On July 28, 2021 before me, Rozita Ah Kiong, Notary Public
Date Here Insert Name and Title of the Officer
personally appeared Terrence L. Robinson, Senior Vice President
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.



Place Notary Seal and/or Stamp Above

Signature *Rozita Ah Kiong*
Signature of Notary Public

OPTIONAL

Completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: Bid Bond

Document Date: June 18, 2021 Number of Pages: 1

Signer(s) Other Than Named Above: No other signer(s)

Capacity(ies) Claimed by Signer(s)

Signer's Name: Terrence L. Robinson

Corporate Officer – Title(s): Senior Vice President

Partner – Limited General

Individual Attorney in Fact

Trustee Guardian of Conservator

Other: _____

Signer is Representing: Kiewit Infrastructure West Co.

Signer's Name: _____

Corporate Officer – Title(s): _____

Partner – Limited General

Individual Attorney in Fact

Trustee Guardian of Conservator

Other: _____

Signer is Representing: _____

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
		see attached Contractor's Certification of Pending Actions			

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President
Name

Signature Date July 28, 2021

USE ADDITIONAL FORMS AS NECESSARY

Contractor's Certification of Pending Actions

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN
5/4/2020	Hawaii Civil Rights Commission – EEOC	Walter H. Kupau, Jr. v. Kiewit Infrastructure West Co.; Allegations of age and disability discrimination	N	Pending	
1/27/2020	DLIR – Hawaii	Walter Kupau KLIR Complaint; Allegations of Unlawful discharge of employment and discrimination	N	Pending	
9/25/2019	U.S. District Court, District of Hawaii	Vanessa Vasquez v. Kiewit Infrastructure West Co.	Y	Pending	
5/3/2019	Superior Court of the State of California	Omid Etemadi v. Kiewit Infrastructure West Co.; Lawsuit alleging failure to prevent discrimination, failure to provide reasonable accommodation, failure to engage in interactive process, wrongful termination in violation of public policy, age discrimination, disability discrimination and retaliation.	Y	11/12/2019	Settlement
5/2/2018	Superior Court of the State of California Los Angeles County	Reginald Kelly vs. Kiewit Infrastructure West Co. (Discrimination); Litigation alleging discrimination based on race and wrongful termination.	Y	2/7/2019	Settlement
3/1/2018	NLRB	Victor Hernandez NLRB Charge; NLRB charge re alleged discrimination to discourage protected activities	N	Closed	Withdrawn/Not Pursued
9/14/2017	U.S. Equal Employment Opportunity Commission – San Francisco District Office	David L. McDonald EEOC Charge 2018-0002; Claim by employee alleging disability discrimination.	N	Closed	Settlement
4/19/2017	United States District Court for the Northern District of CA	Lindsey L. Austin v. Kiewit Infrastructure West Co and Cherne Contracting Corporation; Lawsuit alleging retaliation for filing a complaint of race/color and age discrimination	Y	Closed	Settlement
8/8/2016	15399 Kamehameha Guideway	Greg Scher v. Kiewit Infrastructure West Co. lawsuit; Lawsuit alleging wrongful termination based on disability discrimination and age discrimination.	Y	Pending	
3/17/2016	15399 Kamehameha Guideway	Mark Hardeman v. Kiewit Infrastructure West Co. (EEO); EEO Charge alleging race discrimination and retaliation	N	Closed	Settlement

Contractor’s Certification of Pending Actions

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN
3/8/2016	EEOC	Kathryn Lee v. TPac - a Division of Kiewit Western; Charge alleging sex discrimination and equal pay discrimination	N	Closed	Settlement
3/7/2016	EEOC – Hawaii	Vanessa Vasquez v. Kiewit Infrastructure West Co.; Charge alleging sex discrimination	N	7/6/2020	Right to Sue Issued
1/4/2016	22383 Foothill Carrying Job	Armando Perez v. Kiewit Corporation and Kiewit Infrastructure West Co.; Lawsuit alleging race discrimination, color discrimination, national origin discrimination, harassment and failure to prevent harassment, negligent retention and supervision of employee, hostile work environment, infliction of emotional distress	Y	Closed	Settlement
11/12/2015	15399 Kamehameha Guideway	Greg Scher EEOC Charge; EEOC and Hawaii Civil Rights Commission charge alleging age and disability related discrimination.	N	Closed	Right to Sue Issued
4/23/2015	12952 I-405 Sepulveda Pass Widening	David A. Hunt v. Kiewit Infrastructure West Co.; Lawsuit alleging age discrimination, retaliation, violation of public policy. The Court found in Kiewit's favor.	Y	Closed	Finding in Kiewit's favor
5/19/2015	15399 Kamehameha Guideway	David Staggs EEOC Charge; Allegations of religion discrimination, disability discrimination and retaliation.	N	Closed	Matter conciliated with no admission of liability. Kiewit Infrastructure West Co., ("Kiewit"); (1) has entered into conciliation agreements with the DOL and EEOC on a non-admission basis; (2) denies any misconduct whatsoever; and (3) to avoid costly litigation, has decided that early resolution was the most practical resolution in these situations. Kiewit takes its commitment to affirmative action and equal employment opportunity seriously and has a comprehensive EEO Policy and Anti-Harassment and Nondiscrimination Policy.
4/15/2015	13198 Farrington Guideway	William K. Johnson v. Kiewit Infrastructure Co.; Allegations of disability discrimination, race discrimination, retaliation, ancestry discrimination	N	Closed	No Cause Finding
12/31/2014	13198 Farrington Guideway	John Correa v. Kiewit Infrastructure West Co.; Allegations of race discrimination and national origin discrimination.	N	Closed	No Cause Finding

Contractor's Certification of Pending Actions

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN
12/9/2014	12952 I-405 Sepulveda Pass Widening	Pamela Lacy v. Maria Martinez and Kiewit Construction; Allegations of race discrimination, color discrimination, age discrimination and retaliation	N	Closed	No Cause Finding
10/9/2014	23473 Carlsbad Desalination	Irma S. Gonzalez EEOC Charge; Allegation of sex discrimination	N	Closed	No Cause Finding
8/14/2014	EEOC – Seattle, WA	Randy A. Puska v. Kiewit Infrastructure West Co.; Allegation of age discrimination	N	Closed	No Cause Finding
5/8/2014	EEOC	Charles Duane Plank EEOC Charge; Allegation of age discrimination.	N	Closed	Settlement
5/2/2014	Superior Court of the State of California, County of Los Angeles	LaSheima Swafford v. Kiewit Infrastructure West Co.; Lawsuit by former employee alleging race discrimination, sexual harassment and intentional infliction of emotional distress	Y	Closed	Settlement
3/18/2014	EEOC – Los Angeles	Walter L. Williams v. Kiewit Infrastructure West Co.; Allegations of race discrimination and retaliation in charge of discrimination	N	Closed	Withdrawn/Not Pursued
1/24/2014	12952 I-405 Sepulveda Widening Pass	Brandi Harris v. Kiewit Infrastructure Co. and James Helmick; Allegations of race discrimination and wrongful termination.	N	Closed	No Cause Finding
5/30/2013	12952 I-405 Sepulveda Pass Widening	Luis Trujillo v. Kiewit Infrastructure West Co.; Allegations of discrimination and retaliation.	N	Closed	No Cause Finding
7/27/2012	5970 All American Canal	Lisa Davis v Kiewit Pacific Co. (Punitive Damages); Lawsuit alleging gender discrimination and retaliation.	Y	Closed	Judgment
12/6/2012	12952 I-405 Sepulveda Pass Widening	Martha Hernandez v. Kiewit Infrastructure West Co.; Allegation of sex discrimination.	N	Closed	No Cause Finding
5/22/2012	12952 I-405 Sepulveda Pass Widening	Harold Hillhouse v. Kiewit Infrastructure West Co.; Allegation of age discrimination.	N	Closed	Withdrawn/Not Pursued
3/1/2012	14285 520 Pontoons	Willie Mitchell v. Kiewit Infrastructure West Co.; Allegation of race discrimination.	N	Closed	No Cause Finding

Contractor's Certification of Pending Actions

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN
1/12/2012	22239 SR 520 Floating Bridge & Landing	Brent A. Gamble v. Kiewit/General/Mason, a Joint Venture; Allegation of race discrimination.	N	Closed	No Cause Finding
2/17/2012	Utah Anti-Discrimination and Labor Commission/EEOC	Euphemia Y. Avery v. Kiewit Western Co.; Allegation of sex discrimination.	N	Closed	No Cause Finding
3/24/2011	Oregon Bureau of Labor and Industries/EEOC	Lisa M. Rice v. Kiewit Infrastructure West Co., Chad Heath and Brad Cavit; Allegations of age and sex discrimination and retaliation.	N	Closed	No Cause Finding
12/10/2010	12900 Denver Union Station SP Work	Caroline E. Hankins v. Kiewit Western Co.; Allegations of sex discrimination and retaliation.	N	Closed	No Cause Finding
2/17/2010		Kevin J. Milnes v Kiewit Pacific Co.; allegation of disability discrimination.	N	Closed	Kiewit Infrastructure West Co., ("Kiewit"): (1) has entered into conciliation agreements with the DOL and EEOC on a non-admission basis; (2) denies any misconduct whatsoever; and (3) to avoid costly litigation, has decided that early resolution was the most practical resolution in these situations. Kiewit takes its commitment to affirmative action and equal employment opportunity seriously and has a comprehensive EEO Policy and Anti-Harassment and Nondiscrimination Policy.

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name		DBA	
Kiewit Infrastructure West Co.		N/A	
Street Address	City	State	Zip
10704 Shoemaker Avenue	Santa Fe Springs	CA	90670
Contact Person, Title		Phone	Fax
Terrence L. Robinson, Senior Vice President		562-946-1816	562-946-3823

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
Danny J. McKie	Supervising
City and State of Residence	Employer (if different than Bidder/Proposer)
Newport Beach, California	N/A
Interest in the transaction	
Shareholder of Kiewit Corporation	

Name	Title/Position
N/A	N/A
City and State of Residence	Employer (if different than Bidder/Proposer)
N/A	N/A
Interest in the transaction	
N/A	

* 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.

Terrence L. Robinson, Senior Vice President

July 28, 2021

Print Name, Title

Signature

Date

Failure to sign and submit this form with the bid/proposal shall make the bid/proposal non-responsive. In the case of an informal solicitation, the contract will not be awarded unless a signed and completed Mandatory Disclosure of Business Interests Form is submitted.

DEBARMENT AND SUSPENSION CERTIFICATION
PRIME CONTRACTOR
FAILURE TO COMPLETE AND SUBMIT AT TIME OF BID SHALL RENDER BID NON-RESPONSIVE

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
David J. Miles	President
Terrence L. Robinson	Senior Vice President
Andrew J. Peplow	Vice President
Katrina C. Williams	Assistant Secretary

IMPORTANT NOTICE: If Bidder or other interested person is a corporation, state secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if Bidder or other interested person is an individual, state first and last names in full.

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.

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: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

NOTE: Providing false information may result in criminal prosecution or administrative sanctions.

DEBARMENT AND SUSPENSION CERTIFICATION
SUBCONTRACTORS, SUPPLIERS AND MANUFACTURERS
TO BE COMPLETED BY BIDDER
FAILURE TO COMPLETE AND SUBMIT AT TIME OF BID SHALL RENDER BID NON-RESPONSIVE

Names of the Principal individual owner(s)

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) for their subcontractor/supplier/manufacturers.

Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Robert Conboy - American Air Balance Co., Inc.	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Michael Castonguay - Applied Engineering Concepts	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

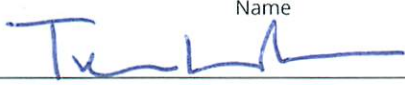
NAME	TITLE
Nick Mocerri III - Atlas Integrated Systems	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Kailey Hale - Bilco Company c/o Specialty Building	Bilco Rep for SoCal

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
SUBCONTRACTORS, SUPPLIERS AND MANUFACTURERS
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Barbara Smith - CMC Rebar	Chief Executive Officer

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Rob Tullman - Corpro Companies	President & CEO

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Adam Silva - Crown Fence	Vice President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
William F. Crowley - DN Tanks, Inc.	President & Chief Executive Officer
Michael Azarela - DN Tanks, Inc.	Chief Operating Officer, Treasurer
Thomas P. Christie - DN Tanks, Inc.	Executive Vice President of Work Acquisition
David Gourley - DN Tanks, Inc.	Executive Vice President of Special Operations

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Dan Thomas - FD Thomas, Inc.	President
Mike Kostenko - FD Thomas, Inc.	Vice President
ASRC - FD Thomas, Inc.	Parent Company

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Dennis Gutierrez - G2 Metal Fab	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Michael Parsons - Handrail Systems, Inc.	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Chris Ward - Hanson Aggregates Pacific Southwest LLC	CEO President North America

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Renee Stein - Infra-Structure Aggregates, Inc.	Secretary, Treasurer

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Eugene D. III Van Wagner - Mass Electric	President
Michael P. Rinehart - Mass Electric	Executive Vice President
Brandon T. Parker - Mass Electric	Vice President
Michael F. Norton - Mass Electric	Secretary

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Jason Jackson - Oldcastle Infrastructure	CEO

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Phillip Chapman - PGC Construction	President

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Durga Agrawal - Piping Technology & Products	Owner

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Chris Zamdahl - Royal Industrial Solutions LA	106% Employee-Owned

SUBCONTRACTOR SUPPLIER MANUFACTURER


NAME	TITLE
Rick Arzola - Santa Fe Winwater Company	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Richard Chico - Sonco Construction Inc.	President

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
SUBCONTRACTORS, SUPPLIERS AND MANUFACTURERS
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Dave Burrell - Southwest Valve & Equipment	CFO
Kelly Brians - Southwest Valve & Equipment	Vice President
Virgil Diaz - Southwest Valve & Equipment	Principal

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Brett Hoffman - Henry Pratt Company	Western Regional Sales Manager

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Robert Shepherd - Southwest V-Ditch Inc.	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Gary Conley - Technical Systems Inc.	Chief Executive Officer
Steve DeHaan	Chief Operations Officer
Brad Peistrup	Chief Revenue Officer

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

DEBARMENT AND SUSPENSION CERTIFICATION
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Please indicate if principal owner is serving in the capacity of **subcontractor**, **supplier**, and/or **manufacturer**:

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Alvaro Vargas - V&A Tree Service, Inc.	President
Annabel Vargas - V&A Tree Service, Inc.	Vice President
Valentina Vargas - V&A Tree Service, Inc.	Administrative Manager

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Edward Mojica - Wessex Industries	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Mitch Whitson - Whitson Contracting & Management	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
David Shaw - Alvarez & Shaw, Inc.	CFO
Chase Alvarez - Alvarez & Shaw, Inc.	CEO

Contractor Name: Kiewit Infrastructure West Co.

Certified By Terrence L. Robinson Title Senior Vice President

Name

 Signature

Date November 2, 2021

USE ADDITIONAL FORMS AS NECESSARY

LOBBY PROHIBITION, CERTIFICATION AND DISCLOSURE

In acknowledgment that funds received under this agreement have been provided pursuant to a Federal grant, recipient hereby recognizes the prohibitions against lobbying the Federal government with any of these funds. Recipient agrees that it shall comply with the laws set forth at 31 U.S.C. § 1352 (1989) and 24 C.F.R. part 87, to wit:

A. Conditions on use of funds

Recipient shall not expend any funds received pursuant to this agreement to pay any person to influence an officer or employee of Federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with any of the following Covered Federal actions:

- (1) The awarding of any federal contract
- (2) The making of any Federal grant
- (3) The making of any Federal Loan
- (4) The entering into of any cooperative agreement
- (5) The extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

For purposes of defining the terms of this part of the agreement, the definitions set forth in 24 C.F.R. § 87.105 are hereby adopted and incorporated herein by reference.

B. Certification and Disclosure

Each recipient at every tier under this agreement shall file a certification regarding lobbying, and a Disclosure Form-LLL, where required by 24 C.F.R. § 87.110. The certification form and Disclosure Form-LLL are attached to this agreement.

C. Certifications must be filed:

- (1) By any person upon each submission that initiates agency consideration for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000, or a Federal loan or loan guarantee exceeding \$150,000.
- (2) Upon receipt by any person of a Federal contract, grant, or cooperative agreement exceeding \$100,000, or upon receipt of a Federal loan or loan guarantee exceeding \$150,000.
- (3) By any person who requests or receives from a person referred to in subsections 1 and 2 of this paragraph:
 - a. A subcontract exceeding \$100,000 at any tier under a Federal contract;
 - b. A subgrant, contract or subcontract exceeding \$100,000 at any tier under a Federal grant;
 - c. A contract or subcontract exceeding \$100,000 at any tier under a Federal loan exceeding \$150,000;
 - d. A contract or subcontract exceeding \$100,000 at any tier under a Federal cooperative agreement.

D. Disclosure Forms-LLL must be filed in every instance when a person applies for, requests, or receives Federal appropriations exceeding \$100,000 pursuant to a contract, subcontract, grant, subgrant, loan, or cooperative agreement when such person has paid or expects to pay any sum, in cash or in kind, to influence or attempt to influence any officer or employee of an agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress. Further, Disclosure Form-LLL must be filed by recipients at any tier at the end of each calendar quarter in which there occurs any event that requires disclosure or materially affects information submitted in prior disclosures. Such events include:

- (1) 1. An increase of \$25,000 in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action;
- (2) 2. A change in the person(s) influencing or attempting to influence a covered action;
- (3) 3. A change in the officer(s), employee(s), or member(s) contacted to influence a covered action.

All disclosure Forms-LLL, but not certifications, shall be forwarded from tier to tier until received by the principal recipient, which in turn will file them with the appropriate Federal agency.

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

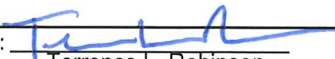
This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLLA Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing there port in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, State and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.
(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item4) to the lobbying entity (item10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.
15. Check whether or not a SF-LLLA Continuation Sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing datasources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

DISCLOSURE OF LOBBYING ACTIVITIES Approved by OMB
 Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
 (See reverse for public burden disclosure)

0348-0046

1. Type of Federal Action: <input type="checkbox"/> a. Contract a. Grant b. Cooperative agreement c. Loan d. Loan guarantee e. Loan insurance		2. Status of Federal Action: <input type="checkbox"/> a. bid/offer/application b. initial award c. post-award		3. Report Type: <input type="checkbox"/> a. initial finding b. material change For Material Change Only year _____ quarter _____ date of last report _____	
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, <i>if known:</i> Congressional District, <i>if known:</i>			5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime: Congressional District, <i>if known:</i>		
6. Federal Department/Agency:			7. Federal Program Name/Description: CFDA Number, <i>if applicable:</i> _____		
8. Federal Action Number, if known:			9. Award Amount, if known: \$ _____		
10. a. Name and Address of Lobbying Entity (if individual, last name, first name, M) (attach Continuation Sheet(s) SF-LLL4, <i>if necessary</i>)			b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI): (attach Continuation Sheet(s) SF-LLL4, <i>if necessary</i>)		
11. Amount of Payment (check all that apply) \$ _____ <input type="checkbox"/> actual <input type="checkbox"/> planned			13. Type of Payment (check all that apply) <input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferral <input type="checkbox"/> f. other: specify: _____		
12. Form of Payment (check all that apply) <input type="checkbox"/> a, cash <input type="checkbox"/> b. in-kind: specify: nature _____ Value _____					
14. Brief Description of Services Performed or to be Performed and Date(s) of Service, Including officer(s), employee(s), or Member(s), contacted, for Payment indicated in item 11: (attach Continuation Sheet(s) SF-LLL4, <i>if necessary</i>)					
15. Continuation Sheet(s) SF-LLL4 attached: <input type="checkbox"/> Yes <input type="checkbox"/> No					
16. Information requested through this for misauthorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.			Signature:  Print Name: <u>Terrence L. Robinson</u> Title: <u>Senior Vice President</u> Telephone No.: <u>562-946-1816</u> Date: <u>July 28, 2021</u>		
Federal Use Only:				Authorized for Local Reproduction Standard Form LLL (Rev. 7-07)	

DISCLOSURE OF LOBBYING ACTIVITIES Approved by

CONTINUATION SHEET

OMB0348-0046

Reporting Entity: Kiewit Infrastructure West Co. Page 2 of 2

Disclosure of Lobbying Activities form OMB0348-0046 does not apply

Authorized for Local Reproduction
Standard Form - LLL-A

COMMITMENT TO COMPLY WITH SKILLED AND TRAINED WORKFORCE REQUIREMENTS

Bidder, on behalf of itself and its subcontractor(s) at every tier, hereby commits that a skilled and trained workforce will be used to perform all work on the Project that falls within an apprenticeship occupation in the building or construction trades in accordance with Chapter 2.9 (commencing with Section 2600) of Part 1 of Division 2 of the Public Contract Code. Pursuant to Public Contract Code section 2601, as of January 1, 2018:

“Skilled and trained workforce” means a workforce that meets all of the following conditions: All the workers performing work in an apprenticeable occupation in the building and construction trades are either skilled journeypersons or apprentices registered in an apprenticeship program approved by the chief.

For work performed on or after January 1, 2018, at least 40 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation. This requirement shall not apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.


For work performed on or after January 1, 2019, at least 50 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation. This requirement shall not apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.

For work performed on or after January 1, 2020, at least 60 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation. This requirement shall not apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.

NOTE: The above commitment is required by California Public Utilities Code section 132354.7 and must be submitted by Bidder in order for the Bid to be responsive to the IFB.

Name of Bidder: Kiewit Infrastructure West Co.

Name and Title of Bidder’s Authorized Representative: Terrence L. Robinson, Senior Vice President

Signature of Bidder’s Representative:  Date: July 28, 2021
(SIGN HERE)

Insert Company Letterhead

Skilled and Trained Workforce Certification Form

Month: _____ Year: _____

In accordance with Public Utilities Code section 132354.7 and Public Contract Code sections 2600-2602, _____ (the "Prime Contractor") certifies that all the workers performing

(Prime Contractor Name)

work in an apprenticeable occupation utilized on the project known as _____ (the "Project") during this monthly reporting period are either skilled

(Project Name)

journeypersons or apprentices registered in an apprenticeship program approved by the Chief of the Division of Apprenticeship Standards of the California Department of Industrial Relations (the "Chief").

"Skilled journeyperson" means a worker who either:

- (1) Graduated from an apprenticeship program for the applicable occupation that was approved by the Chief or apprenticeship program located outside California and approved for federal purposes, pursuant to the apprenticeship regulations adopted by the Federal Secretary of Labor.
- (2) Has at least as many hours of on-the-job experience in the applicable occupation as would be required to graduate from an apprenticeship program that is approved by the Chief.

In addition, the Prime Contractor certifies that it has met the requirements of Public Contract Code 2601(d), subject to certain exceptions set forth therein, that the required percentage of the skilled journeypersons or skilled journeyperson hours employed to perform work on the Project by the Prime Contractor and all subcontractors are graduates of an apprenticeship program for the applicable apprenticeable occupation¹.

A graduate of an apprenticeship program means either of the following:

- (1) An individual that has been issued a certificate of completion under the authority of the California Apprenticeship Council for completing an apprenticeship program approved by the Chief pursuant to Section 3075 of the Labor Code, or
- (2) An individual that has completed an apprenticeship program located outside California and approved for federal purposes pursuant to the apprenticeship regulations adopted by the federal Secretary of Labor.

I declare, under penalty of perjury under the laws of the State of California, that the foregoing is true and correct. I certify that the attached Skilled and Trained Workforce Monthly Compliance Reports are complete and accurate.

Full Name: _____

Title: _____

Signature: _____ Date Signed: _____

Please upload the completed form to the Labor Compliance Monitoring System (LCMS) monthly.

Insert contractor name/letterhead here

Skilled and Trained Workforce Monthly Compliance Report

DIRECTIONS: This form is required to be submitted by the Prime for all contractors regardless of tier by the 15th of the following month for work performed corresponding to this reporting period. Items with a red asterisk (*) indicate a required field.

Project Title *	<input type="text"/>		
Project Number *	<input type="text"/>		
Prime Contractor *	<input type="text"/>		
Subcontractor *	<input type="text"/>		
Contact Name *	<input type="text"/>		
Contact Number *	<input type="text"/>		
Work Month & Year *	Month	Year	
	<input type="text"/>	<input type="text"/>	
Exemptions *	The contractor or subcontractor need not meet the apprenticeship graduation requirements if either (1) is true, or (2)(A) and (2)(B) are both true:	Please select * (True/False)	Exempt or non-exempt?
	(1) The contractor or subcontractor employed skilled journeypersons to perform fewer than 10 hours of work on the project during this reporting period?	<input type="text"/>	Exempt if (1) is "True".
	(2) (A) The subcontractor was not a listed subcontractor under Section 4104 or a substitute for a listed subcontractor. (2) (B) The subcontract does not exceed one-half of 1 percent of the price of the prime contract.	<input type="text"/>	Exempt if both (2)(A) and (2)(B) are "True".

Report * Please fill out the following report for all apprenticeable occupations utilized in this reporting period.

SKILLED JOURNEYPerson (SJ) REPORT							
Apprenticeable Occupation (use dropdown menu) *	Required minimum SJ: Apprentice Graduate percentage (see 2nd page attachment) *	Number of Skilled Journeypersons (SJ) employed by the contractor to perform work on the project		SJ ratio between the number of SJ: Apprentice Graduates to SJ: On-The-Job Experience workers	Number of hours worked by SJ employed by the contractor to perform work on the project		SJ ratio of hours worked by SJ: Apprentice Graduates compared with SJ: On-The-Job Experience workers
		SJ: Apprentice Graduate *	SJ: On-The-Job Experience *		SJ: Apprentice Graduate *	SJ: On-The-Job Experience *	
EXAMPLE Laborer	40%	7	3	70%	30	70	30%

Terms	Definitions
Apprentice	Defined in Labor Code 3077
Skilled Journeyperson: Apprentice Graduate	Defined in Public Contracts Code 2601 (e) (1)
Skilled Journeyperson: On-The-Job Experience	Defined in Public Contracts Code 2601 (e) (2)

Apprenticeable Occupations (San Diego County)	Annual Apprenticeship Graduation Rate Minimum Requirements for Employed Skilled Journeypersons (%)		
	January 1 2018	January 1 2019	January 1 2020
Asbestos Worker, Heat and Frost Insulator	40	50	60
Boilermaker - Blacksmith	40	50	60
Bricklayer	30	30	30
Bricktender	40	50	60
Bridge Carpenter	30	30	30
Building Construction Inspector and Field Soils and Material Tester	30	30	30
Carpenter	30	30	30
Carpet, Linoleum and Resilient Floor Layer	40	50	60
Cement Mason	30	30	30
Drywall Finisher	40	50	60
Drywall Installer/Lather (Carpenter)	30	30	30
Electrician: Inside Wireman	40	50	60
Electrician: Sound and Signal Technician	40	50	60
Electrical Utility Lineman	40	50	60
Elevator Constructor	40	50	60
Field Surveyor: Chainman/Rodman	30	30	30
Field Surveyor: Chief of Party	30	30	30
Glazier	40	50	60
Horizontal Directional Drilling (Laborer)	40	50	60
Ironworker	40	50	60
Laborer	40	50	60
Landscape/Irrigation Fitter	40	50	60
Landscape/Irrigation Laborer	40	50	60
Marble Finisher	30	30	30
Metal Roofing Systems Installer	40	50	60
Millwright	40	50	60
Modular Furniture Installer (Carpenter)	30	30	30
Operating Engineer	30	30	30
Operating Engineer: Dredger	30	30	30
Operating Engineer: Landscape Construction	30	30	30
Painter	40	50	60
Painter: Industrial Painter	40	50	60
Parking and Highway Improvement (Striper-Laborer)	40	50	60
Pile Driver (Carpenter)	30	30	30
Plasterer	30	30	30
Plaster Tender	40	50	60
Plumber, Pipefitter, Steamfitter	40	50	60
Roofer	30	30	30
Sheet Metal Worker	40	50	60
Sprinkler Fitter (Fire Protection/Fire Control Systems)	40	50	60
Stator Rewinder	40	50	60
Terrazzo Finisher (Carpenter)	30	30	30
Terrazzo Installer (Carpenter)	30	30	30
Terrazzo Finisher	30	30	30
Terrazzo Worker	30	30	30
Tile Finisher	30	30	30
Tile Layer	30	30	30

Please visit the California Legislative Information website for further information on Public Contracts Code (PCC) 2600-2602, <https://leginfo.ca.gov/>.

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM A



FOR

PURE WATER PROGRAM: NORTH CITY WATER RECLAMATION PLANT FLOW EQUALIZATION BASIN

BID NO.:	<u>K-21-1791-DBB-3-A</u>
SAP NO. (WBS/IO/CC):	<u>B-21059</u>
CLIENT DEPARTMENT:	<u>2000</u>
COUNCIL DISTRICT:	<u>1</u>
PROJECT TYPE:	<u>BO</u>

BID DUE DATE:

**2:00 PM
JULY 7, 2021**

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.**

B. BIDDER'S QUESTIONS

Q1. The current set of plans only includes sheet 1 thru 121 of 132 sheets. Will sheets 122 thru 132 be released to bidders?

A1. Those sheets are no longer part of the construction package.

Q2. On plan sheet 33 of 132 (40381-1033-D), under the general notes section, line 18 states "contractor shall remove and replace all utility boxes serving as handholes that are not in "as-new" condition in proposed sidewalk, damaged boxes, or those that are not in compliance with current code shall be removed and replaced with new boxes." Is there a quantity of these handholes you can provide that don't fall under the "as-new" and/or not in compliance with current code?

A2. This is a City of San Diego standard note that was required to be included as a note on this sheet. Designer not aware of any utility boxes specific to this project that meet this condition. However, any such items would be shown and identified in the drawings.

Q3. The project duration posted on planet bids shows 1,420 working days while the solicitation document states 530 working days for final acceptance and completion. Please advise what duration we should be using for the bidding process.

A3. The milestones required completion dates shall be as specified in the Solicitation Document, Supplementary Special Provisions Section 6-9.

Q4. Are there any traffic restrictions on the North City Water Reclamation Plant site? Are we able to access the site off of Miramar Rd and Eastgate Mall going through the guard shack? Are there any restrictions on what private plant roads we can use for vehicle traffic?

- A4. Access to the North City Water Reclamation Plant will only be allowed from Eastgate Mall and requires coordination with the Construction Management Team. Access to the plant is no longer allowed from Miramar Road due to security reasons.
- Q5. We would like to request that our **HYDRALASTIC 836** please be reviewed as an cold-applied waterproofing material here. Please see the attached data sheets to assist with review, if you can please let me know if it's acceptable it would be greatly appreciated.
- A5. Substitutions (materials and/or suppliers) will need to meet the requirements of the specifications and plans, and requests for substitutions will be evaluated in accordance to SSP 4-6.
- Q6. Specification 03 31 40, part 1.04.A states that "The Tank Subcontractor shall have successfully completed at least three circular prestressed concrete tanks of at least one-half of the diameter, height and capacity." Please confirm that prime contractor's that have built at least three tanks, but used a prestressing and shotcrete subcontractor, are acceptable to build the tank on this project the same way.
- A6. Any and all parties performing the work required under Specification 03 31 40 Prestressed Concrete Tank must meet the qualification requirements. If the prime is not performing any of the work required under 03 31 40, the prime does not need to meet the qualification requirements, however, their sub(s) performing the work must meet the requirements. If the prime is performing work required under 03 31 40, the prime and any subs performing work must all meet the qualification requirements.
- Q7. As per our mandatory Pre-Bid meeting today, Andrew Del Rio said that 30 days advance notice is required for Good Faith the effort in Contacting Agencies. See pages 103 & 104 .Paragraph 12.8 and 12.9
- Can this Project be delayed 2 weeks so we can meet this 30-day requirement?
- A7. Bid Opening has been extended per this Addendum A.

- Q8. Please confirm that equipment rented from a certified DBE Firm will be counted as 100%.
- A8. The Bidder will be credited up to 60% of the amount to be paid to the Suppliers for materials and supplies. Please refer to Instructions to Bidders, Section 12, Subcontractor Information, Subsection 12.2, Listing of Suppliers, page 19, of the solicitation documents.
- Q9. Section 6.1 of the Notice Inviting Bids requires that all plumbing or pipefitting work that falls within the classification of a C-36 License shall be performed by a contractor with a C-36 License. Please confirm that if a Contractor does not possess a valid C-36 license at time of bid that they will need to subcontract out this work to a contractor that does possess a valid C-36 license.
- A9. Confirmed, all plumbing or pipefitting work that falls within the classification of a C-36 License shall be performed under a contract or subcontract with a Contractor with a C-36.
- Q10. In Attachment E, Supplementary Special Provisions, Section 6-1.5.2 (Page 167) items 2 & 3 state: "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." This section, which was not included in the specifications of previous City contracts, greatly increases the risk to the Contractors and will subsequently increase the pricing to the City. Please consider removing items 2 & 3 from SSP Section 6-1.5.2.
- A10. Bid the Work as specified.
- Q11. In Attachment E, Supplementary Special Provisions, Section 6-2.1 (Page 168) it states "Do not Work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed as provided here: a) Activities that disrupt plant operations are prohibited during the summer, unless otherwise approved in writing by the Owner." Technical Specification Section 01 31 13, Project

Coordination, already includes numerous constraints/ restrictions/ required sequencing for the project. To avoid confusion, please confirm that the Contractor must follow the restrictions listed in Specification Section 01 31 13 and remove the broad moratorium requirement listed in Attachment E, Supplementary Special Provisions, Section 6-2.1 (Page 168) from the project specifications..

- A11. See modification in this Addendum A.
- Q12. Section 01 31 13 - 1.01-A states"...The Contractor will not be responsible for performing surveying." In Section 01 31 13 - 1.10-B "Contractor's Responsibilities:" it outlines numerous survey items that are to be completed by the Contractor. Please clarify what surveying is the responsibility of the Contractor and what surveying will be performed and paid for by the City.
- A12. Survey services provided by the City are specified in Supplementary Special Provisions Section 3-10.2, page130. The Contractor shall provide any additional incidental survey work.
- Q13. Currently the Debarment and Suspension Certification (Subcontractors/Suppliers/Manufacturers) Form is due at the time of Bid. Having to submit these forms will sincerely restrict all Contractors' ability to efficiently close this bid. On the previous City of San Diego projects, Primes were allowed to turn this form in within 24 hours. We respectfully request the City consider allowing the Debarment and Suspension Certification for Subcontractors, Suppliers, and Manufacturers to be turned in within 24 hours after the bid.
- A13. The Debarment and Suspension Certification for Subcontractors, Suppliers, and Manufacturers form will be due at time of bid.
- Q14. On page 18 of the specifications, Section 12.1 of the Instructions to Bidders, it states that, "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." Please confirm that this can be fulfilled by filling out the 4500-4: DBE Subcontractor Utilization Form that is due at time of bid and that this

information is not needed to be input in any other areas of the bid documents.

- A14. The requirement can be fulfilled by completing 4500-4, DBE Subcontractor Utilization Form and List of Subcontractors form on page 1242 of the solicitation documents.
- Q15. On page 19 of the specifications, Section 12.2 of the Instructions to Bidders, it states that "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." Please confirm that this can be fulfilled by filling out the 4500-4: DBE Subcontractor Utilization Form that is due at time of bid and that this information is not needed to be input in any other areas of the bid documents.
- A15. The requirement can be fulfilled by completing 4500-4, DBE Subcontractor Utilization Form and Named Equipment/Material Supplier List form on page 1243 of the solicitation documents.
- Q16. Can you please send a copy of a Good Faith Effort that has passed the City of San Diego Requirements & has been responsive? We are new to bidding for the City of San Diego and we have never seen a good faith effort at your standards. The directions are not clear (extremely wordy) & I would appreciate a passing example for reference so we can complete correctly.
- A16. For guidance with good faith effort documentation requirements please refer to Attachment D, Funding Agency Provisions, Section 11, Agency Specific Provisions through Section 14. Forms of the solicitation documents.
- Q17. What is the DBE Goal for this project? I see a GFE is required but do not see an actual goal.
- A17. Please refer to Notice Inviting Bids, Section 11. Subcontracting Participation Percentages for the fair share objectives goals of 2% MBE and 1% WBE.

C. ATTACHMENTS

1. To Attachment D, Section 10, Davis Bacon Wage Rates and Provisions, Section 10.1, Wage Rates, pages 57 through 86, **DELETE** in their entirety and **SUBSTITUTE** with pages 12 through 45 of this Addendum.
2. To Attachment E, Supplementary Special Provisions, Section 6, Prosecution and Progress of the Work, Section 6-2.1, Moratoriums, page 168, **DELETE** in its entirety and **SUBSTITUTE** with the following:

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

3. Do not Work in areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed as provided here:
 - a) Activities that disrupt plant operations are prohibited during summer, except as specified under Section 01 31 13 COORDINATION, unless otherwise approved in writing by the Owner.
3. To Attachment E, Supplementary Special Provisions, Section 6, Prosecution and Progress of the Work, Section 601-2.1.2, Engineered Traffic Control Plans (TCP), page 176, **DELETE** in its entirety and **SUBSTITUTE** with the following:

601-2.1.2 Engineered Traffic Control Plans (TCP). To the "GREENBOOK", ADD the following:

5. Determining the means and methods for access, mobilization, and haul routes shall be your responsibility. Engineered TCP (2-foot x 3-foot size) are required for the following areas:
 - a) East Gate Mall Road

4. To Technicals (Volume 1), Section 01 29 00 Payment Procedures, Part 1 General, Item 1.11 Bid Items, Sub-Item J, page 190, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - J. Traffic Control and Engineered Traffic Control Plans – Lump Sum:
 1. No measurement shall be made for this Item.
 2. General: The Work shall include all traffic control required during construction, coordination with the Construction Manager for compliance and avoidance of conflicts with other construction work ongoing at the plant, and engineered traffic control plans (TCP) as required for the work and in accordance with the SSP.
 3. Payment is made for this Item for all traffic control, preparation and submittal of traffic control plans to the governing regulatory agency, and adherence to the traffic control plan during construction. Payment under this Bid Item shall be made as the lump sum price named in the Bid Schedule.
5. To Technicals (Volume 1), Section 01 31 13 Project Coordination, Part 1 General, Item 1.06 Facility Operations, Sub-Item G, page 196, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - G. The new Flow Equalization Basin construction area can be accessed from Road J. Periodically, roads within the site may be out of service for construction work by others. Coordinate with the CM and develop traffic control plans onsite to avoid disruption and conflicts. During construction, Road J can be accessed from Eastgate Mall (via the facility roadways). The Owner prohibits access of the site from Miramar Road.
6. To Technicals (Volume 2), Section 03 31 40 Prestressed Concrete Tank, Part 1 General, page 498, Item 1.01 Work Included, Sub-Item D, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - D. Concrete work for the construction of the tank. Concrete work shall conform to the provisions of Section 03 30 00, Cast-In-Place Concrete, as supplemented and modified by this section.

D. ADDITIONAL CHANGES

1. The following are additional changes to the Line Items in the PlanetBids Tab:

For clarity where applicable, **ADDITIONS**, if any, have been **Underlined** and **DELETIONS**, if any, have been **~~Stricken out.~~**

Section	Item Code	Description	UoM	Quantity	Payment Reference
Main Bid	237310	Traffic Control <u>Traffic Control</u> <u>and Engineered</u> <u>Traffic Control</u> <u>Plans</u>	LS	1	Section 01 29 00

E. PLANS

1. The following Drawing sheets have been modified as shown below. See pages 46 through 61 of this Addendum.

- a) **DELETE** in its entirety and **REPLACE:**

- 40381-1007-D, No. PK1-G-005B
- 40381-1029-D, No. PK1-G-110
- 40381-1033-D, No. PK1-CG-001
- 40381-1037-D, No. PK1-CG-114
- 40381-1038-D, No. PK1-CG-501
- 40381-1040-D, No. PK1-SW-101
- 40381-1043-D, No. PK1-Y-114
- 40381-1050-D, No. PK1-ES-108
- 40381-1051-D, No. PK1-ES-113
- 40381-1052-D, No. PK1-ES-114
- 40381-1068-D, No. PK1-12-S-503
- 40381-1069-D, No. PK1-12-S-504
- 40381-1071-D, No. PK1-12-S-506
- 40381-1096-D, No. PK1-12-E-500
- 40381-1114-D, No. PK1-SD-005

- b) **ADD** the following new drawing sheet:
40381-1032A-D, No. PK1-C-002

James Nagelvoort, Director
Engineering & Capital Projects Department

Dated: *June 15, 2021*
San Diego, California

JN/RWB/lir

10. DAVIS BACON WAGE RATES AND PROVISIONS:

10.1 WAGE RATES: This contract shall be subject to the following Davis-Bacon Wage Decisions:

General Decision Number: CA20210001 06/11/2021

Superseded General Decision Number: CA20200001

State: California

Construction Types: Building, Heavy (Heavy and Dredging), Highway and Residential

County: San Diego County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS; RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination if it is higher) for all hours spent performing on the contract in calendar year 2021.

If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	01/08/2021
2	03/05/2021
3	03/19/2021
4	04/09/2021
5	04/23/2021
6	06/04/2021
7	06/11/2021

ASBE0005-002 07/06/2020

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 45.39	23.74
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 28.92	18.73

ASBE0005-004 07/01/2019

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)....	\$ 20.63	12.17

BOIL0092-003 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 46.03	38.81

BRCA0004-008 11/01/2019

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 39.60	18.05

BRCA0018-004 06/01/2019

	Rates	Fringes
MARBLE FINISHER.....	\$ 33.43	14.11
	Rates	Fringes

TILE FINISHER.....	\$ 28.23	12.65
TILE LAYER.....	\$ 40.07	18.36

BRCA0018-010 09/01/2020

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 33.66	14.20
TERRAZZO WORKER/SETTER.....	\$ 41.60	14.73

CARP0409-002 07/01/2016

	Rates	Fringes
Diver		
(1) Wet.....	\$ 712.48	17.03
(2) Standby.....	\$ 356.24	17.03
(3) Tender.....	\$ 348.24	17.03
(4) Assistant Tender.....	\$ 324.24	17.03

Amounts in "'Rates' column are per day

CARP0409-008 08/01/2010

	Rates	Fringes
Modular Furniture Installer.....	\$ 17.00	7.41

CARP0547-001 07/01/2018

	Rates	Fringes
CARPENTER		
(1) Bridge.....	\$ 42.34	19.17
(2) Commercial Building....	\$ 37.11	19.17
(3) Heavy & Highway.....	\$ 42.21	19.17
(4) Residential Carpenter..	\$ 29.69	19.17
(5) Residential		
Insulation Installer.....	\$ 18.00	8.16
MILLWRIGHT.....	\$ 42.71	19.17
PILEDRIVERMAN.....	\$ 42.34	19.17

CARP0547-002 07/01/2017

	Rates	Fringes
Drywall		
(1) Work on wood framed construction of single family residences, apartments or condominiums under four stories		
Drywall Installer/Lather...\$	22.95	18.85
Drywall Stocker/Scrapper...\$	12.50	12.27
(2) All other work		
Drywall Installer/Lather...\$	32.00	17.63
Drywall Stocker/Scrapper...\$	12.50	12.27

* ELEC0569-001 08/31/2020

	Rates	Fringes
Electricians (Tunnel Work)		
Cable Splicer.....\$	54.36	3%+14.88
Electrician.....\$	53.61	3%+14.88
Electricians: (All Other Work, Including 4 Stories Residential)		
Cable Splicer.....\$	48.40	3%+14.88
Electrician.....\$	47.65	3%+14.88

ELEC0569-004 06/01/2021

	Rates	Fringes
ELECTRICIAN (Sound & Communications Sound Technician).....\$	35.20	13.84
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which		

electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.

 ELEC0569-005 06/01/2021

	Rates	Fringes
Sound & Communications		
Sound Technician.....	\$ 35.20	13.84

SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.
 SOUND TECHNICIAN: Terminating, operating and performing final check-out

 ELEC0569-006 02/22/2021

Work on street lighting; traffic signals; and underground systems and/or established easements outside of buildings

	Rates	Fringes
Traffic signal, street light and underground work		
Utility Technician #1.....	\$ 35.17	9.01
Utility Technician #2.....	\$ 28.60	8.80

STREET LIGHT & TRAFFIC SIGNAL WORK:

UTILITY TECHNICIAN #1: Installation of street lights and traffic signals, including electrical circuitry, programmable controller, pedestal-mounted electrical meter enclosures and laying of pre-assembled cable in ducts. The layout of electrical systems and communication installation including proper position of trench depths, and radius at duct banks, location for manholes, street lights and traffic signals.

UTILITY TECHNICIAN #2: Distribution of material at jobsite, installation of underground ducts for electrical, telephone, cable TV land communication systems. The setting, leveling, grounding and racking of precast manholes, handholes and transformer pads.

ELEC0569-008 08/31/2020		
	Rates	Fringes
ELECTRICIAN (Residential, 1-3 Stories).....	\$ 35.74	7.68

ELEC1245-001 06/01/2020		
	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 59.14	20.78
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	\$ 47.24	19.59
(3) Groundman.....	\$ 36.12	19.19
(4) Powderman.....	\$ 51.87	18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

ELEV0018-001 01/01/2021		
	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 59.32	35.825+a+b

FOOTNOTE:

- a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
- b. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

 ENGI0012-003 07/01/2020

	Rates	Fringes
OPERATOR: Power Equipment		
(All Other Work)		
GROUP 1.....	\$ 48.25	27.20
GROUP 2.....	\$ 49.03	27.20
GROUP 3.....	\$ 49.32	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 48.96	25.25
GROUP 6.....	\$ 51.03	27.20
GROUP 8.....	\$ 51.14	27.20
GROUP 9.....	\$ 49.29	25.25
GROUP 10.....	\$ 51.26	27.20
GROUP 11.....	\$ 49.41	25.25
GROUP 12.....	\$ 51.43	27.20
GROUP 13.....	\$ 51.53	27.20
GROUP 14.....	\$ 51.56	27.20
GROUP 15.....	\$ 51.64	27.20
GROUP 16.....	\$ 51.76	27.20
GROUP 17.....	\$ 51.93	27.20
GROUP 18.....	\$ 52.03	27.20
GROUP 19.....	\$ 52.14	27.20
GROUP 20.....	\$ 52.26	27.20
GROUP 21.....	\$ 52.43	27.20
GROUP 22.....	\$ 52.53	27.20
GROUP 23.....	\$ 52.64	27.20
GROUP 24.....	\$ 52.76	27.20
GROUP 25.....	\$ 52.93	27.20
OPERATOR: Power Equipment		
(Cranes, Piledriving & Hoisting)		
GROUP 1.....	\$ 49.60	27.20
GROUP 2.....	\$ 50.38	27.20
GROUP 3.....	\$ 50.67	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 51.03	27.20
GROUP 6.....	\$ 51.14	27.20

	Rates	Fringes
GROUP 7.....	\$ 51.26	27.20
GROUP 8.....	\$ 51.43	27.20
GROUP 9.....	\$ 51.60	27.20
GROUP 10.....	\$ 52.60	27.20
GROUP 11.....	\$ 53.60	27.20
GROUP 12.....	\$ 54.60	27.20
GROUP 13.....	\$ 55.60	27.20
OPERATOR: Power Equipment		
(Tunnel Work)		
GROUP 1.....	\$ 50.10	27.20
GROUP 2.....	\$ 50.88	27.20
GROUP 3.....	\$ 51.17	27.20
GROUP 4.....	\$ 51.31	27.20
GROUP 5.....	\$ 51.53	27.20
GROUP 6.....	\$ 51.64	27.20
GROUP 7.....	\$ 51.76	27.20

PREMIUM PAY:

\$3.75 per hour shall be paid on all Power Equipment Operator work on the following Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: \$2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator (includes loed, lull or similar types under 5 tons; Generator operator; Generator, pump or compressor plant operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator); Concrete mixer operator-skip type; Conveyor operator; Fireman; Forklift operator (includes loed, lull or similar types over 5 tons; Hydrostatic pump operator; oiler crusher (asphalt or concrete plant); Petromat laydown machine; PJU

side dum jack; Screening and conveyor machine operator (or similar types); Skiploader (wheel type up to 3/4 yd. without attachment); Tar pot fireman; Temporary heating plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar type (Skid steer); Equipment greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter radioman (ground); Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or similar type); Boring machine operator; Boxman or mixerman (asphalt or concrete); Chip spreading machine operator; Concrete cleaning decontamination machine operator; Concrete Pump Operator (small portable); Drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum); Equipment greaser (grease truck); Guard rail post driver operator; Highline cableway signalman; Hydra-hammer-aero stomper; Micro Tunneling (above ground tunnel); Power concrete curing machine operator; Power concrete saw operator; Power-driven jumbo form setter operator; Power sweeper operator; Rock Wheel Saw/Trencher; Roller operator (compacting); Screed operator (asphalt or concrete); Trenching machine operator (up to 6 ft.); Vacuum or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant engineer; Batch plant operator; Bit sharpener; Concrete joint machine operator (canal and similar type); Concrete planer operator; Dandy digger; Deck engine operator; Derrickman (oilfield type); Drilling machine operator, bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum); Drilling machine operator; Hydrographic seeder machine operator (straw, pulp or seed), Jackson track maintainer, or similar type; Kalamazoo Switch tamper, or similar type; Machine tool operator; Maginnis internal full slab vibrator, Mechanical berm, curb or gutter (concrete or asphalt); Mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar); Micro tunnel system (below ground); Pavement breaker operator (truck mounted); Road oil mixing machine operator; Roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck); Self-propelled

tar pipelining machine operator; Skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.); Slip form pump operator (power driven hydraulic lifting device for concrete forms); Tractor operator-bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (guniting work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bending machine operator;

Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity): Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less tha 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth- moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self- loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote- control earth-moving equipment operator (operating a second piece of equipment: \$1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any

combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

ENGINEERS ZONES

\$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1S, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1, T17N, R14E, SBM

\$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point which is the SW corner of Section 34. T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a think strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

\$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE 1/4 of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the

intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

 ENGI0012-004 08/01/2020

	Rates	Fringes
OPERATOR: Power Equipment		
(DREDGING)		
(1) Leverman.....	\$ 56.40	30.00
(2) Dredge dozer.....	\$ 50.43	30.00
(3) Deckmate.....	\$ 50.32	30.00
(4) Winch operator (stern winch on dredge).....	\$ 49.77	30.00
(5) Fireman-Oiler, Deckhand, Bargeman, Leveehand.....	\$ 49.23	30.00
(6) Barge Mate.....	\$ 49.84	30.00

 IRON0433-006 07/01/2020

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 34.58	24.81
Ornamental, Reinforcing and Structural.....	\$ 41.00	33.45

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training

Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

LABO0089-001 07/01/2020

	Rates	Fringes
LABORER (BUILDING and all other Residential Construction)		
Group 1.....	\$ 34.18	20.48
Group 2.....	\$ 34.86	20.48
Group 3.....	\$ 35.57	20.48
Group 4.....	\$ 36.37	20.48
Group 5.....	\$ 38.30	20.48
LABORER (RESIDENTIAL CONSTRUCTION - See definition below)		
(1) Laborer.....	\$ 30.82	18.80
(2) Cleanup, Landscape, Fencing (Chain Link & Wood).....	\$ 29.53	18.80

RESIDENTIAL DEFINITION: Wood or metal frame construction of single family residences, apartments and condominiums - excluding (a) projects that exceed three stories over a garage level, (b) any utility work such as telephone, gas, water, sewer and other utilities and (c) any fine grading work, utility work or paving work in the future street and public right-of-way; but including all rough grading work at the job site behind the existing right of way

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete Screeding for Rought Strike-off; Concrete, water curing;

Demolition laborer; Flagman; Gas, oil and/or water pipeline laborer; General Laborer; General clean-up laborer; Landscape laborer; Jetting laborer; Temporary water and air lines laborer; Material hoseman (walls, slabs, floors and decks); Plugging, filling of Shee-bolt holes; Dry packing of concrete; Railroad maintenance, Repair Trackman and road beds, Streetcar and railroad construction trac laborers; Slip form raisers; Slurry seal crews (mixer operator, applicator operator, squeegee man, Shuttle man, top man), filling of cracks by any method on any surface; Tarman and mortar man; Tool crib or tool house laborer; Window cleaner; Wire Mesh puling-all concrete pouring operations

GROUP 2: Asphalt Shoveler; Cement Dumper (on 1 yard or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute man, pouring concrete, the handling of the cute from ready mix trucks, such as walls, slabs, decks, floors, foundations, footings, curbs, gutters and sidewalks; Concrete curer-impervious membrane and form oiler; Cutting torch operator (demoliton); Guinea chaser; Headboard man-asphlt; Laborer, packing rod steel and pans; membrane vapor barrier installer; Power broom sweepers (small); Riiprap, stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Tank sealer and cleaner; Tree climber, faller, chain saw operator, Pittsburgh Chipper and similar type brush shredders; Underground laborers, including caisson bellower

GROUP 3: Buggymobile; Concrete cutting torch; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2 1/2 feet drill steel or longer; Dri Pak-it machine; High sealer (including drilling of same); Hydro seeder and similar type; Impact wrench, mult-plate; Kettlemen, potmen and mean applying asphalt, lay-kold, creosote, line caustic and similar type materials (applying means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operators of pneumatic, gas, electric tools, vibratring machines, pavement breakers, air blasting, come-along, and similar mechanical tools not separately classified herein; Pipelayers back up man coating, grouting, making of joints, sealing, caulking, diapering and inclduing rubber gasket joints, pointing and any and all other services; Rotary Scarifier or multiple head concrete chipping scaarifier; Steel header board man and guideline setter; Tampers, Barko, Wacker and similar type; Trenching machine, handpropelled

GROUP 4: Asphalt raker, luterman, ironer, asphalt dumpman and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), Grinder or sander; Concrete saw man; cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Laser beam in connection with laborer's work; Oversize concrete vibrator operator 70 pounds and over; Pipelayer performing all services in the laying, installation and all forms of connection of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit, and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid, gas, air or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzleman), Porta shot-blast, water blasting

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller-all power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power.

 LABO0089-002 11/01/2020

	Rates	Fringes
LABORER (MASON TENDER)	\$ 33.00	19.23

 LABO0089-004 07/01/2020

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
Laborers:		
Group 1	\$ 35.30	20.48
Group 2	\$ 35.76	20.48
Group 3	\$ 36.17	20.48
Group 4	\$ 37.01	20.48
Group 5	\$ 40.28	20.48

LABORER CLASSIFICATIONS

GROUP 1: Laborer: General or Construction Laborer, Landscape Laborer. Asphalt Rubber Material Loader. Boring Machine Tender (outside), Carpenter Laborer (cleaning, handling, oiling & blowing of panel forms and lumber), Concrete Laborer, Concrete Screeding for rough strike-off, Concrete water curing. Concrete Curb & Gutter laborer, Certified Confined Space Laborer, Demolition laborer & Cleaning of Brick and lumber, Expansion Joint Caulking; Environmental Remediation, Monitoring Well, Toxic waste and Geotechnical Drill tender, Fine Grader, Fire Watcher, Limbers, Brush Loader, Pilers and Debris Handlers. flagman. Gas Oil and Water Pipeline Laborer. Material Hoseman (slabs, walls, floors, decks); Plugging, filling of shee bolt holes; Dry packing of concrete and patching; Post Holer Digger (manual); Railroad maintenance, repair trackman, road beds; Rigging & signaling; Scaler, Slip-Form Raisers, Filling cracks on any surface, tool Crib or Tool House Laborer, Traffic control (signs, barriers, barricades, delineator, cones etc.), Window Cleaner

GROUP 2: Asphalt abatement; Buggymobile; Cement dumper (on 1 yd. or larger mixers and handling bulk cement); Concrete curer, impervious membrane and form oiler; Chute man, pouring concrete; Concrete cutting torch; Concrete pile cutter; driller/Jackhammer, with drill steel 2 1/'2 feet or longer; Dry pak-it machine; Fence erector; Pipeline wrapper, gas, oil, water, pot tender & form man; Grout man; Installation of all asphalt overlay fabric and materials used for reinforcing asphalt; Irrigation laborer; Kettleman-Potman hot mop, includes applying asphalt, lay-klold, creosote, lime caustic and similar tyhpes of materials (dipping, brushing, handling) and waterproofing; Membrane vapor barrier installer; Pipelayer backup man (coating, grouting, making of joints, sealing caulking, diapering including rubber basket joints, pointing); Rotary scarifier, multiple head concrete chipper; Rock slinger; Roto scraper & tiller; Sandblaster pot tender; Septic tank digger/installer; Tamper/wacker operator; Tank scaler & cleaner; Tar man & mortar man; Tree climber/faller, chainb saw operator, Pittsburgh chipper & similar type brush shredders.

GROUP 3: Asphalt, installation of all frabrics; Buggy Mobile Man, Bushing hammer; Compactor (all types), Concrete Curer - Impervious membrane, Form Oiler, Concrete Cutting Torch,

Concrete Pile Cutter, Driller/Jackhammer with drill steel 2 1/2 ft or longer, Dry Pak-it machine, Fence erector including manual post hole digging, Gas oil or water Pipeline Wrapper - 6 ft pipe and over, Guradrail erector, Hydro seeder, Impact Wrench man (multi plate), kettleman-Potman Hot Mop includes applying Asphalt, Lay-Kold, Creosote, lime caustic and similar types of materials (dipping, brushing or handling) and waterproofing. Laser Beam in connection with Laborer work. High Scaler, Operators of Pneumatic Gas or Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs and similar mechanical tools, Remote-Controlled Robotic Tools in connection with Laborers work. Pipelayer Backup Man (Coating, grouting, making of joints, sealing, caulking, diapering including rubber gasket joints, pointing and other services). Power Post Hole Digger, Rotary Scarifier (multiple head concrete chipper scarifier), Rock Slinger, Shot Blast equipment (8 to 48 inches), Steel Headerboard Man and Guideline Setter, Tamper/Wacker operator and similar types, Trenching Machine hand propelled.

GROUP 4: Any worker exposed to raw sewage. Asphalt Raker, Luteman, Asphalt Dumpman, Asphalt Spreader Boxes, Concrete Core Cutter, Concrete Saw Man, Cribber, Shorer, Head Rock Slinger. Installation of subsurface instrumentation, monitoring wells or points, remediation system installer; Laborer, asphalt-rubber distributor bootman; Oversize concrete vibrator operators, 70 pounds or over. Pipelayer, Prefabricated Manhole Installer, Sandblast Nozzleman (Water Blasting-Porta Shot Blast), Traffic Lane Closure.

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Horizontal directional driller, Boring system, Electronic tracking, Driller: all power drills excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and all other types of mechanical drills without regard to form of motive power. Environmental remediation, Monitoring well, Toxic waste and Geotechnical driller, Toxic waste removal. Welding in connection with Laborer's work.

LABO0300-005 03/01/2021

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 37.49	21.88

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

LABO0345-001 07/01/2020

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 45.05	19.62
GROUP 2.....	\$ 44.10	19.62
GROUP 3.....	\$ 40.56	19.62

FOOTNOTE: GUNITE PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0" above base level and which work must be performed in whole or in part more than 75'-0" above base level, that work performed above the 75'-0" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 37.85	15.99
(2) Vehicle Operator/Hauler.	\$ 38.02	15.99
(3) Horizontal Directional Drill Operator.....	\$ 39.87	15.99
(4) Electronic Tracking Locator.....	\$ 41.87	15.99
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 39.06	19.01
GROUP 2.....	\$ 40.36	19.01
GROUP 3.....	\$ 42.37	19.01
GROUP 4.....	\$ 44.11	19.01

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs,

monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

LABO1414-003 08/05/2020

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER....	\$ 36.03	21.01
PLASTER TENDER.....	\$ 38.58	21.01

Work on a swing stage scaffold: \$1.00 per hour additional.

Work at Military Bases - \$3.00 additional per hour:
Coronado Naval Amphibious Base, Fort Irwin, Marine Corps Air Station-29 Palms, Imperial Beach Naval Air Station, Marine Corps Logistics Supply Base, Marine Corps Pickle Meadows, Mountain Warfare Training Center, Naval Air Facility-Seeley, North Island Naval Air Station, Vandenberg AFB.

PAIN0036-001 07/01/2020

	Rates	Fringes
Painters: (Including Lead Abatement)		
(1) Repaint (excludes San Diego County).....	\$ 29.59	17.12
(2) All Other Work.....	\$ 33.12	17.24

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

PAIN0036-010 10/01/2020

	Rates	Fringes
DRYWALL FINISHER/TAPER		
(1) Building & Heavy Construction.....	\$ 36.69	18.90
(2) Residential Construction (Wood frame apartments, single family homes and multi-duplexes up to and including four stories).....	\$ 27.11	17.51

PAIN0036-012 10/01/2020

	Rates	Fringes
GLAZIER.....	\$ 45.55	18.06

PAIN0036-019 01/01/2021

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 33.52	17.59

PLAS0200-005 08/07/2019

	Rates	Fringes
PLASTERER.....	\$ 43.73	16.03

NORTH ISLAND NAVAL AIR STATION, COLORADO NAVAL AMPHIBIOUS BASE, IMPERIAL BEACH NAVAL AIR STATION: \$3.00 additional per hour.

PLAS0500-001 07/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
GROUP 1.....	\$ 26.34	21.12
GROUP 2.....	\$ 27.99	21.12
GROUP 3.....	\$ 30.07	21.12

CEMENT MASONS - work inside the building line, meeting the following criteria:

GROUP 1: Residential wood frame project of any size; work classified as Type III, IV or Type V construction; interior tenant improvement work regardless the size of the project; any wood frame project of four stories or less.

GROUP 2: Work classified as type I and II construction

GROUP 3: All other work

 PLUM0016-006 09/01/2020

	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Camp Pendleton; Vandenberg Air Force Base.....	\$ 55.88	23.66
Work ONLY on new additions and remodeling of commercial buildings, bars, restaurants, and stores not to exceed 5,000 sq. ft. of floor space.....	\$ 50.70	23.73
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 38.73	22.06
All other work except work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space and work on strip malls, light commercial, tenant improvement and remodel work.....	\$ 52.28	24.71

PLUM0016-011 09/01/2020

	Rates	Fringes
PLUMBER/PIPEFITTER		
Residential.....	\$ 41.62	20.63

PLUM0345-001 09/01/2020

	Rates	Fringes
PLUMBER		
Landscape/Irrigation Fitter..	\$ 35.30	24.10
Sewer & Storm Drain Work....	\$ 39.39	21.48

ROOF0045-001 03/01/2021

	Rates	Fringes
ROOFER.....	\$ 36.25	9.49

SFCA0669-001 04/01/2021

	Rates	Fringes
SPRINKLER FITTER.....	\$ 43.01	24.62

SHEE0206-001 07/01/2020

	Rates	Fringes
SHEET METAL WORKER		
Camp Pendleton.....	\$ 42.62	29.55
Except Camp Pendleton.....	\$ 40.62	29.55
Sheet Metal Technician.....	\$ 30.51	9.49

SHEET METAL TECHNICIAN - SCOPE:

- a. Existing residential buildings, both single and multi-family, where each unit is heated and/or cooled by a separate system
- b. New single family residential buildings including tracts.
- c. New multi-family residential buildings, not exceeding five stories of living space in height, provided each unit is heated or cooled by a separate system. Hotels and motels are excluded.
- d. LIGHT COMMERCIAL WORK: Any sheet metal, heating and air conditioning work performed on a project where the total construction cost, excluding land, is under \$1,000,000
- e. TENANT IMPROVEMENT WORK: Any work necessary to

finish interior spaces to conform to the occupants of commercial buildings, after completion of the building shell

 TEAM0166-001 09/01/2019

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 18.90	34.69
GROUP 2.....	\$ 26.49	34.69
GROUP 3.....	\$ 26.69	34.69
GROUP 4.....	\$ 26.89	34.69
GROUP 5.....	\$ 27.09	34.69
GROUP 6.....	\$ 27.59	34.69
GROUP 7.....	\$ 29.09	34.69

FOOTNOTE: HAZMAT PAY: Work on a hazmat job, where hazmat certification is required, shall be paid, in addition to the classification working in, as follows: Levels A, B and C - +\$1.00 per hour. Workers shall be paid hazmat pay in increments of four (4) and eight (8) hours.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Fuel Man, Swamper

GROUP 2: 2-axle Dump Truck, 2-axle Flat Bed, Concrete Pumping Truck, Industrial Lift Truck, Motorized Traffic Control, Pickup Truck on Jobsite

GROUP 3: 2-axle Water Truck, 3-axle Dump Truck, 3-axle Flat Bed, Erosion Control Nozzleman, Dump Crete Truck under 6.5 yd, Forklift 15,000 lbs and over, Prell Truck, Pipeline Work Truck Driver, Road Oil Spreader, Cement Distributor or Slurry Driver, Bootman, Ross Carrier

GROUP 4: Off-road Dump Truck under 35 tons 4-axles but less than 7-axles, Low-Bed Truck & Trailer, Transit Mix Trucks under 8 yd, 3-axle Water Truck, Erosion Control Driver, Grout Mixer Truck, Dump Crete 6.5yd and over, Dumpster Trucks, DW 10, DW 20 and over, Fuel Truck and Dynamite, Truck Greaser, Truck Mounted Mobile Sweeper 2-axle Winch Truck

GROUP 5: Off-road Dump Truck 35 tons and over, 7-axles or more, Transit Mix Trucks 8 yd and over, A-Frame Truck, Swedish Cranes

GROUP 6: Off-Road Special Equipment (including but not limited to Water Pull Tankers, Athey Wagons, DJB, B70 Wuclids or like Equipment)

GROUP 7: Repairman

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical

order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

**Table 10-5
Mitigation Measures – North City Pure Water Facility Influent Pump Station**

Mitigation Measure	Timing of Mitigation			Responsible Person	Location/Notes
	Pre Const.	During Const.	Post Const.		
MM-AQ-1 (construction BMPs)		X		Construction Manager	Entire site
MM-AQ-2 (construction NO _x)		X		Construction Manager	Entire site
MM-BIO-4 (Coastal California Gnatcatcher)	X	X		City of San Diego	Coastal sage scrub within the facility within MCAS Miramar and within the MHPA south of Miramar Road.
MM-BIO-9a (Qualified biologist)	X			Owner/permittee	Entire site
MM-BIO-9b (preconstruction meeting)	X			City of San Diego	Entire site
MM-BIO-9c (documentation)	X	X	X	Owner/Permittee	Entire site
MM-BIO-9d (biological construction mitigation/monitoring exhibit)	X			City of San Diego	Entire site
MM-BIO-9e (construction fencing)	X			City of San Diego	Entire site
MM-BIO-9f (on-site education)	X			City of San Diego	Entire site
MM-BIO-9g (biological monitoring)		X		City of San Diego	Entire site
MM-BIO-9j (BMPs/erosion/runoff)	X	X	X	City of San Diego	Entire site
MM-BIO-9k (toxics/project staging areas/equipment storage)		X	X	Construction Manager/owner	Entire site
MM-HAZ-2 (hazardous material reporting form)			X	City of San Diego	Entire site
MM-HIS-3 (archaeological monitoring)	X	X	X	Principal Investigator (Archaeologist)	Entire site
MM-NOI-4 (noise and vibration study)	X			Construction Contractor	Entire site
MM-PALEO-1 (paleontological monitoring)	X	X	X	Principal Investigator (Paleontologist)	Entire site

April 2017 10-35 9420-04

PK1-G-005B

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

**GENERAL
MITIGATION MONITORING AND
REPORTING PROGRAM (PAGES 34)**

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 7 OF 132 SHEETS

WBS B-21059

APPROVED: *Raymond Martin* DATE 4/8/2021
FOR CITY ENGINEER
PRINT DCE NAME: *Raymond Martin* RCE# C89963

SUBMITTED BY: **MONIKA SMOCZYNSK**
PROJECT MANAGER

PROJECT ENGINEER: **THIEN-LONG TRAN**

DESCRIPTION	BY	APPROVED	DATE	FILM
▲ Addendum A	CH	<i>Raymond Martin</i>	6/07/21	

260-1709
CCS27 COORDINATE
1900-6269
CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

40381-1007-D

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



FOR REFERENCE ONLY

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
ADDENDUM A	6/2/21	07, 29, 32A, 33, 37, 38, 40, 43, 50, 51, 52, 68, 69, 71, 96, 114	

STORM WATER REQUIREMENTS

1. THIS PROJECT IS SUBJECT TO MUNICIPAL CODE SECTION 4303 AND ORDER NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100.
2. ALL WORK RELATED TO POST-CONSTRUCTION STORMWATER QUALITY SHALL BE IN ACCORDANCE WITH THE STORM WATER QUALITY MANAGEMENT PLAN ENTITLED, NORTH CITY WATER RECLAMATION PLANT EXPANSION 585316
 PROJECT NAME/WBS OR IO: B-15142
 PROJECT ADDRESS: 4949 EASTGATE MALL
 PREPARED BY: KEITH HANSEN
 DATE PREPARED: MAY 22, 2020
3. POST-CONSTRUCTION BMPs ARE REQUIRED, SEE SHEETS CG-114 AND CG-501.

POST-CONSTRUCTION BMP CERTIFICATION:

AS THE PROFESSIONAL IN RESPONSIBLE CHARGE FOR THE DESIGN OF THE PROJECT, I CERTIFY THAT I HAVE INSPECTED ALL CONSTRUCTED LOW IMPACT DEVELOPMENT (LID) SITE DESIGN, SOURCE CONTROL, HYDROMODIFICATION MANAGEMENT, AND TREATMENT CONTROL BMPs REQUIRES PER THE STORM WATER STANDARDS MANUAL AND CONTRACT REQUIREMENTS; AND THAT SAID BMPs HAVE BEEN CONSTRUCTED IN COMPLIANCE WITH THE APPROVED PLANS AND ALL APPLICABLE SPECIFICATIONS, PERMITS, ORDINANCES AND SAN DIEGO REGIONAL MS4 PERMIT.

I UNDERSTAND THAT THIS BMP CERTIFICATION STATEMENT DOES NOT CONSTITUTE AN OPERATION AND MAINTENANCE VERIFICATION.

SIGNATURE: _____
 DATE OF SIGNATURE: _____
 PRINTED NAME: KEITH HANSEN
 TITLE: PROJECT MANAGER
 PHONE No: (760) 931-7700

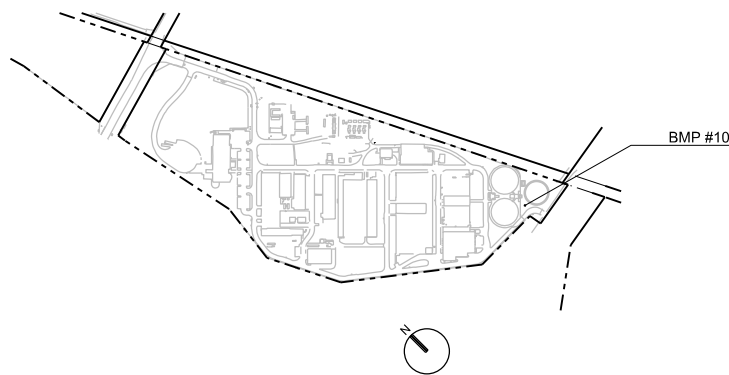
SITE DESIGN & POLLUTANT CONTROL BMP OPERATION & MAINTENANCE PROCEDURE									
O&M RESPONSIBLE PARTY DESIGNEE: CITY OF SAN DIEGO - PUBLIC UTILITIES DEPARTMENT									
BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE INDICATORS	MAINTENANCE ACTIONS	QUANTITY	INCLUDED IN O&M			SHEET NUMBER(S)
POLLUTANT CONTROL BMP(S) DESCRIPTION: BMP #10	QUARTERLY & AFTER MAJOR STORM EVENT	SEM-ANNUALLY OR IF REQUIRED BY MAINTENANCE INDICATORS	- STANDING WATER AFTER 24HRS - ACCUMULATION OF LITTER & DEBRIS - EROSION - OVERGROWN VEGETATION	- CLEAR OBSTRUCTIONS & DEBRIS - RE-SEED, RE-PLANT OR REPLACE BIO-SOIL - REPLACE RIP-RAP - TRIMMOW VEGETATION	558 SF	X	YES	NO	CG-114 CG-501

DECLARATION OF RESPONSIBLE CHARGE:

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK AND THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PERMANENT STORM WATER BMPs AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE AND THAT THE DESIGN IS CONSISTENT WITH THE CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

NAME _____ R.C.E. NO. 60223 DATE _____

SITE MAP



PK1-C-002

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
PDP COVER SHEET

CITY OF SAN DIEGO, CALIFORNIA
 PUBLIC UTILITIES DEPARTMENT
 SHEET 32A OF 132 SHEETS

WBS B-21059

APPROVED: *Richard Martin* DATE 4/8/2021
 FOR CITY ENGINEER
 PRINT DCE NAME: Rayhanah Martin RCE# C89963

SUBMITTED BY: **MONIKA SMOCZYNSKI**
 PROJECT MANAGER

DESIGNED BY: **THIEN-LONG TRAN**
 PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FIRM
▲ Addendum A	CH	<i>Richard Martin</i>	6/07/21	

260-1709
 CCS27 COORDINATE
 1900-6269
 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
 INSPECTOR _____ DATE COMPLETED _____

40381-1032A-D

CONSULTANT

O'Day
 CONSULTANTS

2710 Loker Avenue West
 Suite 100
 Carlsbad, California 92010
 760-931-7700
 Fax: 760-931-8680
 ODayConsultants.com

Civil Engineering
 Planning
 Processing
 Surveying

REGISTERED PROFESSIONAL ENGINEER
 KEITH W. HANSEN
 NO. 60223
 EXP. 6-30-2022
 CIVIL
 STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/1/2021

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

GENERAL NOTES

- APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK TO BE PERFORMED UNTIL A PERMIT HAS BEEN ISSUED.
- UPON ISSUANCE OF A PERMIT, NO WORK WILL BE PERMITTED ON WEEKENDS OR HOLIDAYS UNLESS APPROVED BY TRAFFIC CONTROL PERMIT FROM THE DEVELOPMENT SERVICES DEPARTMENT.
- THE APPROVAL OF THIS PLAN OR ISSUANCE OF A PERMIT BY THE CITY OF SAN DIEGO DOES NOT AUTHORIZE THE PERMIT HOLDER OR OWNER TO VIOLATE ANY FEDERAL, STATE OR CITY LAWS, ORDINANCES, REGULATIONS, OR POLICIES.
- IMPORTANT NOTICE: SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT, TOLL FREE (800) 422-4133, TWO DAYS BEFORE YOU DIG.
- CONTRACTOR SHALL BE RESPONSIBLE FOR POTHOLING AND LOCATING ALL EXISTING UTILITIES THAT CROSS THE PROPOSED TRENCH LINE WHILE MAINTAINING A 1 FOOT VERTICAL CLEARANCE.
- "PUBLIC IMPROVEMENT SUBJECT TO DESUETUDE OR DAMAGE." IF REPAIR OR REPLACEMENT OF SUCH PUBLIC IMPROVEMENTS IS REQUIRED, CONTRACTOR SHALL OBTAIN THE REQUIRED PERMITS FOR WORK IN THE PUBLIC RIGHT-OF-WAY, SATISFACTORY TO THE PERMIT ISSUING AUTHORITY.
- DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY THE CITY ENGINEER OR THE CHANGE IS REQUIRED BY THE RESIDENT ENGINEER.
- CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNAL LOOPS, CONDUITS, AND LANE STRIPPING DAMAGED DURING CONSTRUCTION.
- PRIOR TO SITE DISTURBANCE, CONTRACTOR SHALL MAKE ARRANGEMENTS FOR A PRECONSTRUCTION MEETING WITH THE CITY OF SAN DIEGO, CONSTRUCTION MANAGEMENT AND FIELD ENGINEERING DIVISION (858) 627-3200.
- CONTRACTOR SHALL ONLY PERFORM SITE SURVEY AND UTILITY MARK OUT SERVICES PRIOR TO THE PRECONSTRUCTION MEETING.
- CONTRACTOR SHALL IMPLEMENT AN EROSION CONTROL PROGRAM DURING THE PROJECT CONSTRUCTION ACTIVITIES. THE PROGRAM SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS OF THE STATE WATER RESOURCE CONTROL BOARD.
- CONTRACTOR SHALL HAVE EMERGENCY MATERIAL AND EQUIPMENT ON HAND FOR UNFORESEEN SITUATIONS, SUCH AS DAMAGE TO UNDERGROUND WATER, SEWER, AND STORM DRAIN FACILITIES WHERE FLOW MAY GENERATE EROSION AND SEDIMENT POLLUTION.
- AN AS-GRADED GEOTECHNICAL REPORT AND SET OF THE REDLINE "AS-BUILT" GRADING PLANS SHALL BE SUBMITTED TO AREA 3 ON THE THIRD FLOOR OF DEVELOPMENT SERVICES WITHIN 30 CALENDAR DAYS OF THE COMPLETION OF GRADING. AN ADDITIONAL SET SHALL BE PROVIDED TO THE RESIDENT ENGINEER OF THE CONSTRUCTION MANAGEMENT & FIELD SERVICES DIVISION AT 9573 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123.
- "AS-BUILT" DRAWINGS MUST BE SUBMITTED TO THE RESIDENT ENGINEER PRIOR TO ACCEPTANCE OF THIS PROJECT BY THE CITY OF SAN DIEGO.
- MANHOLES AND PULL BOX COVER SHALL BE LABELED WITH NAME OF COMPANY.
- CONTRACTOR SHALL PROVIDE RED-LINES DRAWINGS IN ACCORDANCE WITH 2-5.4, "RED-LINES AND RECORD DOCUMENTS."
- CONTRACTOR SHALL MAINTAIN A MINIMUM OF 1 FOOT VERTICAL SEPARATION TO ALL UTILITIES UNLESS OTHERWISE SPECIFIED ON THE PLANS.
- CONTRACTOR SHALL REMOVE AND REPLACE ALL UTILITY BOXES SERVING AS HANDHOLES THAT ARE NOT IN "AS-NEW" CONDITION IN PROPOSED SIDEWALK, DAMAGED BOXES, OR THOSE THAT ARE NOT IN COMPLIANCE WITH CURRENT CODE SHALL BE REMOVED AND REPLACED WITH NEW BOXES, INCLUDING WATER, SEWER, TRAFFIC SIGNALS, STREET LIGHTS, DRY UTILITIES-SDG&E, COX, ETC. ALL NEW METAL LIDS SHALL BE SLIP RESISTANT AND INSTALLED FLUSH WITH PROPOSED SIDEWALK GRADE. IF A SLIP RESISTANT METAL LID IS NOT COMMERCIALY AVAILABLE FOR THAT USE, NEW BOXES AND LIDS SHALL BE INSTALLED.
- THE AREA WHICH IS DEFINED AS A NON GRADING AREA AND WHICH IS NOT TO BE DISTURBED SHALL BE STAKED PRIOR TO START OF THE WORK. THE PERMIT APPLICANT AND ALL OF THEIR REPRESENTATIVES OR CONTRACTORS SHALL COMPLY WITH THE REQUIREMENTS FOR PROTECTION OF THIS AREA AS REQUIRED BY ANY APPLICABLE AGENCY. ISSUANCE OF THE CITY'S GRADING PERMIT SHALL NOT RELIEVE THE APPLICANT OR ANY OF THEIR REPRESENTATIVES OR CONTRACTORS FROM COMPLYING WITH ANY STATE OR FEDERAL REQUIREMENTS BY AGENCIES INCLUDING BUT NOT LIMITED TO CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CALIFORNIA DEPARTMENT OF FISH AND GAME. COMPLIANCE MAY INCLUDE OBTAINING PERMITS, OTHER AUTHORIZATIONS, OR COMPLIANCE WITH MANDATES BY ANY APPLICABLE STATE OR FEDERAL AGENCY.
- PRIOR TO CONSTRUCTION, SURVEY MONUMENTS (HORIZONTAL AND VERTICAL) THAT ARE LOCATED IN THE CONSTRUCTION AREA SHALL BE TIED-OUT AND REFERENCED BY A LAND SURVEYOR.
- UPON COMPLETION OF CONSTRUCTION, ALL DESTROYED SURVEY MONUMENTS ARE REQUIRED TO BE REPLACED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE PREPARED AND FILED WITH THE COUNTY SURVEYOR AS REQUIRED BY THE PROFESSIONAL LAND SURVEYOR ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA.
- MONUMENT PRESERVATION CERTIFICATION
THE PERMITTEE SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ALL SURVEY MONUMENTS DESTROYED BY CONSTRUCTION. IF A VERTICAL CONTROL MONUMENT 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. PRIOR TO PERMIT ISSUANCE THE PROFESSIONAL LAND SURVEYOR OR CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING WILL BE RESPONSIBLE FOR MONUMENT PRESERVATION AND SHALL PROVIDE A CORNER RECORD OR RECORD OF SURVEY TO THE COUNTY SURVEYOR AS REQUIRED BY THE PROFESSIONAL LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA, IF APPLICABLE.
 NO SURVEY MONUMENTS EXIST NEAR THE AREA OF CONSTRUCTION
 SURVEY MONUMENTS EXISTING IN OR NEAR CONSTRUCTION WILL BE PROTECTED IN PLACE
 PRECONSTRUCTION CORNER RECORD FOR SURVEY MONUMENTS TO BE DESTROYED DURING CONSTRUCTION
CORNER RECORD # _____ OR RECORD OF SURVEY # _____
 POST CONSTRUCTION CORNER RECORD FOR SURVEY MONUMENTS DESTROYED DURING CONSTRUCTION AND REPLACED AFTER CONSTRUCTION.
CORNER RECORD # _____ OR RECORD OF SURVEY # _____
- UNLESS OTHERWISE NOTED OR SPECIFIED, SURFACE IMPROVEMENTS DAMAGED OR REMOVED AS A RESULT OF THE CONTRACTOR'S OPERATIONS SHALL BE RECONSTRUCTED BY THE CONTRACTOR TO THE SAME DIMENSIONS AND WITH THE SAME TYPE OF MATERIAL.

GRADING PLANS FOR: NCWRP EXPANSION AND NCPWF INFLUENT PUMP STATION AND PIPELINE PACKAGE 1 - FLOW EQUALIZATION

GRADING + GEOTECHNICAL SPECIFICATIONS

- ALL GRADING SHALL BE CONDUCTED UNDER THE OBSERVATION AND TESTING BY A QUALIFIED PROFESSIONAL ENGINEER AND, IF REQUIRED, A QUALIFIED PROFESSIONAL GEOLOGIST. ALL GRADING MUST BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY ORDINANCE AND THE RECOMMENDATIONS AND SPECIFICATIONS SET FORTH IN THE PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT(S) ENTITLED:
REPORT OF GEOTECHNICAL INVESTIGATION, NORTH CITY WATER RECLAMATION PLANT EXPANSION, CITY OF SAN DIEGO, PROJECT NO. 44F1 BY ALLIED GEOTECHNICAL ENGINEERS, INC., 9500 CUYAMACA STREET, SUITE 102, SANTEE, CALIFORNIA 92071-2685. JANUARY 17, 2018.
- THESE DOCUMENTS WILL BE FILED IN THE RECORDS SECTION OF DEVELOPMENT SERVICES UNDER THE PROJECT NUMBER INDICATED IN THE TITLE BLOCK OF THESE PLANS.
- ALL FILL SOIL SHALL BE COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MOST RECENT VERSION OF A.S.T.M. D-1557 OR AN APPROVED ALTERNATIVE STANDARD.
- AT THE COMPLETION OF THE GRADING OPERATIONS FOR THE EARTHWORK SHOWN ON THIS PLAN, AN AS-GRADED GEOTECHNICAL REPORT SHALL BE PREPARED IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE CITY OF SAN DIEGO GUIDELINES FOR GEOTECHNICAL REPORTS. THE FINAL "AS-GRADED" GEOTECHNICAL REPORT SHALL BE SUBMITTED IN ACCORDANCE WITH THE GENERAL NOTES ON THESE PLANS WITHIN 30 DAYS OF THE COMPLETION OF GRADING. WHERE GEOLOGIC INSPECTION IS INDICATED IN THE PERMIT, PLANS, SPECIFICATIONS, OR GEOTECHNICAL REPORT(S), THE FINAL "AS-GRADED" GEOTECHNICAL REPORT MUST ALSO BE REVIEWED AND SIGNED BY A QUALIFIED PROFESSIONAL GEOLOGIST.
- THE COMPANY OR COMPANIES REPRESENTED BY THE INDIVIDUALS SIGNING ITEM NO. 5 OF THIS CERTIFICATE IS/ARE THE GEOTECHNICAL CONSULTANT(S) OF RECORD. IF THE GEOTECHNICAL CONSULTANT OF RECORD IS CHANGED FOR THE PROJECT, THE WORK SHALL BE STOPPED UNTIL THE REPLACEMENT HAS SUBMITTED AN ACCEPTABLE TRANSFER OF GEOTECHNICAL CONSULTANT OF RECORD DECLARATION PREPARED IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE CITY OF SAN DIEGO GUIDELINES FOR GEOTECHNICAL REPORTS. IT SHALL BE THE DUTY OF THE PERMITTEE TO NOTIFY THE RESIDENT ENGINEER AND THE GEOLOGY SECTION OF DEVELOPMENT SERVICES IN WRITING OF SUCH CHANGE PRIOR TO THE RECOMMENCEMENT OF GRADING.
- THESE GRADING PLANS HAVE BEEN REVIEWED BY THE UNDERSIGNED AND FOUND TO BE IN CONFORMANCE WITH THE RECOMMENDATIONS AND SPECIFICATIONS CONTAINED IN THE REFERENCED GEOTECHNICAL REPORT(S) PREPARED FOR THIS PROJECT.

JOSEPH GOLDHAMMER	G.E.	DATE	ALLIED GEOTECHNICAL ENGINEERS, INC. 9500 CUYAMACA STREET, SUITE 102 SANTEE, CA 92071-2685 TEL: (619) 449-5900
NICHOLAS E. BARNES	C.E.G.	DATE	

DECLARATION OF RESPONSIBLE CHARGE

ENGINEER OF WORK FOR THE GRADING AND DRAINAGE ONLY.
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

KEITH HANSEN R.C.E. NO. 60223 EXP. 06-30-2018 DATE

OWNER/APPLICANT

CITY OF SAN DIEGO
PUBLIC UTILITIES DEPARTMENT

REFERENCE DRAWINGS

STREET DEDICATION	343-02
SEWER EASEMENT	1350-B
SLOPE EASEMENT	11899-D
RECORD DRAWINGS (MARCH 1997)	26982

SITE ADDRESS

4949 EASTGATE MALL, SAN DIEGO, CA 92121

TOPOGRAPHY SOURCE

TOWILL, INC., 8799 BALBOA AVENUE, SUITE 140, SAN DIEGO, CA 92123-1537. AERIAL TOPOGRAPHY. DATE OF PHOTOGRAPHY WAS MAY 11, 2015. AERIAL TOPOGRAPHY IS IN THE CALIFORNIA COORDINATE SYSTEM, ZONE 6, NAD83, VERTICAL DATUM OF 1929. SUPPLEMENTAL SURVEY HAS BEEN PROVIDED BY O'DAY ENGINEERING IN OCTOBER 2017.

BENCHMARK

EASTGATE MALL WILLIAMS LINE N:2614 E:17091 367.962
* BP IN FOOTING OF NE CORNER HIGH VOLTAGE TOWER
SEE SHEET C-001 FOR LOCATION.

ASSESSORS PARCEL NUMBER

APN 343-122-08, 343-122-09, 345-021-01

EXISTING LEGAL DESCRIPTION

PORTIONS OF PARCEL 18, PARCEL 19, AND PARCEL 20 ON RECORD OF SURVEY NO. 4234

GRADING QUANTITIES

GRADED AREA	0.522 ACRES	MAX. CUT DEPTH:	23 FT
CUT QUANTITIES	6,700 CYD	MAX CUT SLOPE RATIO (2:1MAX):	2:1
FILL QUANTITIES	0 CYD	MAX. FILL DEPTH:	N/A
EXPORT	6,700 CYD	MAX FILL SLOPE RATIO (2:1MAX):	N/A

THIS PROJECT PROPOSES TO EXPORT 6,700 CUBIC YARDS OF MATERIAL FROM THIS SITE. ALL EXPORT MATERIAL SHALL BE DISCHARGED TO A LEGAL DISPOSAL SITE. THE APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

NOTE: THESE QUANTITIES DO NOT INCLUDE SHRINKAGE, BULKING, OR REMEDIAL GRADING. CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL QUANTITIES REQUIRED FOR CONSTRUCTION.

CONSTRUCTION STORM WATER PROTECTION NOTES

- TOTAL SITE DISTURBANCE AREA (ACRES) 0.81 AC
HYDROLOGIC UNIT / WATERSHED HYDROLOGIC: PENASQUITOS/MISSION BAY WATERSHED
HYDRAULIC SUB AREA NAME AND NUMBER: MIRAMAR HA 906.40
- THE PROJECT SHALL COMPLY WITH THE REQUIREMENTS OF THE
 WPCP
THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NUMBER R9-2013-0001 AND SUBSEQUENT AMENDMENTS.
 SWPPP
THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NUMBER R9-2013-0001 AND CONSTRUCTION GENERAL PERMIT ORDER NUMBER 2009-009-DWQ AS AMENDED BY ORDER 2010-0014 DWQ AND 2012-0006-DWQ
TRADITIONAL: RISK LEVEL 1 2 3
LUP RISK LEVEL 1 2 3
WQID NO: _____
- CONSTRUCTION SITE PRIORITY
 ASBS HIGH MEDIUM LOW
DISCRETIONARY PERMIT NO: PTS 585316

WORK TO BE DONE

THE PUBLIC IMPROVEMENTS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED ACCORDING TO THE FOLLOWING STANDARD SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.
STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PWPI070116-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2018 EDITION
PWPI070116-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION (WHITEBOOK), 2018 EDITION
PWPI092816-07	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2014 EDITION
DOCUMENT NO.	DESCRIPTION
PWPI070116-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2018 EDITION

CIVIL LEGEND

PROPOSED IMPROVEMENTS

IMPROVEMENT	STANDARD DWGS.	SYMBOL
SPOT ELEVATION		158.5
FINISH SURFACE ELEVATION		152.5 FS
MAJOR CONTOUR LINE		155
MINOR CONTOUR LINE		
TOP OF SLOPE, GRADING LIMITS		
SLOPE INDICATOR		
TOE OF SLOPE		
DRAINAGE DITCH	SDD-106	
VEGETATED SWALE		
CATCH BASIN (TYPE '1')	SDD-119	
STORM DRAIN CLEAN OUT	D-09, D-10	
RIP-RAP	SDD-104	
STAGING OR WORK AREA LIMITS		
DEMOLITION		
STRUCTURE, BUILDING OR FACILITY		
CONCRETE PAVEMENT		
DECOMPOSED GRANITE		

EXISTING IMPROVEMENTS

SPOT ELEVATION	157.7
MAJOR CONTOUR LINE	155
MINOR CONTOUR LINE	
DRAINAGEWAY OR DITCH	
CATCH BASIN OR INLET	
CLEANOUT OR MANHOLE	
RIGHT OF WAY LINE (ROW)	
EASEMENT LINE	
PROPERTY LINE	
CENTER LINE OF PIPE, ROAD, ETC.	
CHAIN LINK FENCE	
STRUCTURE, BUILDING OR FACILITY	
BRUSH/TREE LINE	

POLLUTANT CONTROL BMP OPERATION & MAINTENANCE PROCEDURE

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.:

O&M RESPONSIBLE PARTY DESIGNEE: CITY OF SAN DIEGO

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE INDICATORS	MAINTENANCE ACTIONS*	QUANTITY	INCLUDED IN O&M MANUAL	SHEET NUMBER(S)
POLLUTANT CONTROL BMP(S) DESCRIPTION: BMP 10	QUARTERLY & AFTER MAJOR STORM EVENT	SEMI-ANNUALLY OR IF REQUIRED BY MAINTENANCE INDICATORS	- STANDING WATER AFTER 24HRS - ACCUMULATION OF LITTER & DEBRIS - EROSION - OVERGROWN VEGETATION	- CLEAR OBSTRUCTIONS & DEBRIS - RE-SEED, RE-PLANT OR REPLACE BIO-SOIL - REPLACE RIP-RAP - TRIM/MOW VEGETATION	560 SF	X YES NO	PK1-CG-114 PK1-CG-501

* REFER TO THE SWOMP FOR MORE DETAILED MAINTENANCE METHODS.

PK1-CG-001

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN CIVIL SITE GRADING & LOCATION COVER SHEET

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 33 OF 132 SHEETS		WBS B-21059
APPROVED: FOR CITY ENGINEER PRINT DCE NAME: Rayhanah Martin DATE: 4/8/2021 RCE# C89963	SUBMITTED BY: MONIKA SMO CZYNSKI PROJECT MANAGER	
DESIGNED BY: THIEN-LONG TRAN PROJECT ENGINEER	DATE FILM: 6/07/21	
DESCRIPTION: Addendum A	BY: CH	APPROVED: [Signature]
		260-1709
		1900-6269
		CCS27 COORDINATE
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1033-D
INSPECTOR	DATE COMPLETED	



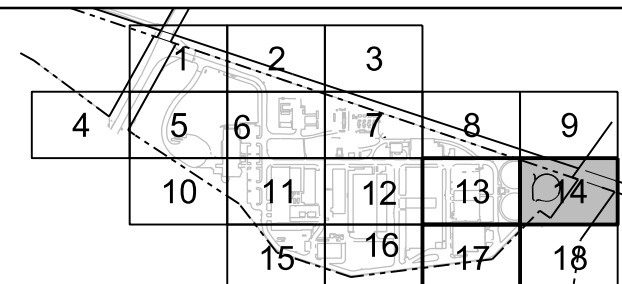
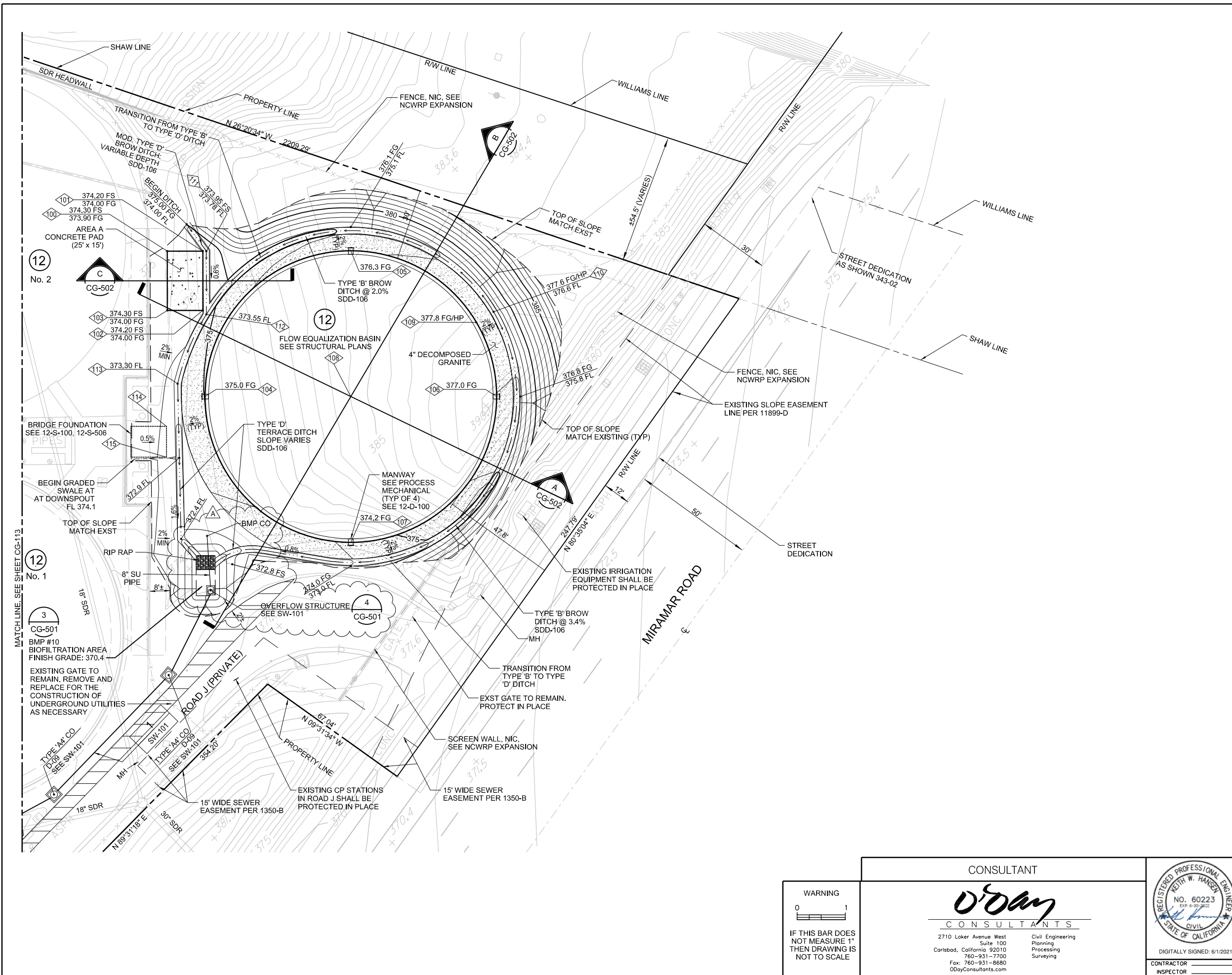
CONSULTANT

O'Day
CONSULTANTS

2710 Loker Avenue West
Suite 100
Carlsbad, California 92010
760-931-7700
Fax: 760-931-8680
OdayConsultants.com

Civil Engineering
Planning
Processing
Surveying

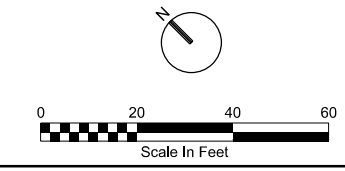
WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



KEYPLAN
NTS

COORDINATE TABLE			
NO	DESCRIPTION	NORTHING	EASTING
100	CONC PAD	1899999.46	6271297.56
101	CONC PAD, TOP EDGE OF BROW DITCH	1899988.85	6271308.17
102	CONC PAD, TOP EDGE OF BROW DITCH	1899971.17	6271290.49
103	CONC PAD	1899981.78	6271279.89
104	MANWAY CENTER @ OUTSIDE OF WALL	1899944.83	6271265.47
105	MANWAY CENTER @ OUTSIDE OF WALL	1899944.83	6271352.44
106	MANWAY CENTER @ OUTSIDE OF WALL	1899857.85	6271352.44
107	MANWAY CENTER @ OUTSIDE OF WALL	1899857.85	6271265.47
108	FACILITY 12 CENTER INSIDE CORE WALL Ø 120.0' OUTSIDE CORE WALL Ø 122.0' OUTSIDE FOOTING Ø 126.0'	1899901.34	6271308.95
109	HP AT FACE OF TANK	1899886.17	6271368.55
110	HP AT DITCH FL	1899884.07	6271376.79
111	CL DITCH	1899987.79	6271309.23
112	CL DITCH	1899968.93	6271290.37
113	CL DITCH	1899956.82	6271261.13
114	CORNER CONC PAD ELEV 375.7	1899947.41	6271245.08
115	CORNER CONC PAD ELEV 375.7	1899938.22	6271235.88

- NOTES:**
- SEE YARD PIPING PLANS FOR EXISTING AND PROPOSED UNDERGROUND UTILITIES.
 - THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.
 - GRADING DESIGN IS BASED ON AERIAL TOPOGRAPHY PROVIDED BY THE CITY OF SAN DIEGO. THE CONTRACTOR SHALL VERIFY EXISTING GRADES WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL GRADES ARE IN CONFLICT WITH THE PROPOSED WORK.
 - THE CITY OF SAN DIEGO PUBLIC UTILITIES DEPARTMENT WILL OWN AND MAINTAIN ALL STORM DRAINS. CONTRACTOR SHALL MAINTAIN STORM DRAINS DURING CONSTRUCTION.
 - FOR CORROSION TEST STATIONS SEE Y-114.



PK1-CG-114

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
SITE GRADING & LOCATION
PLAN - AREA 14

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 37 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021 C89963	SUBMITTED BY: MONIKA SMO CZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Raymond Martin</i>	RICE#	PROJECTED BY: THIEN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
▲ Addendum A	CH	<i>Raymond Martin</i>
		DATE FILM: 6/07/21
		260-1709
		1900-6269
		CCS27 COORDINATE
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1037-D
INSPECTOR	DATE COMPLETED	

CONSULTANT

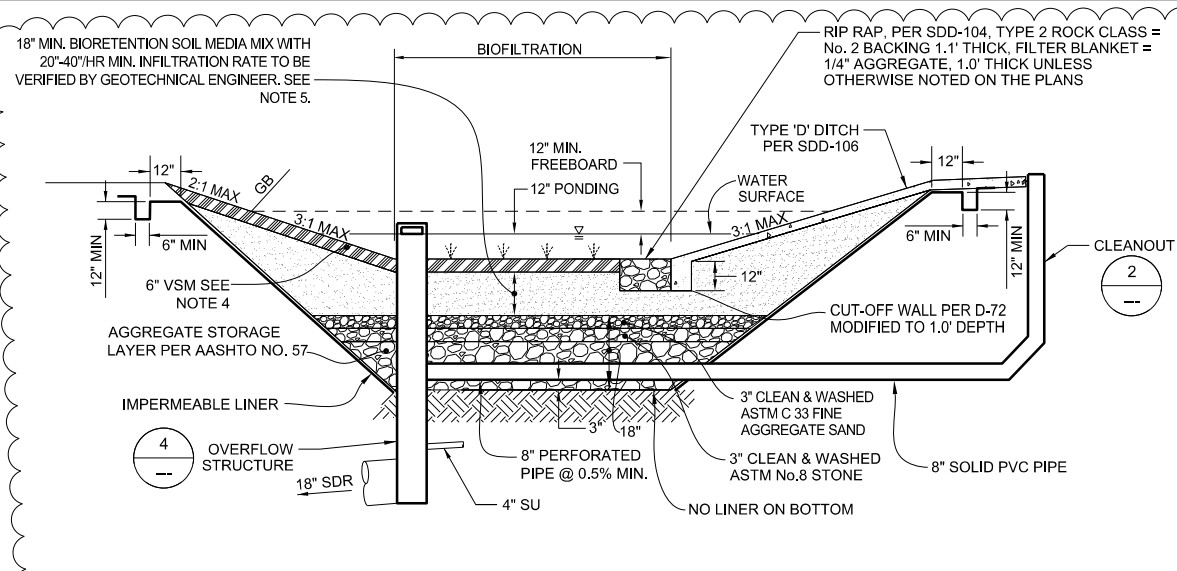
O'Day CONSULTANTS

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Civil Engineering
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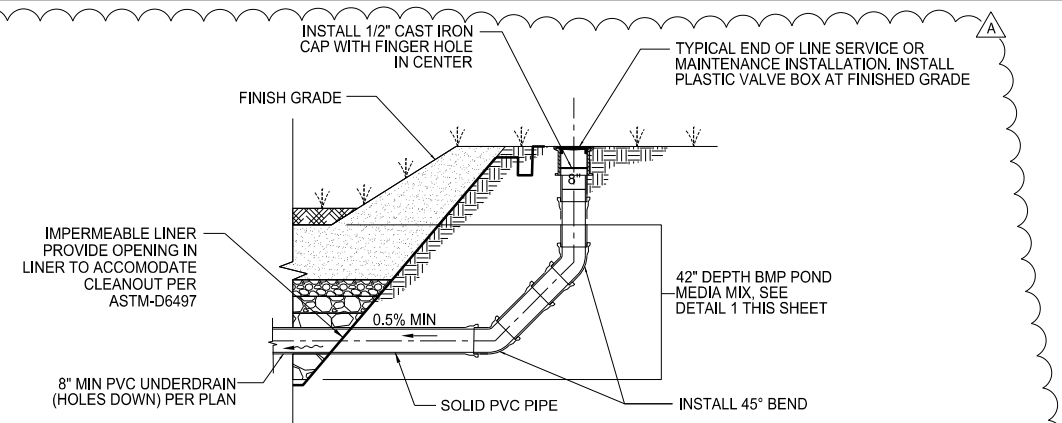
REGISTERED PROFESSIONAL ENGINEER
KEITH W. HANSEN
NO. 60223
Exp. 6-30-2022
CIVIL
STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/1/2021

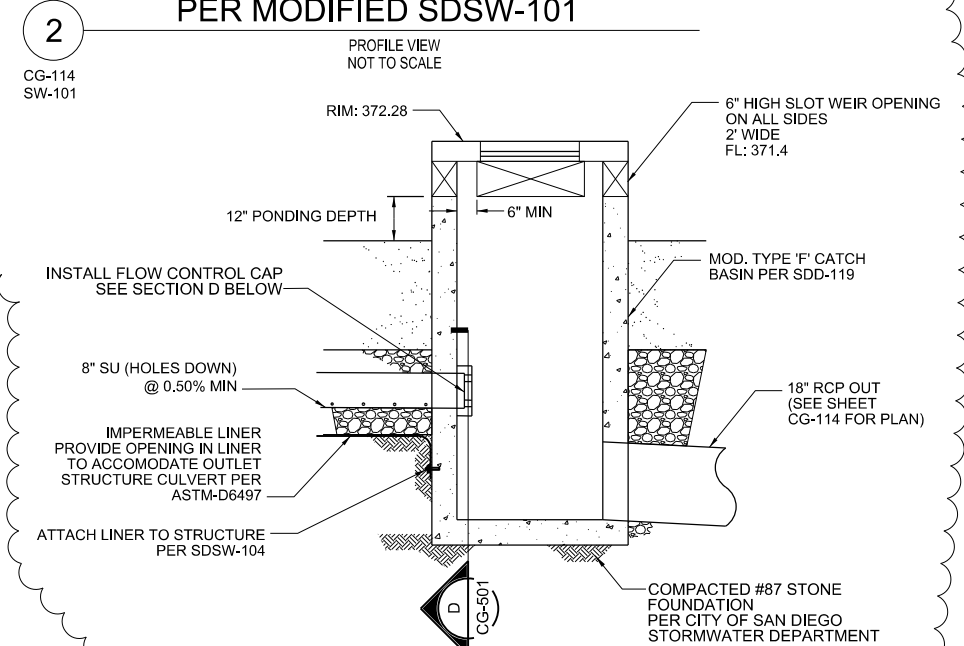


- NOTES:**
1. BMP TO COMPLY WITH CITY OF SAN DIEGO 2018 STORMWATER STANDARDS
 2. BMP SHALL BE REVIEWED AND APPROVED BY GEOTECHNICAL ENGINEER.
 3. SELECTED PLANTS TO BE SUITABLE FOR CLIMATE AND EXPECTED PONDING DEPTH.
 4. VEGETATIVE SUPPORT MATERIAL (VSM) PER SECTION 2.14 OF SPEC 31 23 23.
 5. BIORETENTION SOIL MEDIA SHALL COMPLY WITH SECTION 2.11 OF SPEC 31 23 23.
 6. BMPs SHOULD ADHERE TO APPENDIX E.19 BF-2 NUTRIENT SENSITIVE MEDIA DESIGN OF THE CITY OF SAN DIEGO 2018 STORMWATER STANDARDS.

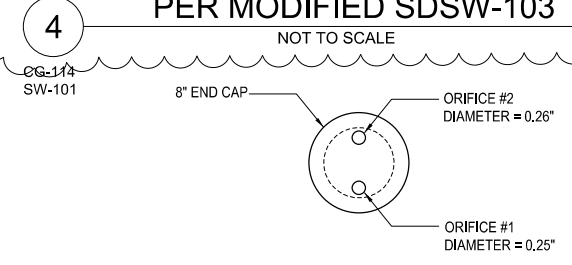
- STORM WATER REQUIREMENTS:**
1. THIS PROJECT IS SUBJECT TO MUNICIPAL CODE SECTION 4303 AND ORDER NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100.
 2. ALL WORK RELATED TO POST-CONSTRUCTION STORMWATER QUALITY SHALL BE IN ACCORDANCE WITH THE STORM WATER QUALITY MANAGEMENT PLAN ENTITLED: PROJECT NAME: NORTH CITY WATER RECLAMATION PLANT EXPANSION SWMP PROJECT ADDRESS: 4949 EASTGATE MALL, SAN DIEGO, CA 92121 PREPARED BY: O'DAY CONSULTANTS, 2710 LOKER AVE W # 100, CARLSBAD, CA 92010 DATE PREPARED: MAY 22, 2020
 3. POST-CONSTRUCTION BMPs ARE REQUIRED, SEE SHEETS: PK1-CG-501



CLEANOUT FOR BMP UNDERDRAIN PER MODIFIED SDSW-101

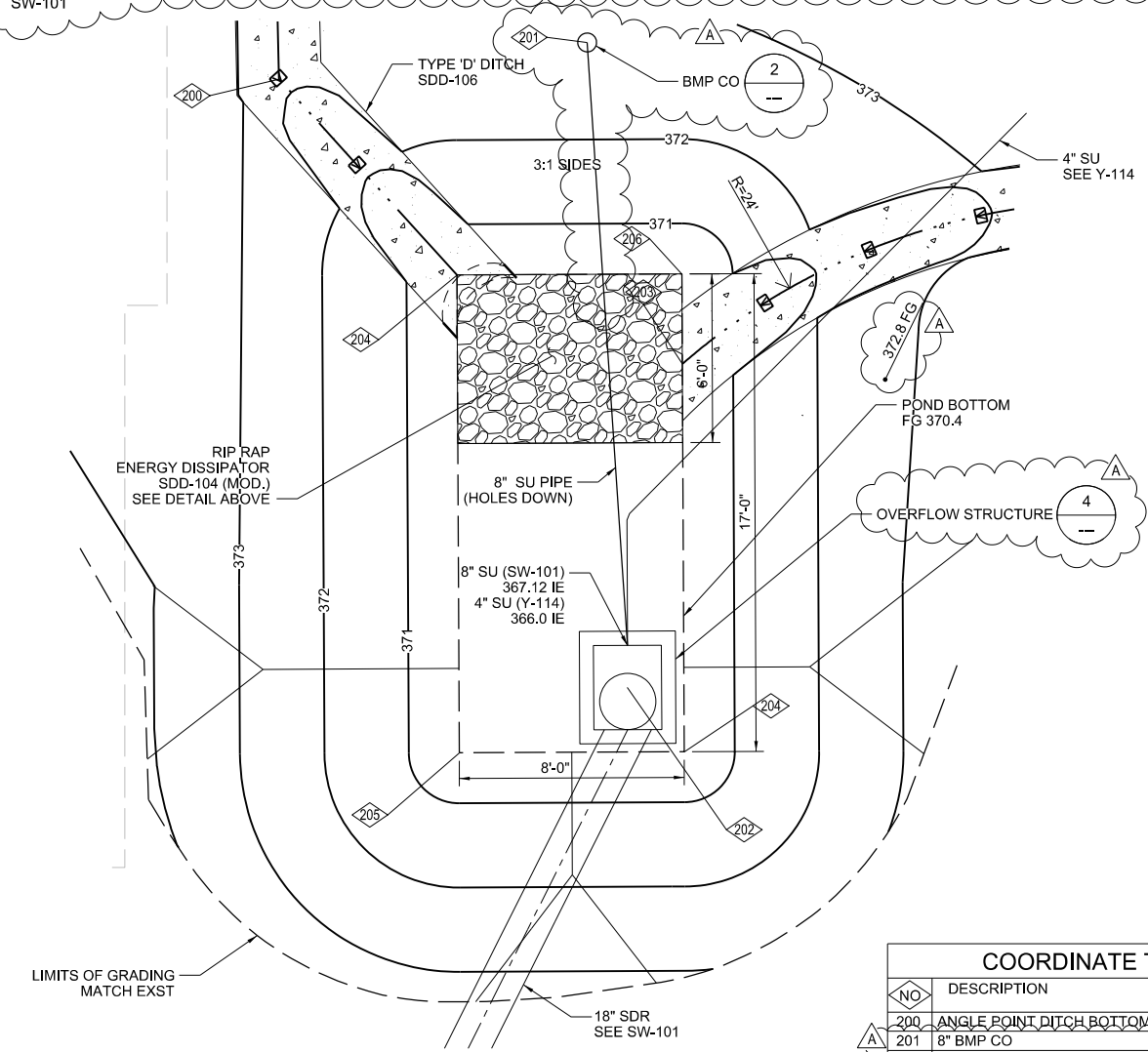


OVERFLOW STRUCTURE PER MODIFIED SDSW-103



ORIFICE OPENINGS @ 8" END CAP

BIOFILTRATION AREA (PARTIAL INFILTRATION) BMP No. 10



POST CONSTRUCTION BMP CERTIFICATION

AS THE PROFESSIONAL IN RESPONSIBLE CHARGE FOR THE DESIGN OF THIS PROJECT, I CERTIFY THAT I HAVE INSPECTED ALL CONSTRUCTED LOW IMPACT DEVELOPMENT (LID) SITE DESIGN, SOURCE CONTROL, HYDROMODIFICATION MANAGEMENT, AND TREATMENT CONTROL BMPs REQUIRED PER THE STORM WATER STANDARDS MANUAL AND CONTRACT REQUIREMENTS AND THAT SAID BMPs HAVE BEEN CONSTRUCTED IN COMPLIANCE WITH THE APPROVED PLANS AND ALL APPLICABLE SPECIFICATION, PERMITS, ORDINANCES AND SAN DIEGO REGIONAL MS4 PERMIT.

I UNDERSTAND THAT THIS BMP CERTIFICATION STATEMENT DOES NOT CONSTITUTE AN OPERATION AND MAINTENANCE VERIFICATION.

SIGNATURE: _____

DATE OF SIGNATURE: _____

PRINTED NAME: _____

TITLE: _____

PHONE NUMBER: _____

NO	DESCRIPTION	ELEV	NORTHING	EASTING
200	ANGLE POINT DITCH BOTTOM	372.4 FG	1899909.47	6271215.86
201	8" BMP CO	372.7 RIM	1899902.64	6271224.53
202	CENTER OF OVERFLOW STRUCTURE	370.4 FL (11")	1899885.39	6271209.32
203	END OF DITCH BOTTOM	371.4 FL	1899892.16	6271218.84
204	TOE OF SLOPE	370.4 FG	1899900.06	6271215.41
205	TOE OF SLOPE	370.4 FG	1899887.99	6271203.45
206	TOE OF SLOPE	370.4 FG	1899882.36	6271209.13
207	TOE OF SLOPE	370.4 FG	1899894.43	6271221.09

BIOFILTRATION POND

NOT TO SCALE

CONSULTANT

O'Day CONSULTANTS

2710 Loker Avenue West
Suite 100
Carlsbad, California 92010
760-931-7700
760-931-8680
O'DayConsultants.com

Civil Engineering
Planning
Processing
Surveying

REGISTERED PROFESSIONAL ENGINEER

KEITH W. HANSEN

NO. 60223
EXP. 6-30-2022

CIVIL

STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/1/2021

PK1-CG-501

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

CIVIL SITE GRADING PLAN - DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 38 OF 132 SHEETS

WBS: B-21059

APPROVED: *Rayhanah Martin* DATE: 4/8/2021
FOR CITY ENGINEER: Rayhanah Martin DATE: 4/8/2021

PROJECT MANAGER: MONIKA SMOCZYNSKI

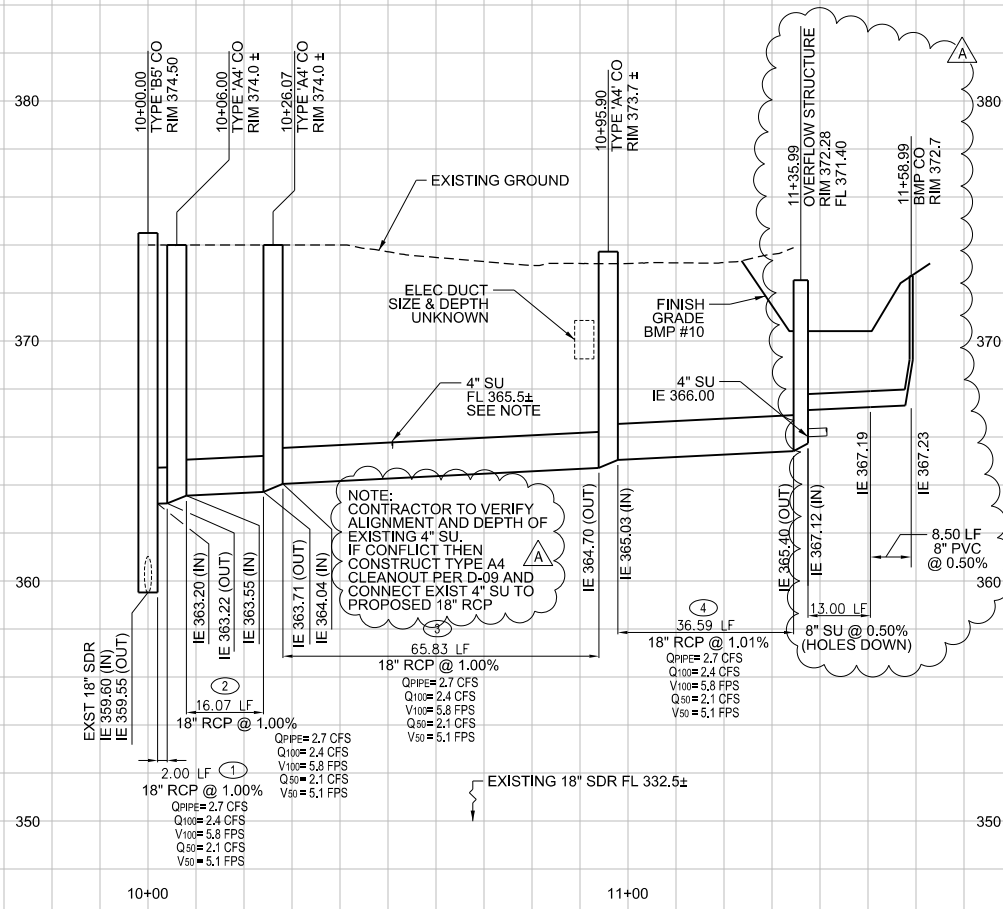
PROJECT ENGINEER: THIEN-LONG TRAN

DESCRIPTION	BY	APPROVED	DATE	FILM
Addendum A	CH	<i>Rayhanah Martin</i>	6/07/21	

260-1709
CCS27 COORDINATE
1900-6269
CCS83 COORDINATE

CONTRACTOR: _____ DATE STARTED: _____
INSPECTOR: _____ DATE COMPLETED: _____

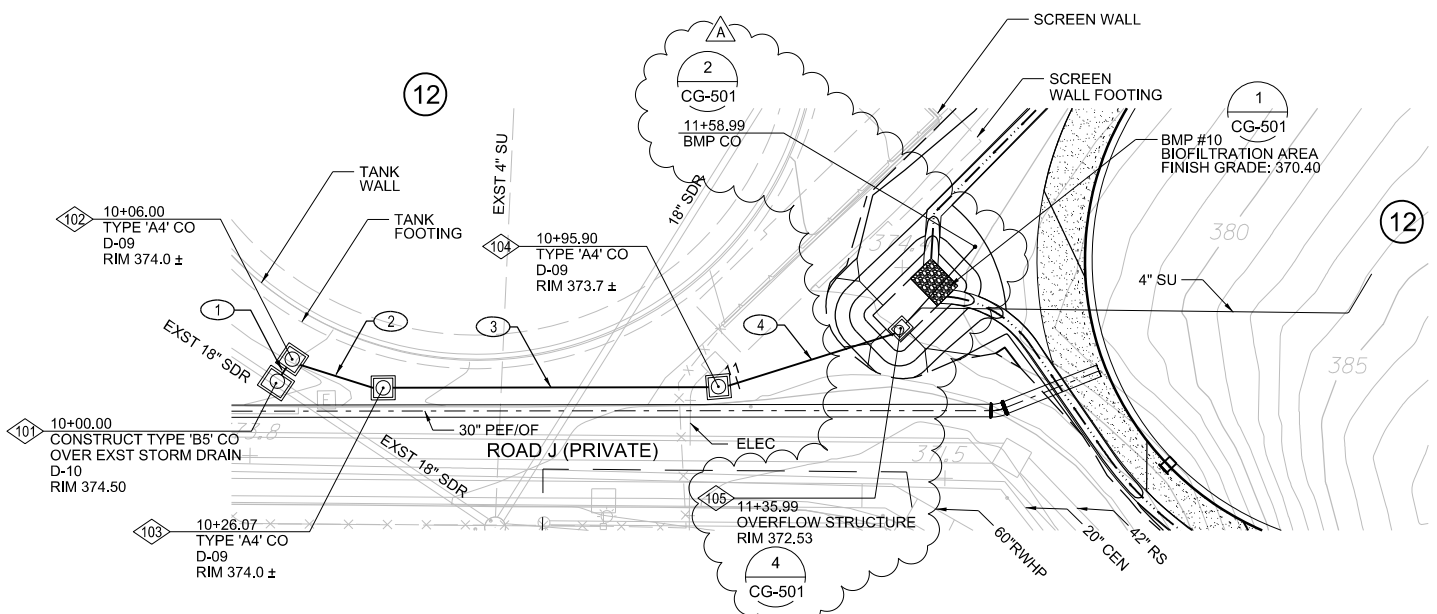
40381-1038-D



SCALE
1"=20' HORIZ.
1"=4' VERT.

PROFILE - STORM DRAIN '1'
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

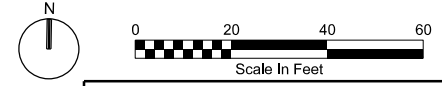
- NOTES:**
- SEE YARD PIPING PLANS FOR EXISTING AND PROPOSED UNDERGROUND UTILITIES.
 - THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.
 - GRADING DESIGN IS BASED ON AERIAL TOPOGRAPHY PROVIDED BY THE CITY OF SAN DIEGO. THE CONTRACTOR SHALL VERIFY EXISTING GRADES WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL GRADES ARE IN CONFLICT WITH THE PROPOSED WORK.
 - THE CITY OF SAN DIEGO PUBLIC UTILITIES DEPARTMENT WILL OWN AND MAINTAIN ALL STORM DRAINS. CONTRACTOR SHALL MAINTAIN STORM DRAINS DURING CONSTRUCTION.



PLAN - STORM DRAIN '1'
SCALE: 1" = 20'

NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N 33°07'42" E	---	2.00'	18" RCP - D-1350
2	N 73°29'27" W	---	16.07'	" "
3	N 88°55'29" E	---	65.83'	" "
4	N 71°37'24" E	---	36.59'	" "

NO	DESCRIPTION	NORTHING	EASTING
101	CENTER OF TYPE 'B5' CO	1899871.77	6271079.39
102	CENTER OF TYPE 'A4' CO	1899876.80	6271082.67
103	CENTER OF TYPE 'A4' CO	1899871.17	6271101.75
104	CENTER OF TYPE 'A4' CO	1899872.59	6271171.55
105	CENTER OF OVERFLOW STRUCTURE	1899885.39	6271209.32



PK1-SW-101

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL STORM DRAINAGE PLAN AND PROFILE

CONSULTANT

O'Day CONSULTANTS

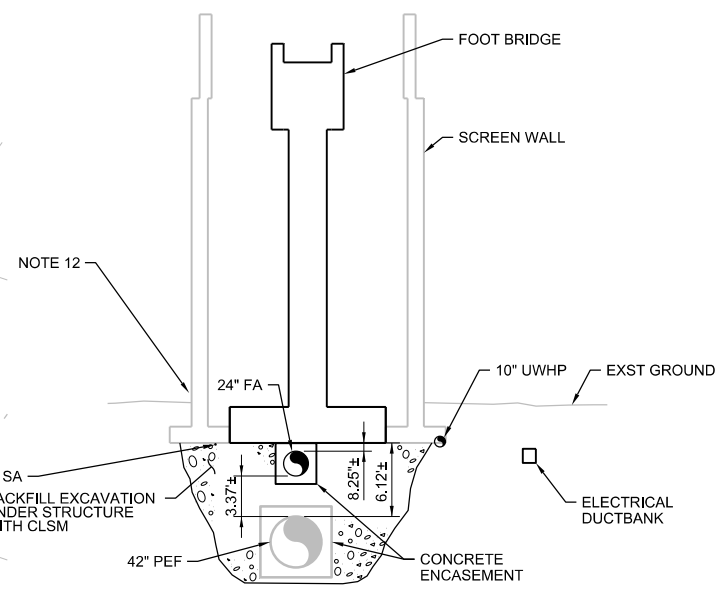
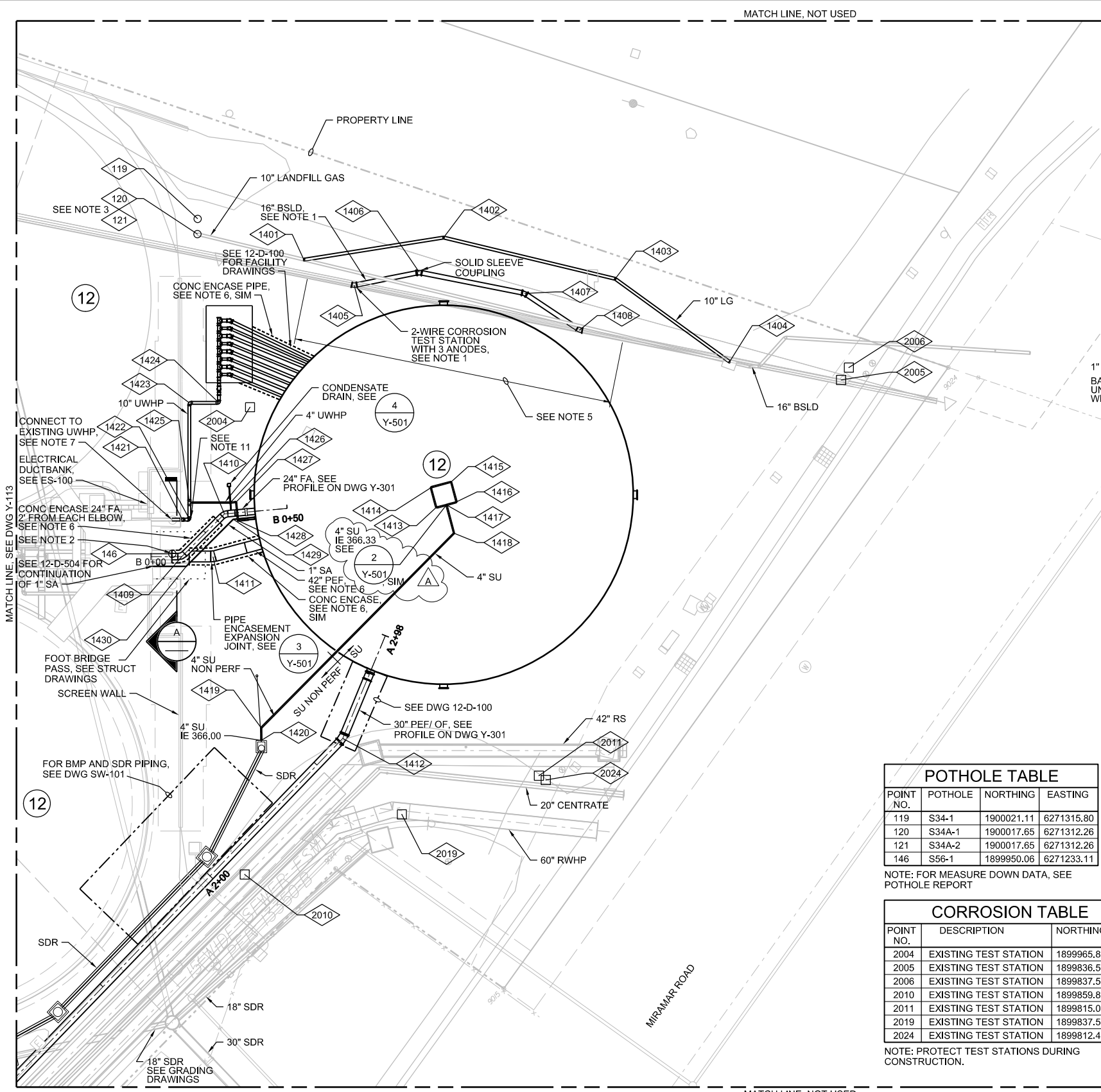
2710 Loker Avenue West
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Carlsbad, California 92010
760-931-7700
Fax: 760-931-8680
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Civil Engineering
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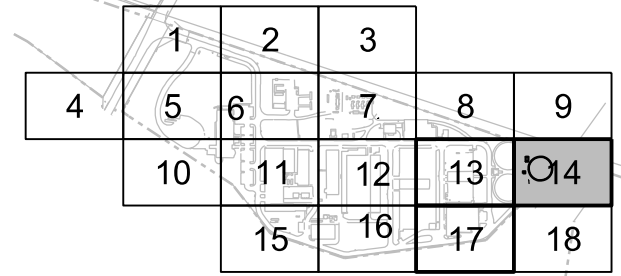


CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 40 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Richard Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMO CZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Richard Martin</i>	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION: Addendum A	BY: CH	DATE FILM: 6/07/21
APPROVED: <i>Richard Martin</i>	DATE: 6/07/21	260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1040-D
INSPECTOR	DATE COMPLETED	

MATCH LINE, NOT USED



A SECTION
1/8"=1'-0"



KEYPLAN
NTS

- NOTES:**
- THE SHUTDOWN OF THE 16" BSL SHALL BE COORDINATED WITH THE MOPO PLAN. THE RELOCATED 16" BSL SHALL HAVE A POLYURETHANE PROTECTIVE COATING, CATHODIC PROTECTION AND CONTINUITY BONDS INSTALLED AT EACH JOINT. SEE SPECIFICATION 26 42 00 GALVANIC ANODE CATHODIC PROTECTION SYSTEM. EXISTING 16" BSLD SHALL BE REMOVED UNDER PROPOSED EQ TANK LOCATION AND RELOCATED TO THE OUTSIDE OF EQ TANK FOOTING. INSTALL CORROSION TEST STATION AND ANODES PER DETAIL 1 ON SHEET CP-001. FIELD LOCATE TEST STATION AND ANODES AS NEEDED. INSTALL CONTINUITY BONDS PER CP-001.
 - EXPOSE THE ENDS OF THE EXISTING 42" PEF, 24" FA AND 10" UWHP PIPES ADJACENT TO THE SCREEN WALL FOOTING. COORDINATE SHUTDOWN OF SERVICE AND REMOVE CAP FROM EACH PIPE. PREPARE PIPE ENDS FOR BELL CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. CONNECT PIPING TO PREPARED ENDS.
 - POTHOLE LOCATIONS S34A-1 AND S34A-2 INDICATE THAT THE 10" LANDFILL GAS LINE IS UNDERNEATH AN UNKNOWN CONCRETE ENCASED UTILITY.
 - FOR FLOW STREAMS NOT IDENTIFIED ON PIPE SCHEDULE, SEE G-014.
 - FIBER OPTIC DUCTBANK. CONFIRM NOT IN USE. REMOVE CONFLICTING DUCTBANK AS NEEDED FOR CONSTRUCTION OF NEW FLOW EQ TANK. ABANDON AND PLUG AT LIMITS OF CONFLICT.
 - CONCRETE ENCASE PIPE, SEE (0330-016A).
 - REMOVE CAP, PREPARE PIPE END PER MANUFACTURERS RECOMMENDATION, CONNECT PIPE WITH EXISTING BELL, AND PROVIDE MECHANICAL THRUST RESTRAINT.
 - POTHOLING CONFIRMED A 42" STEEL PIPE 46" BELOW THE SURFACE. FIELD VERIFY DEPTH.
 - CONTRACTOR TO PROTECT EXISTING LANDFILL GAS LINE IN PLACE DURING CONSTRUCTION UNLESS SHOWN OTHERWISE.
 - PERIMETER DRAIN PIPE ADJACENT AND UNDER STRUCTURES SHALL BE PERFORATED. ALL OTHER CONNECTING PERIMETER DRAIN PIPE SHALL BE NON-PERFORATED. SEE (Y-501).
 - INSTALL THRUST BLOCK, BACKFILL FITTING WITH CONCRETE, SEE (Y-501).
 - PROVIDE SHORING OR TEMPORARY SUPPORT TO PROJECT EXISTING SCREEN WALL.

POTHOLE TABLE

POINT NO.	POTHOLE	NORTHING	EASTING
119	S34-1	1900021.11	6271315.80
120	S34A-1	1900017.65	6271312.26
121	S34A-2	1900017.65	6271312.26
146	S56-1	1899950.06	6271233.11

NOTE: FOR MEASURE DOWN DATA, SEE POTHOLE REPORT

CORROSION TABLE

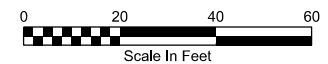
POINT NO.	DESCRIPTION	NORTHING	EASTING
2004	EXISTING TEST STATION	1899965.86	6271284.59
2005	EXISTING TEST STATION	1899836.50	6271426.50
2006	EXISTING TEST STATION	1899837.55	6271431.11
2010	EXISTING TEST STATION	1899859.87	6271176.16
2011	EXISTING TEST STATION	1899815.03	6271266.33
2019	EXISTING TEST STATION	1899837.59	6271226.01
2024	EXISTING TEST STATION	1899812.47	6271266.93

NOTE: PROTECT TEST STATIONS DURING CONSTRUCTION.

PIPING COORDINATE TABLE

POINT NO.	DESCRIPTION	CL ELEV	NORTHING	EASTING
1401	10" LG, 22.5° BEND *	374.43	1899987.30	6271330.86
1402	10" LG, 22.5° BEND	376.35	1899960.38	6271367.94
1403	10" LG, 22.5° BEND	378.95	1899911.51	6271397.89
1404	10" LG, 22.5° BEND *	380.87	1899866.24	6271405.04
1405	16" BSLD, 22.5° BEND *	363.50	1899969.93	6271336.51
1406	16" BSLD, 22.5° BEND	363.50	1899960.64	6271350.41
1407	16" BSLD, 22.5° BEND	363.50	1899924.32	6271374.68
1408	16" BSLD, 22.5° BEND *	363.50	1899907.92	6271377.94
1409	24" FA, 45° BEND	370.08	1899947.25	6271234.67
1410	24" FA, 40° BEND	369.09	1899947.25	6271254.25
1411	42" PEF, 15° BEND	363.57	1899940.10	6271241.82
1412	30" PEF/OF, 22.5° BEND	368.25	1899868.59	6271229.90
1413	4" SU, 90° BEND	366.50	1899900.09	6271304.29
1414	4" SU, 90° BEND	366.50	1899906.01	6271307.71
1415	4" SU, 90° BEND	366.50	1899902.59	6271313.62
1416	4" SU, 90° BEND	366.50	1899896.67	6271310.21
1417	4" SU, TEE	366.50	1899898.38	6271307.25
1418	4" SU, 60° BEND	366.45	1899890.15	6271302.49
1419	4" SU, 45° BEND	366.06	1899889.72	6271213.61
1420	4" SU, END PIPE AT MH	366.00	1899886.81	6271210.73
1421	10" UWHP, 45° VERT BEND DOWN	371.73	1899955.49	6271243.39
1422	10" UWHP, 90° VERT BEND ROLLED UP	369.60	1899953.99	6271244.90
1423	10" UWHP, 90° BEND	369.60	1899980.79	6271271.70
1424	10" UWHP, 90° BEND	369.60	1899973.99	6271278.49
1425	10" x 4" UWHP TEE	369.60	1899957.90	6271248.81
1426	4" UWHP 45° BEND UP	369.68	1899948.41	6271258.28
1427	4" UWHP 90° BEND ROLLED DOWN 45°	371.45	1899947.29	6271259.65
1428	4" UWHP 90° BEND	371.45	1899942.59	6271255.79
1429	1" SA 45° BEND	370.34	1899943.99	6271255.06
1430	1" SA 45° BEND	370.34	1899943.99	6271233.46

* LOCATIONS AND ELEVATIONS ARE APPROXIMATE, FIELD VERIFY



PK1-Y-114

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

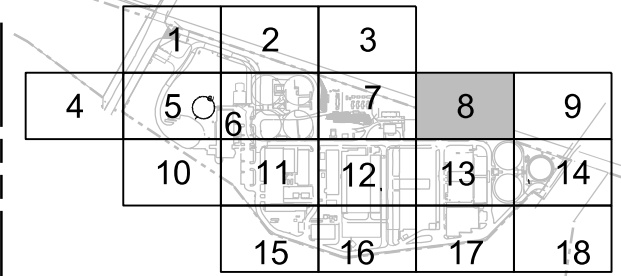
YARD PIPING PLAN - AREA 14

CONSULTANT

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DIGITALLY SIGNED: 6/2/21

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 43 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOczynski PROJECT MANAGER
PRINT DCE NAME: <i>Raymond Martin</i>	PCE#: C89963	PROJECT NO: THien-TRAN LONG PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
Addendum A	CH	<i>Raymond Martin</i>
		DATE: 6/07/21
		FILM
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1043-D
INSPECTOR	DATE COMPLETED	



KEYPLAN
NTS

GENERAL NOTES:

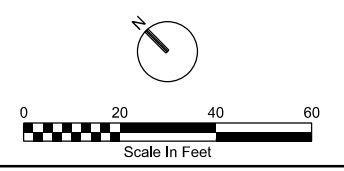
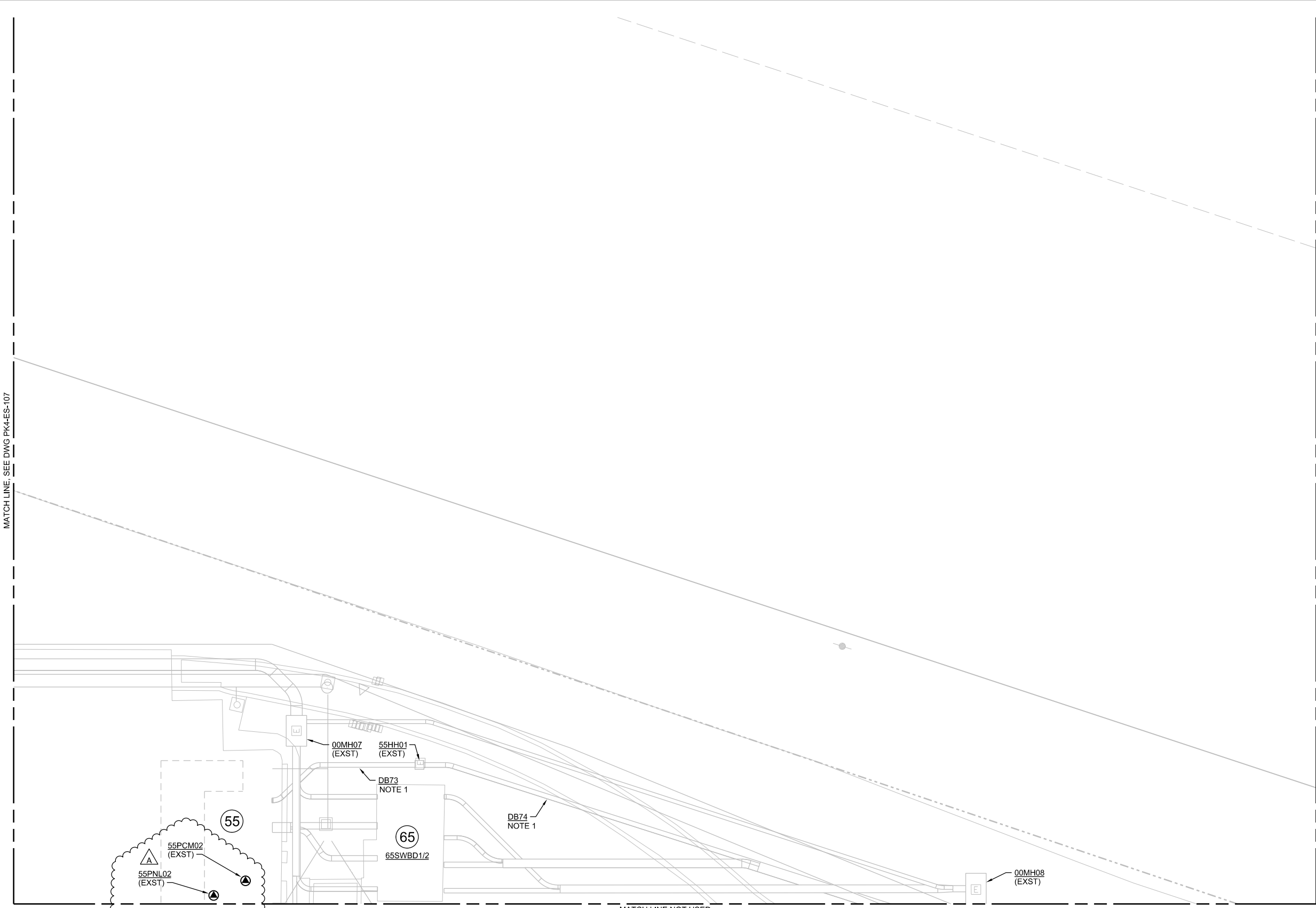
- A. ALL EXTERIOR LIGHTING INSTALLATIONS AND LAMP TYPE SHALL COMPLY WITH CITY OF SAN DIEGO OUTDOOR LIGHTING REGULATION 142.0740.

NOTE:

- 1. UTILIZE EXISTING SPARE CONDUITS IN DUCTBANK FOR NEW CONTROL/INSTRUMENTATION WIRING REQUIRED FOR NEW EQUALIZATION BASIN. REFER TO DUCTBANK AND CONDUIT ROUTE SCHEDULES.

MATCH LINE - SEE DWG PK4-ES-107

MATCH LINE NOT USED



PK1-ES-108

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE
PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
ELECTRICAL
SITE PLAN - AREA 8

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 50 OF 132 SHEETS				WBS	B-21059
APPROVED:	FOR CITY ENGINEER	DATE	4/8/2021	SUBMITTED BY:	MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME:	Rayhanah Martin	DCE#	C89963	PROJECTED BY:	THIEN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED	DATE	FILM	
▲ Addendum A	CH	Rayhanah Martin	6/07/21		260-1709 CCS27 COORDINATE 1900-6269 CCS83 COORDINATE
CONTRACTOR				DATE STARTED	40381-1050-D
INSPECTOR				DATE COMPLETED	

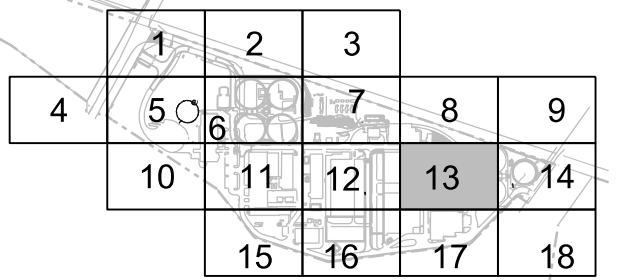
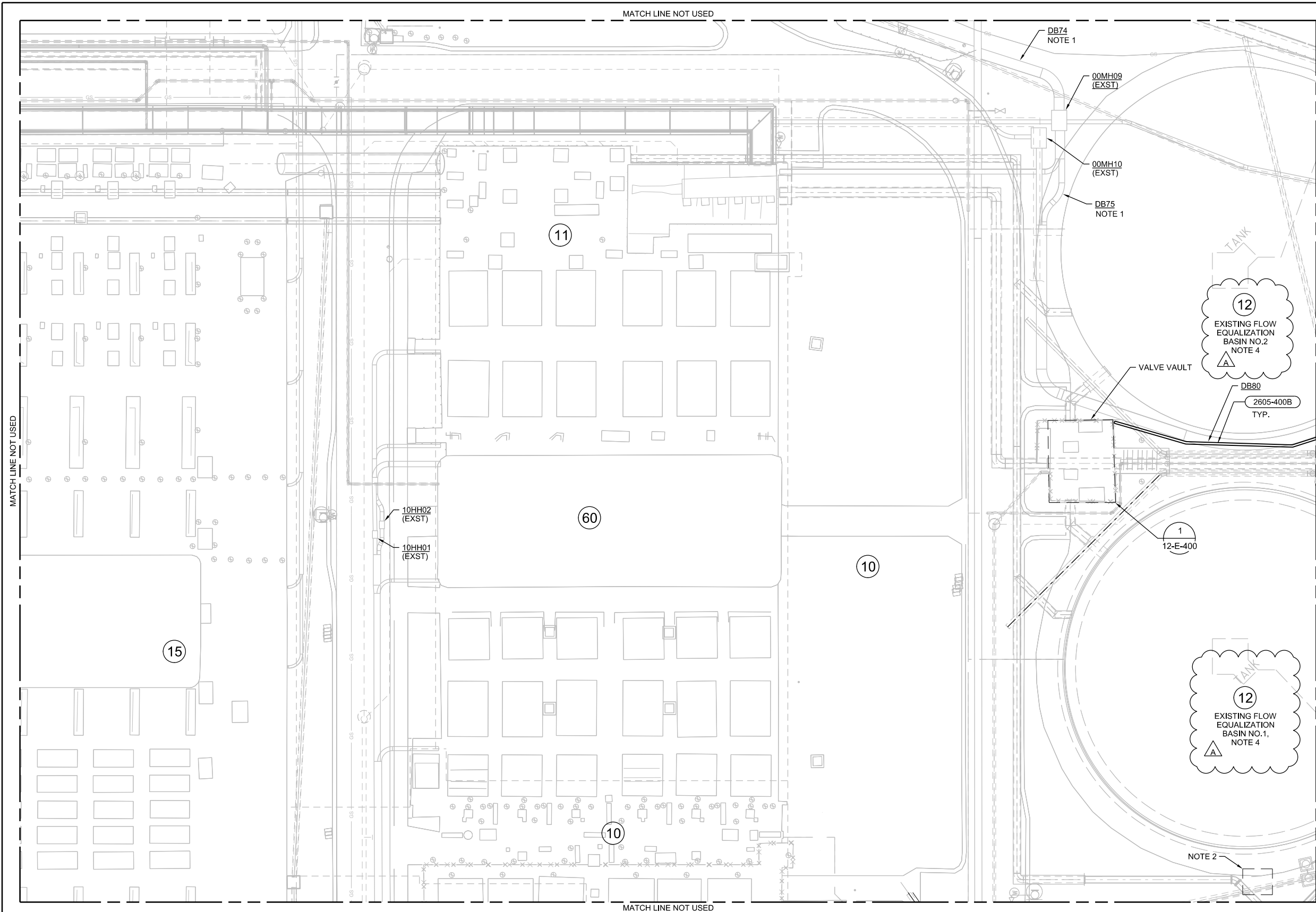
CONSULTANT

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DIGITALLY SIGNED: 6/2/21



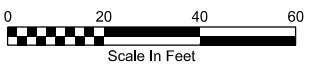
KEYPLAN
NTS

GENERAL NOTES:

A. ALL EXTERIOR LIGHTING INSTALLATIONS AND LAMP TYPE SHALL COMPLY WITH CITY OF SAN DIEGO OUTDOOR LIGHTING REGULATION 142.0740.

NOTES:

- UTILIZE EXISTING SPARE CONDUITS IN DUCTBANK FOR NEW INSTRUMENTATION AND CONTROL WIRING REQUIRED FOR NEW EQUALIZATION BASIN. REFER TO DUCTBANK AND CONDUIT ROUTE SCHEDULES.
- REMOVE AND REINSTALL EXISTING POWER PEDESTAL AND NEARBY BURIED CONDUITS AND CONDUCTORS TO ACCOMMODATE NEW PIPING INSTALLATION.
- SEE YARD-PIPING AND GRADING DRAWINGS FOR ADDITIONAL PIPING.
- LOCATION OF LEVEL INSTRUMENTS ON BASINS NO.1 AND NO.2 SHALL BE AT ONE OF THE EXISTING FOUR FOUL AIR VENT COVERS. FOR BASIN NO.1, INSTRUMENT 12LET501 SHALL BE LOCATED AT THE EASTERN VENT COVER. FOR BASIN NO.2, INSTRUMENT 12LET521 SHALL BE LOCATED AT THE SOUTHERN VENT COVER. REFER TO DETAIL 4027-260 FOR INSTALLATION DETAILS. CONDUIT ROUTING SHALL FOLLOW EXISTING RACEWAY ROUTING THAT EXTENDS UP THE SIDES OF BASIN NO.1 AND 2.



PK1-ES-113

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
ELECTRICAL
SITE PLAN - AREA 13

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 51 OF 132 SHEETS		WBS B-21059
APPROVED: FOR CITY ENGINEER Rayhanah Martin PRINT DCE NAME	DATE 4/8/2021 C89963 RICE#	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
DESCRIPTION Addendum A	BY CH	PROJECT ENGINEER THIEN-LONG TRAN
APPROVED Rayhanah Martin	DATE 6/07/21	FILM 260-1709
		CCS27 COORDINATE 1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1051-D
INSPECTOR	DATE COMPLETED	

CONSULTANT

REGISTERED PROFESSIONAL ENGINEER
RANK STEPHEN HARBETZ
No. E21673
ELECTRICAL
STATE OF CALIFORNIA

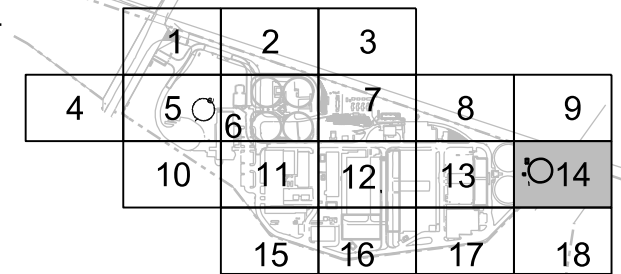
DIGITALLY SIGNED: 6/2/21

CONTRACTOR

INSPECTOR

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MATCH LINE NOT USED



KEYPLAN

NTS

GENERAL NOTES:

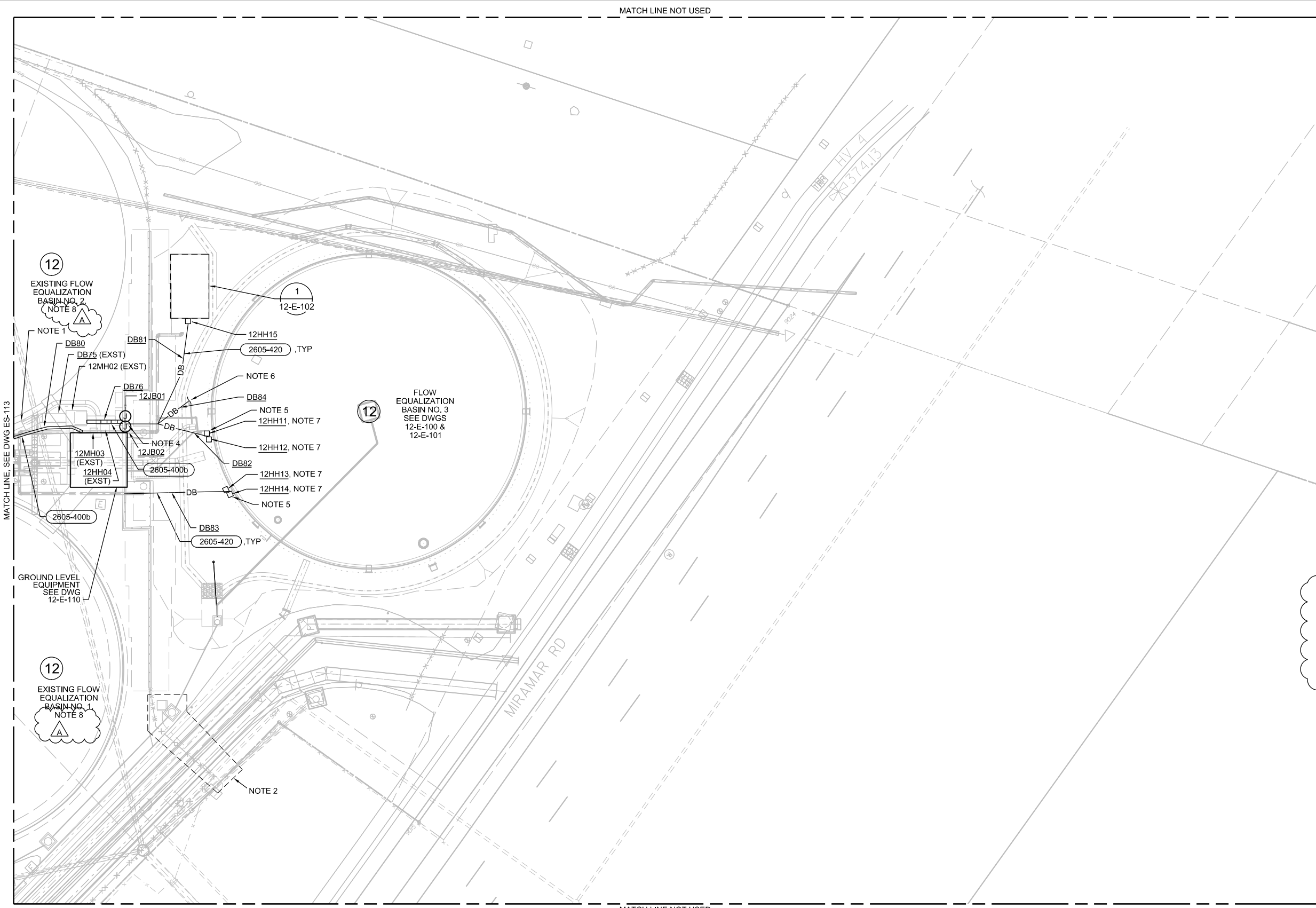
A. ALL EXTERIOR LIGHTING INSTALLATIONS AND LAMP TYPE SHALL COMPLY WITH CITY OF SAN DIEGO OUTDOOR LIGHTING REGULATION 142.0740.

NOTES:

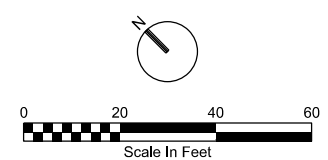
- UTILIZE EXISTING SPARE CONDUITS IN DUCTBANK FOR NEW CONTROL/INSTRUMENTATION WIRING REQUIRED FOR NEW EQUALIZATION BASIN. REFER TO DUCTBANK AND CONDUIT ROUTE SCHEDULES.
- REMOVE AND REINSTALL EXISTING POWER PEDESTAL TO ACCOMMODATE NEW PIPING INSTALLATION. PROVIDE NEW BURIED CONDUIT TO EXTENT NECESSARY TO RECONNECT PEDESTAL AT NEW LOCATION, IN ACCORDANCE WITH DETAIL 2605-420. CONNECT TO EXISTING BURIED CONDUIT AT EXTENT OF PIPING EXCAVATION. PROVIDE NEW TRAFFIC RATED BOX AND EXPOSED CONDUIT TO THE REINSTALLED RECEPTACLES. PROTECT AND RECONNECT EXISTING WIRING TO RECEPTACLES. REFER TO YARD PIPING SHEETS FOR NEW PIPING INSTALLATIONS.

REPLACE BURIED CONDUIT FOR GATE CONTROLLER WIRING THAT IS IMPACTED BY NEW PIPING INSTALLATIONS. PROTECT AND RECONNECT WIRING.
- SEE YARD PIPING AND GRADING DRAWINGS FOR ADDITIONAL PIPING.
- CONDUITS SHALL EXIT ELECTRICAL EQUIPMENT AREA OVER THE TOP OF THE EXISTING CHAIN LINK GATES, ROUTED ALONG THE NORTH FACE OF THE SCREEN WALL. ONCE CLEAR OF THE ELECTRICAL EQUIPMENT AREA, TURN CONDUITS UP AND EXTEND OVER THE TOP OF THE WALL AND INTO THE DUCTBANKS AS INDICATED. PROVIDE NECESSARY LB'S OR JUNCTION BOXES TO FACILITATE PULL POINTS.
- REFER TO 12-E-101 FOR EXTENSION OF CONDUITS UP TANK WALL.
- REFER TO 12-E-100 FOR EXTENSION OF CONDUITS AROUND TANK.
- PROVIDE TRAFFIC RATED CONCRETE BOX.

8. LOCATION OF LEVEL INSTRUMENTS ON BASINS NO.1 AND NO.2 SHALL BE AT ONE OF THE EXISTING FOUR FOUL AIR VENT COVERS. FOR BASIN NO.1, INSTRUMENT 12LET501 SHALL BE LOCATED AT THE EASTERN VENT COVER. FOR BASIN NO.2, INSTRUMENT 12LET521 SHALL BE LOCATED AT THE SOUTHERN VENT COVER. REFER TO DETAIL 4027-260 FOR INSTALLATION DETAILS. CONDUIT ROUTING SHALL FOLLOW EXISTING RACEWAY ROUTING THAT EXTENDS UP THE SIDES OF BASIN NO.1 AND 2.



MATCH LINE NOT USED



PK1-ES-114

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
ELECTRICAL
SITE PLAN - AREA 14

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 52 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Rayhanah Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: Rayhanah Martin	RCE#: C89963	PROJECT ENGINEER: THEIN-LONG TRAN
DESCRIPTION	BY	APPROVED
▲ Addendum A	CH	<i>Rayhanah Martin</i>
		DATE: 6/07/21
		FILM
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
		40381-1052-D

CONSULTANT

REGISTERED PROFESSIONAL ENGINEER
RAYHANAH MARTIN
No. E21673
ELECTRICAL
STATE OF CALIFORNIA

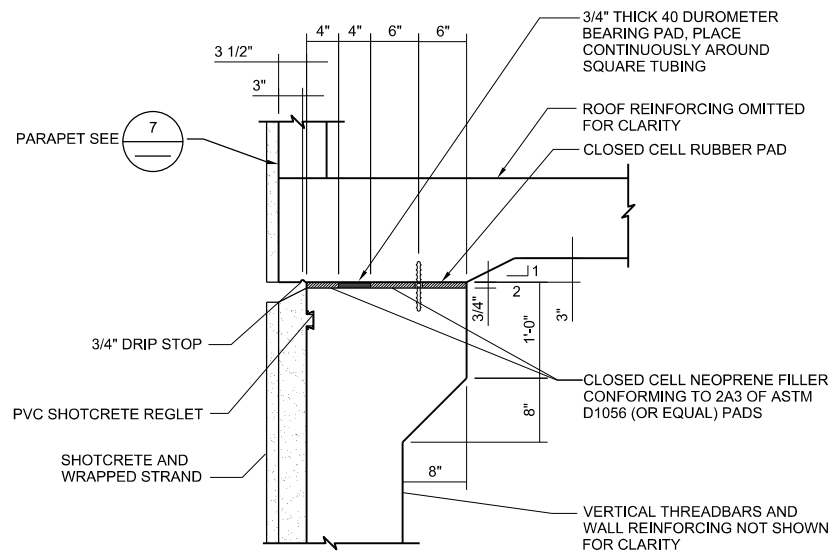
DIGITALLY SIGNED: 6/2/21

CONTRACTOR: _____ DATE STARTED: _____
INSPECTOR: _____ DATE COMPLETED: _____

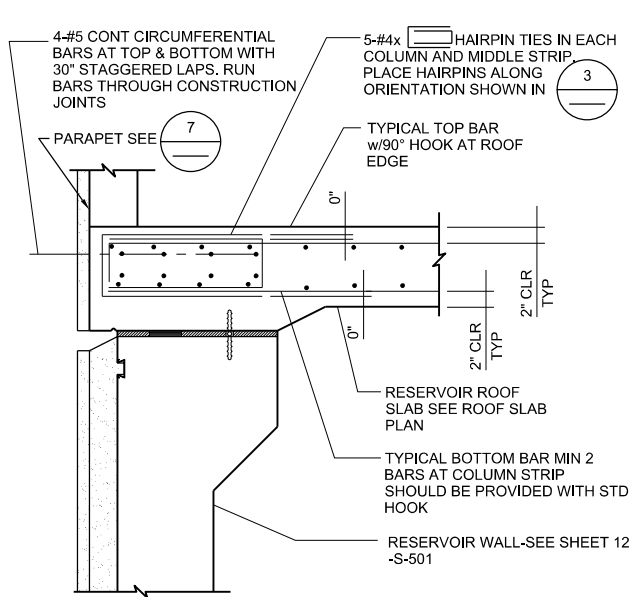
WARNING

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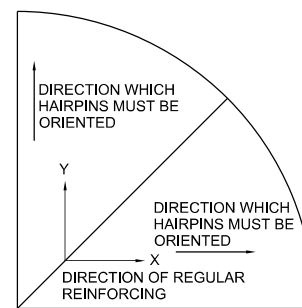
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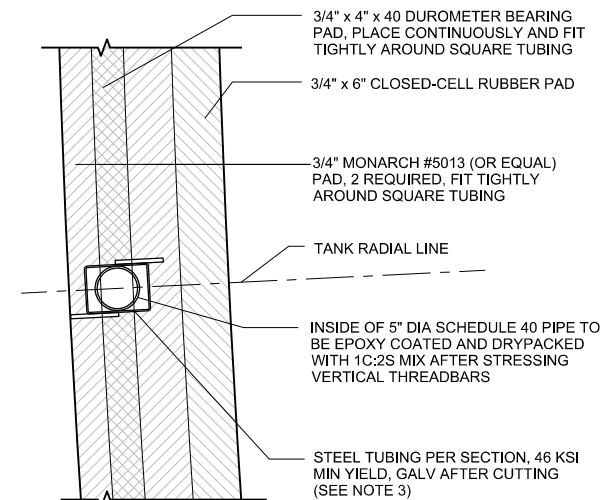
1 ROOF TO WALL JOINT
1"=1'-0"
12-S-501



2 REINF AT ROOF PERIMETER
1"=1'-0"
12-S-502



3 REINF PLAN OF HAIRPIN ORIENTATION
NO SCALE



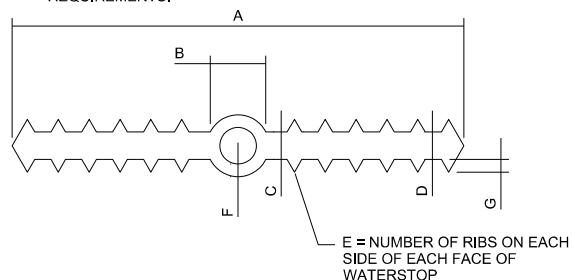
4 PLAN OF WALL TO ROOF CONN
1"=1'-0"
12-S-501

- WALL TO ROOF CONNECTION NOTES:**
1. GLUE ALL PADS TO TOP OF WALL WITH CONTACT CEMENT
 2. FILL ALL VOIDS BETWEEN WALL, ROOF PADS AND TUBING WITH A SOFT MASTIC.
 3. PLACE STEEL TUBING PERPENDICULAR TO TANK RADIAL LINE

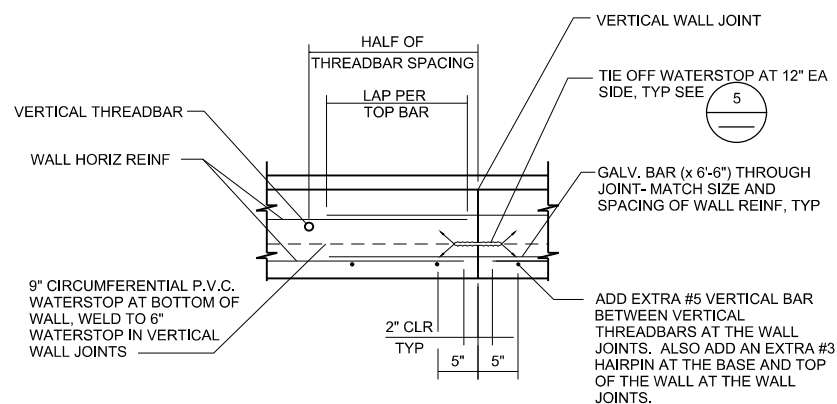
LOCATION	A	B	C	D	E	F	G
FLOOR TO PIPE PENETRATION	6"	7/8"	3/8"	3/8"	8	9/32"	1/8"
FLOOR SLAB JOINT & ROOF SLAB JOINT	6"	-	3/8"	1/4"	7	-	1/8"
WALL TO ROOF SLAB	6"	-	3/8"	1/4"	7	-	1/8"
WALL TO FOOTING RING	9"	1"	3/8"	3/8"	8	1/4"	1/8"
VERTICAL WALL JOINTS	6"	-	3/8"	3/8"	7	-	1/8"

* SEE NOTE 1 BELOW

- NOTES:**
1. NO CENTER BULB ALLOWED IN WATERSTOP FOR VERTICAL JOINTS.
 2. ALL SPLICES SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. SUBMIT SHOP DRAWINGS PRIOR TO INSTALLATION OR SPLICING WATERSTOPS.
 3. SEE SPECIFICATIONS FOR MATERIAL REQUIREMENTS.

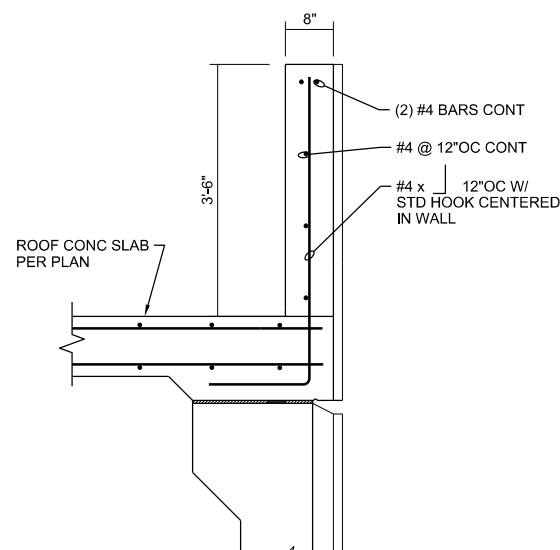


5 PLASTIC WATERSTOP SCHEDULE
1"=1'-0"
12-S-504



- NOTES:**
1. REQUIRED: 9 VERTICAL WALL JOINTS, EVENLY SPACED.
 2. CONTRACTOR TO SUBMIT LOCATIONS OF WALL JOINTS FOR APPROVAL BY ENGINEER OF RECORD.

6 VERTICAL WALL JOINT
1"=1'-0"
12-S-100



7 PARAPET DETAIL
1"=1'-0"

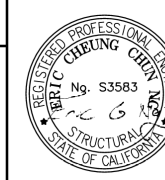
WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



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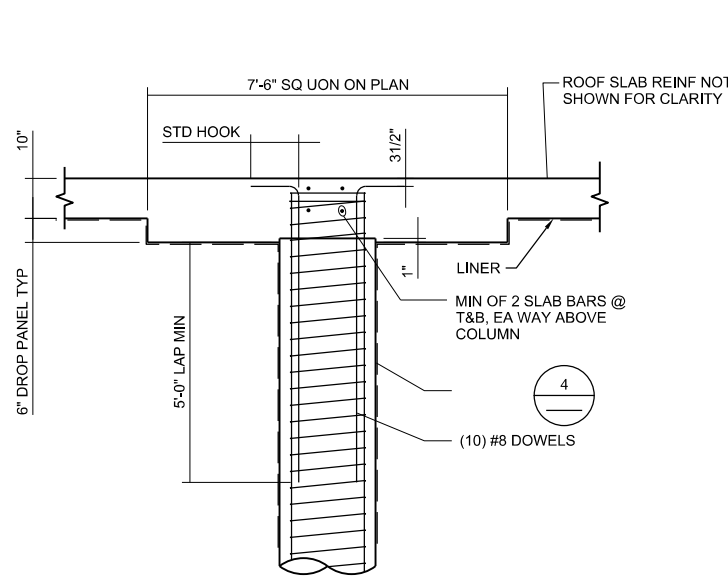
DIGITALLY SIGNED: 6/2/21

CONTRACTOR
INSPECTOR

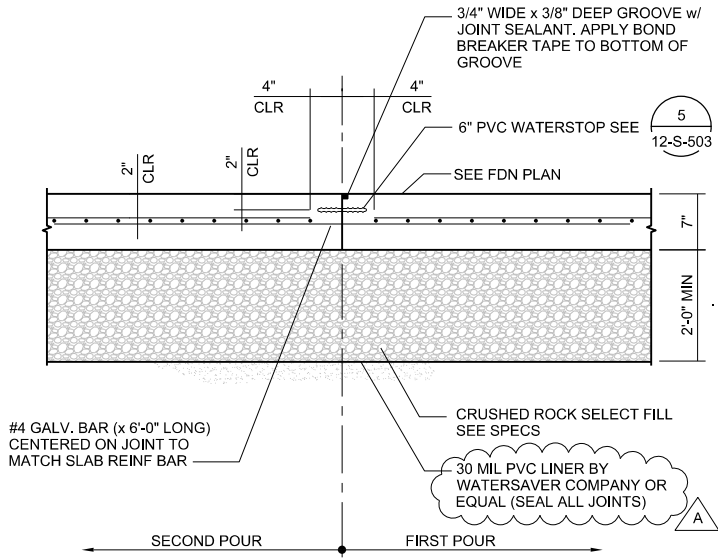
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 68 OF 132 SHEETS				WBS B-21059
APPROVED FOR CITY ENGINEER Richard Martin DATE 4/8/2021 PRINT DCE NAME Rayhanah Martin RCE# C89963	SUBMITTED BY MONIKA SMOCZYNSKI PROJECT MANAGER		PROJECT NO. THEIN-LONG TRAN PROJECT ENGINEER	
DESCRIPTION Addendum A	BY CH	APPROVED Richard Martin	DATE 6/07/21	FILM 260-1709 CCS27 COORDINATE 1900-6269 CCS83 COORDINATE
DATE STARTED				40381-1068-D
DATE COMPLETED				

PK1-12-S-503

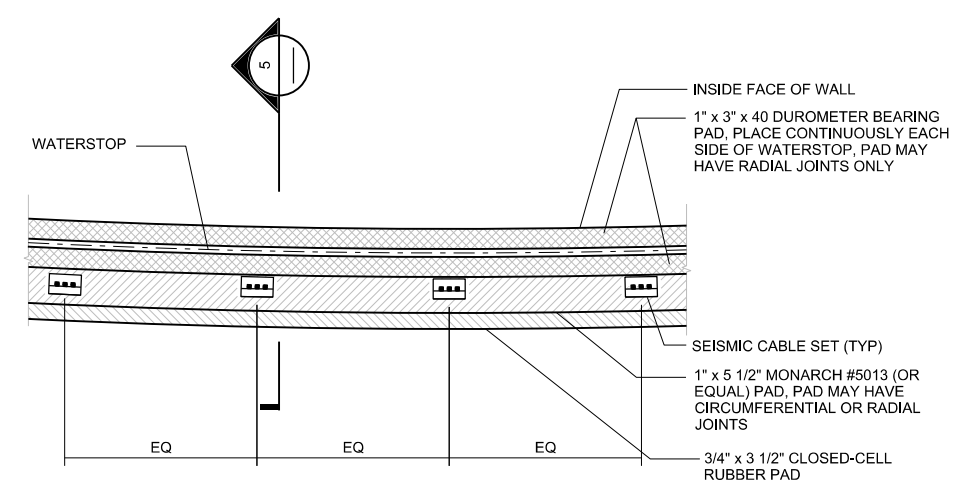
NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
STRUCTURAL FLOW EQUALIZATION BASIN DETAILS



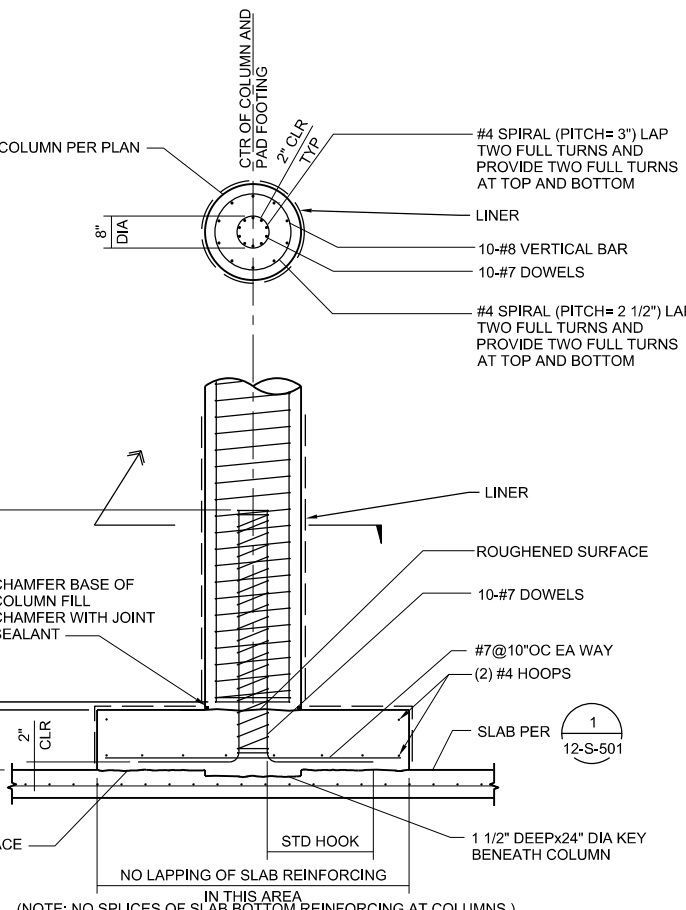
1 DROP PANEL
1/2"=1'-0"
12-S-301



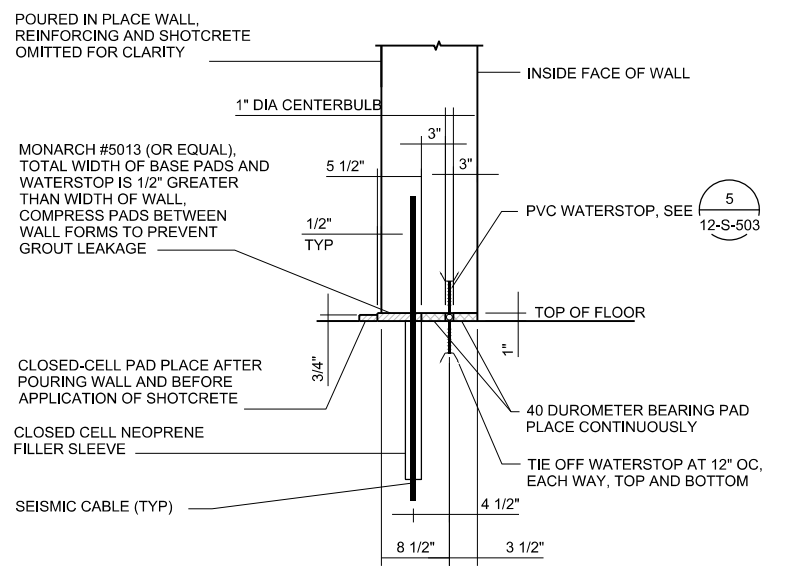
2 FLOOR SLAB JOINT
1"=1'-0"
12-S-100



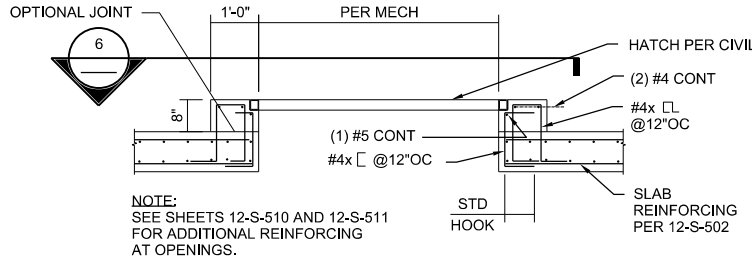
3 PLAN PADS AT WALL BASE JOINT
1"=1'-0"
12-S-501



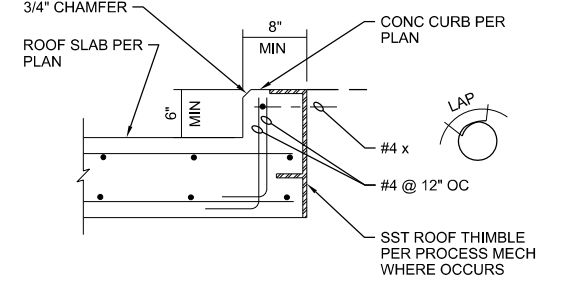
4 COL FTG
1/2"=1'-0"
12-S-301



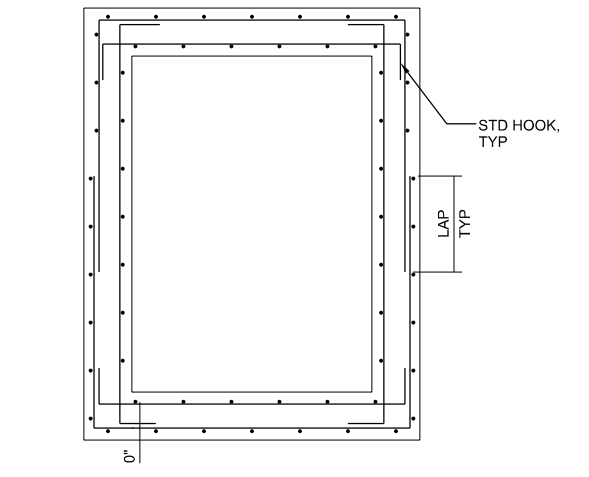
5 WALL WATERSTOP/SEALANT
1"=1'-0"
12-S-501



7 HATCH CURB
1/2"=1'-0"
12-S-110



8 CIRCULAR CONCRETE CURB
1"=1'-0"
12-S-110



6 PLAN VIEW CURB
1/2"=1'-0"

WALL BASE JOINT NOTES:
1. GLUE ALL PADS TO TOP OF WALL FOOTING WITH CONTACT CEMENT.
2. FILL ALL VOIDS BETWEEN BASE PADS, SEISMIC CABLE SLEEVE AND WATERSTOP WITH A SOFT MASTIC.

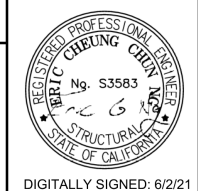
NO LAPPING OF SLAB REINFORCING IN THIS AREA (NOTE: NO SPLICES OF SLAB BOTTOM REINFORCING AT COLUMNS.)

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

CONSULTANT

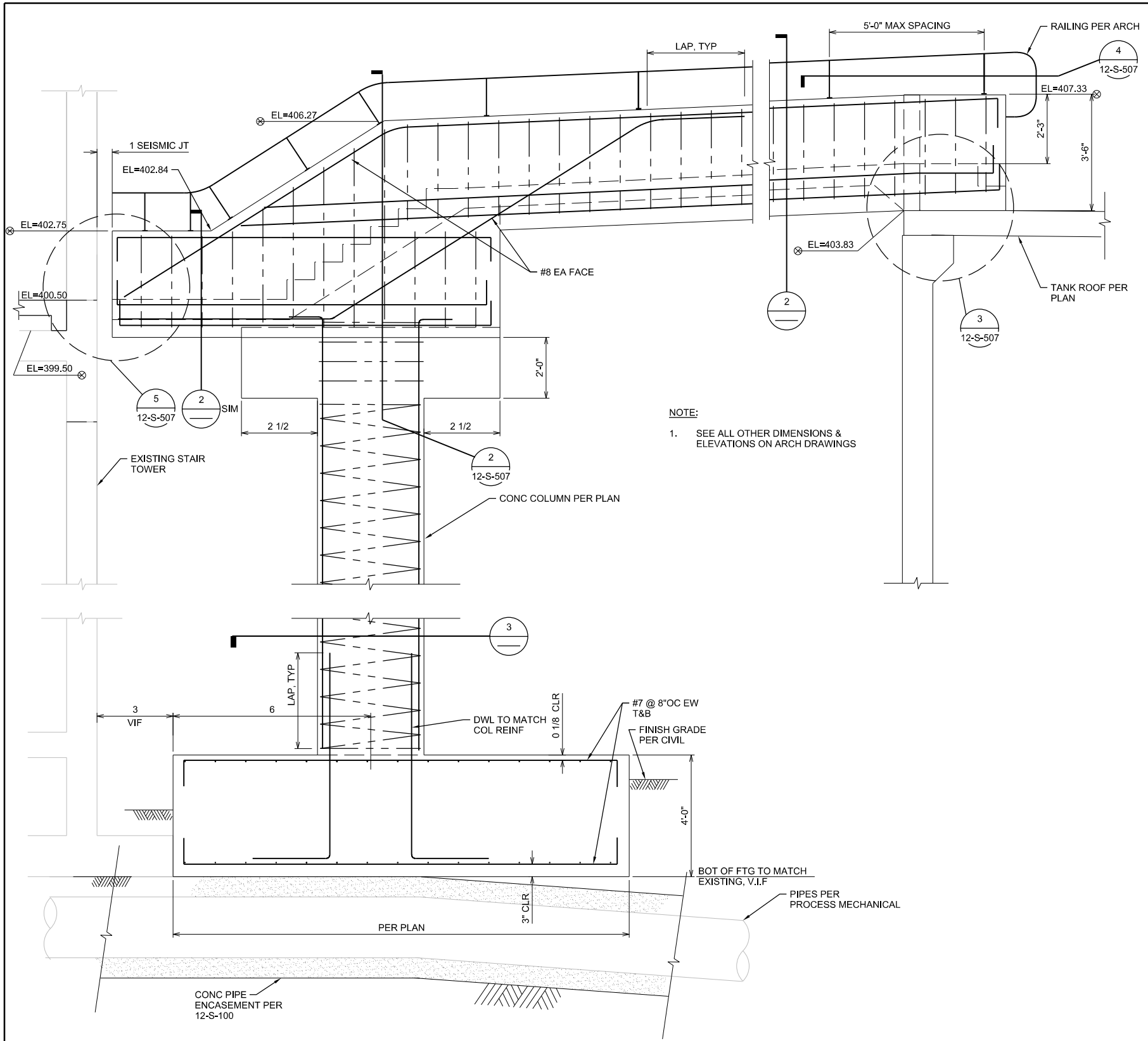
KLEINFELDER
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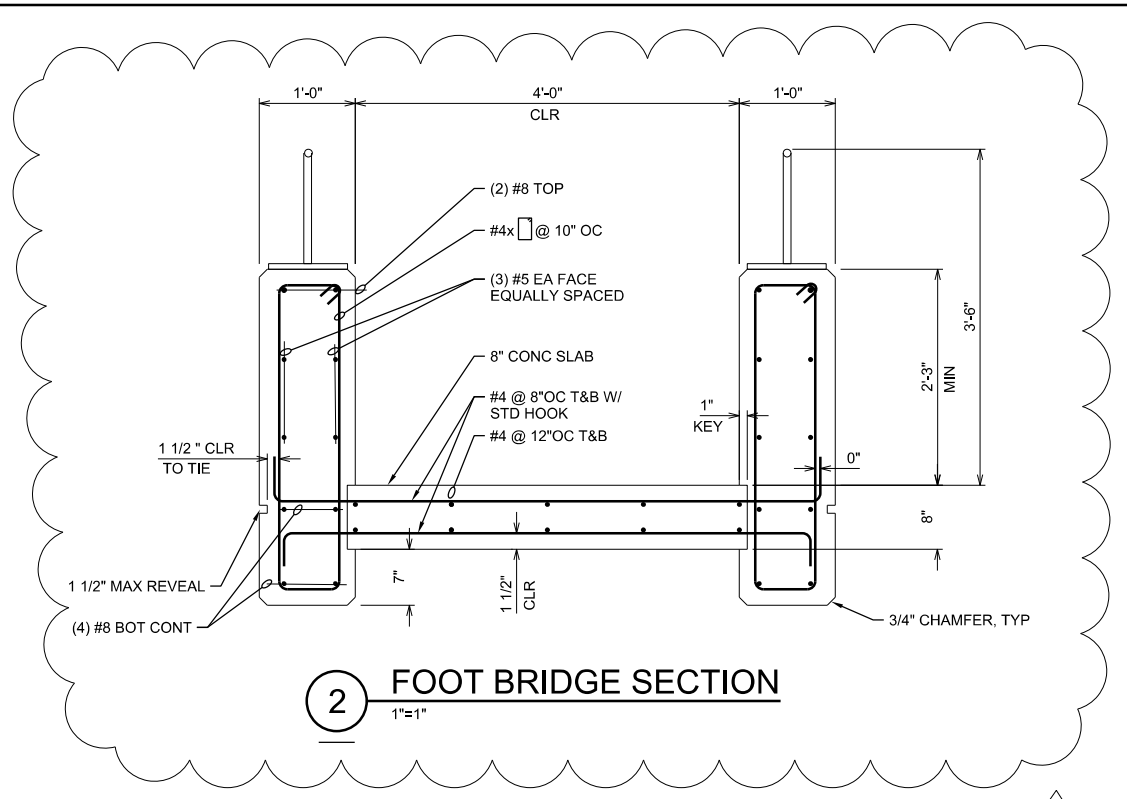


DIGITALLY SIGNED: 6/2/21
CONTRACTOR INSPECTOR

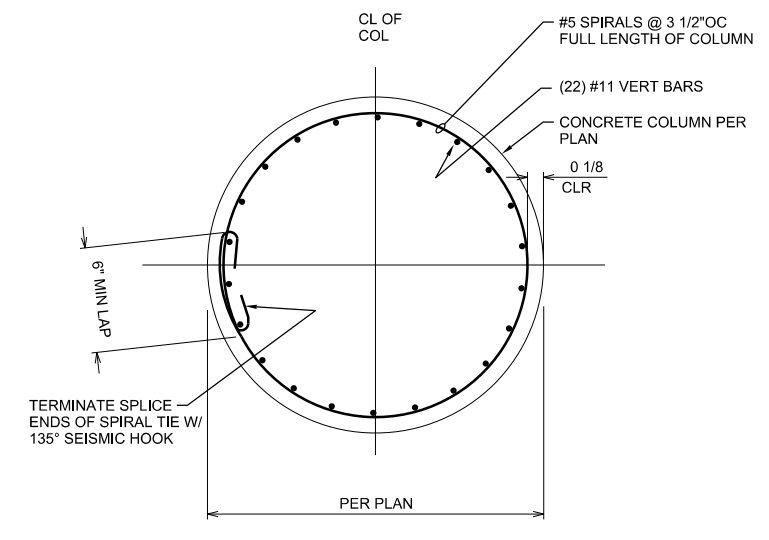
PK1-12-S-504			
NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN			
STRUCTURAL FLOW EQUALIZATION BASIN DETAILS			
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 69 OF 132 SHEETS		WBS <u>B-21059</u>	
APPROVED: <i>Richard Martin</i> FOR CITY ENGINEER PRINT DCE NAME: <i>Richard Martin</i>	DATE: 4/8/2021 C89963	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER	
DESCRIPTION	BY	APPROVED	DATE/FILM
▲ Addendum A	CH	<i>Richard Martin</i>	6/07/21
		PROJECT ENGINEER: THIEN-LONG TRAN	
		260-1709	
		CCS27 COORDINATE	
		1900-6269	
		CCS83 COORDINATE	
		40381-1069-D	
DATE STARTED		DATE COMPLETED	



1 FOOT BRIDGE SECTION
1/2"=1'-0"
12-S-110



2 FOOT BRIDGE SECTION
1"=1"



3 FOOT BRIDGE SECTION
1"=1"

PK1-12-S-506

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
STRUCTURAL
FLOW EQUALIZATION BASIN
FOOT BRIDGE SECTIONS

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 71 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMO CZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Raymond Martin</i>	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION	BY	APPROVED
▲ Addendum A	CH	<i>Raymond Martin</i>
		DATE: 6/07/21
		FILM
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1071-D
INSPECTOR	DATE COMPLETED	

CONSULTANT

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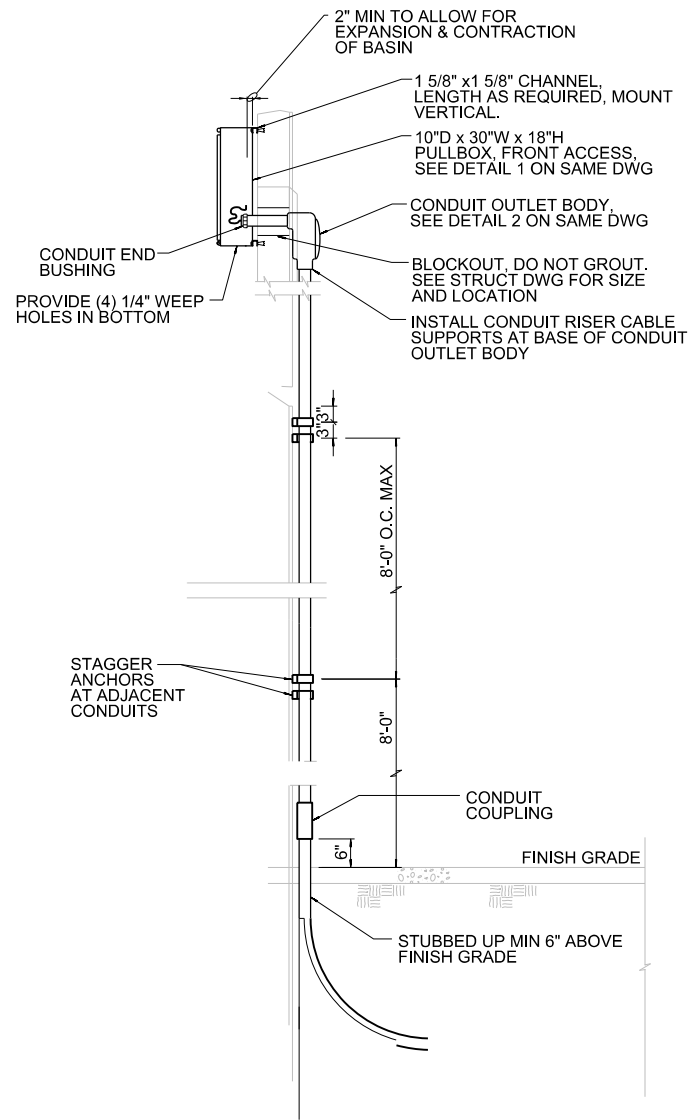
REGISTERED PROFESSIONAL ENGINEER
PUBLIC UTILITIES DIVISION
No. S3583
6/26/21
STRUCTURAL
STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/2/21

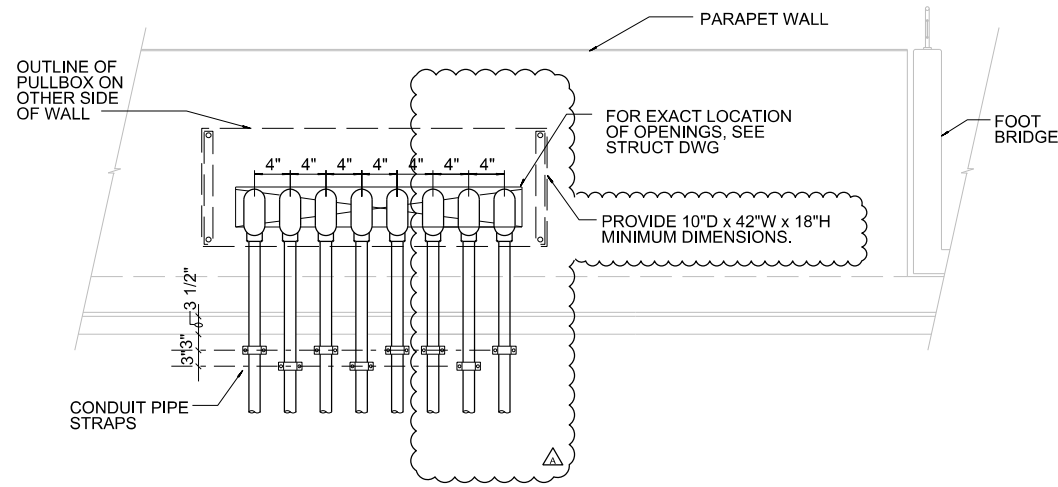
WARNING

0 1

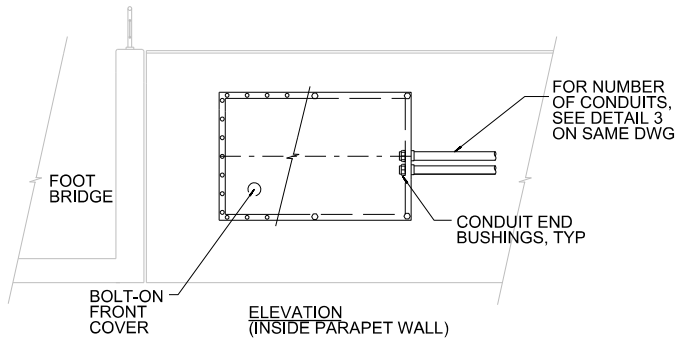
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



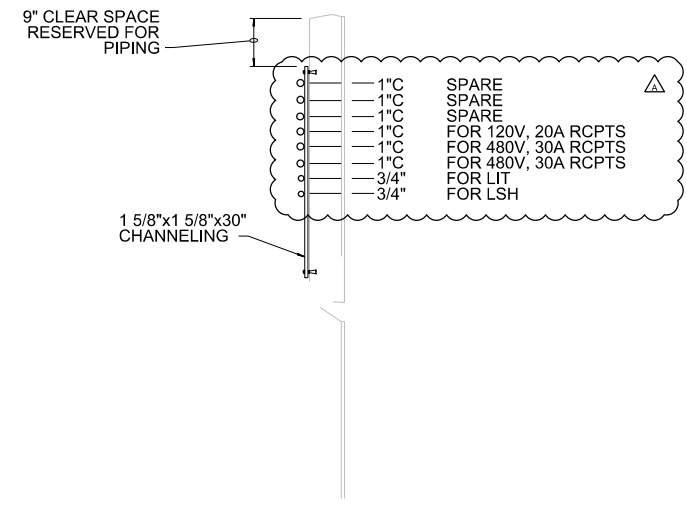
A BASIN SECTION
NTS
12-E-101



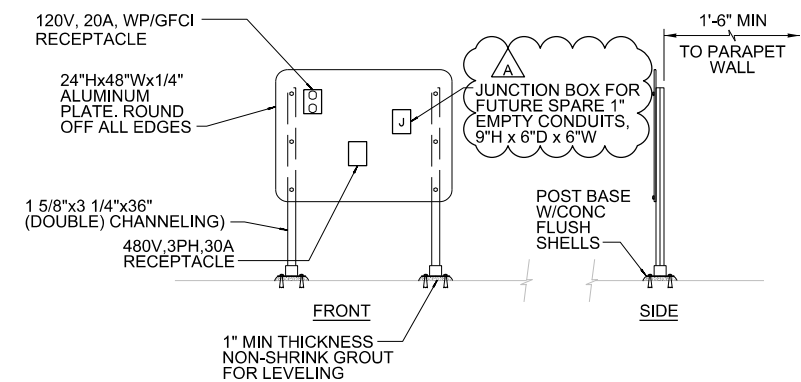
2 BASIN ELEVATION
NTS



1 PULLBOX 12PB01 & 12PB02 DETAIL
NTS



3 CONDUIT INSTALLATION @ BASIN PARAPET
NTS



B BASIN SECTION
NTS
12-E-101

- NOTES: (TYPICAL ALL DETAILS)
1. FOR MATERIAL SELECTION REFER TO AREA CLASSIFICATION AND MATERIALS SELECTION TABLE.
 2. ALLOW MIN 1/4" SPACERS BETWEEN DISSIMILAR MATERIALS AND ALSO ANY CONCRETE SURFACES.

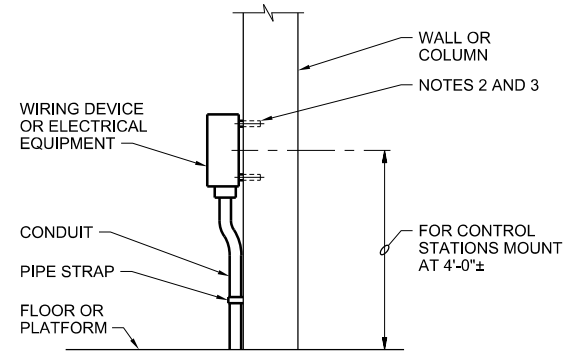
WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

CONSULTANT



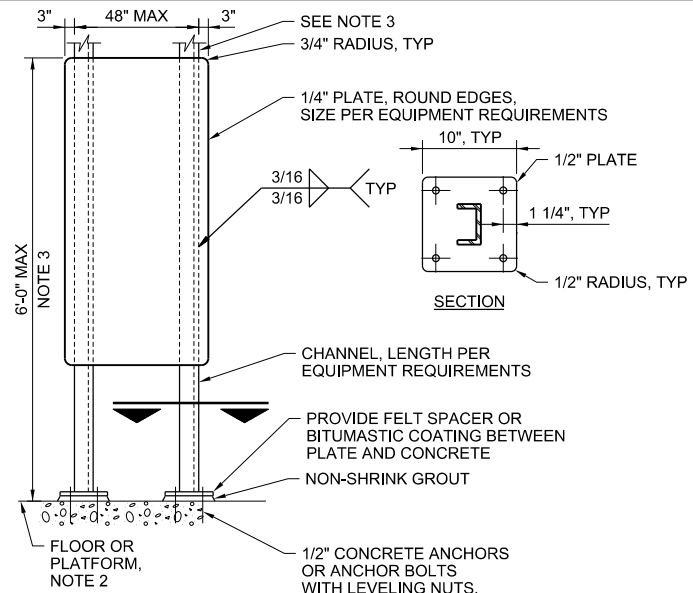
DIGITALLY SIGNED: 6/2/21
CONTRACTOR _____
INSPECTOR _____

PK1-12-E-500		CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 96 OF 132 SHEETS		WBS B-21059
NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN ELECTRICAL FLOW EQUALIZATION BASINS BASIN SECTION AND DETAILS				
APPROVED FOR CITY ENGINEER Rayhanah Martin	DATE 4/8/2021	SUBMITTED BY MONIKA SMOCZYNSKI PROJECT MANAGER		
PRINT DCE NAME Rayhanah Martin	RCE# C89963	PROJECT BY THIEN-LONG TRAN PROJECT ENGINEER		
DESCRIPTION Addendum A	BY CH	APPROVED Rayhanah Martin	DATE 6/07/21	FILM 260-1709
				1900-6296
				CCS27 COORDINATE
				CCS83 COORDINATE
		DATE STARTED		40381-1096-D
		DATE COMPLETED		



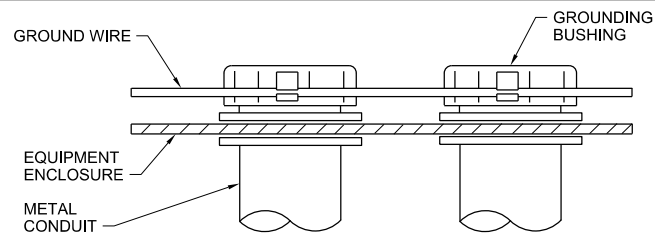
- NOTES:**
1. FOR HARDWARE MATERIAL TYPE, SEE AREA CLASSIFICATION AND MATERIAL SELECTION TABLE.
 2. ON CONCRETE WALLS USE CONCRETE ANCHORS. MOUNT ENCLOSURE ON 1/2" SPACERS OF 1/2" SCHEDULE 80 PVC CONDUIT. SEE NOTE 1.
 3. BOXES 6 INCHES SQUARE AND LESS SHALL BE SUPPORTED BY TWO ANCHORS. LARGER BOXES SHALL BE SUPPORTED BY AT LEAST FOUR.

DEVICE MOUNTING, WALL OR COLUMN (2605-002)



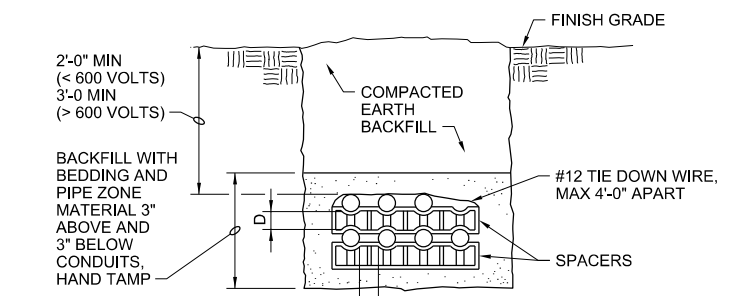
- NOTES:**
1. FOR HARDWARE MATERIAL TYPE, SEE AREA CLASSIFICATION AND MATERIAL SELECTION TABLE.
 2. FOR YARD LOCATIONS PROVIDE A 6 INCH THICK CONCRETE PAD AT GRADE WITH #4 BAR @ 12" OC EACH WAY, CENTERED. THE PAD SHALL BE 12 INCHES LONGER THAN THE MOUNTING PLATE BY ONE HALF THE HEIGHT OF THE MOUNTING PLATE ABOVE FINISHED GRADE. MINIMUM WIDTH 24 INCHES.
 3. FOR HEIGHTS EXCEEDING 5'-0" OR WEIGHT OF MOUNTED EQUIPMENT EXCEEDING 200 LBS. SIZE POSTS AND CONNECTIONS FOR LATERAL LOADS. EXTEND POSTS TO STRUCTURE ABOVE WHERE REQUIRED BY CALCULATION, SEE GENERAL ELECTRICAL CONSTRUCTION NOTES ON DRAWINGS.

DEVICE MOUNTING, EQUIPMENT PEDESTAL (2605-008B)



- NOTES:**
1. THE ENDS OF ALL CONDUITS REQUIRED TO BE GROUNDED BY THE SPECIFICATIONS SHALL BE GROUNDED IN ACCORDANCE WITH THIS DETAIL.

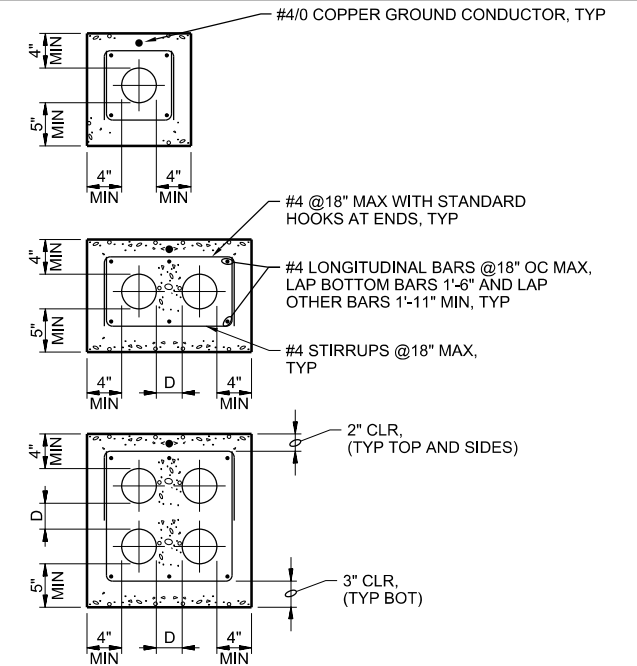
CONDUIT GROUNTING (2605-203)



- NOTES:**
1. INSTALLATION OF DIRECT BURIAL DUCT BANKS WHICH INCLUDE THREE OR MORE CONDUITS OR DUCTS SHALL BE MADE IN ACCORDANCE WITH THIS DETAIL.

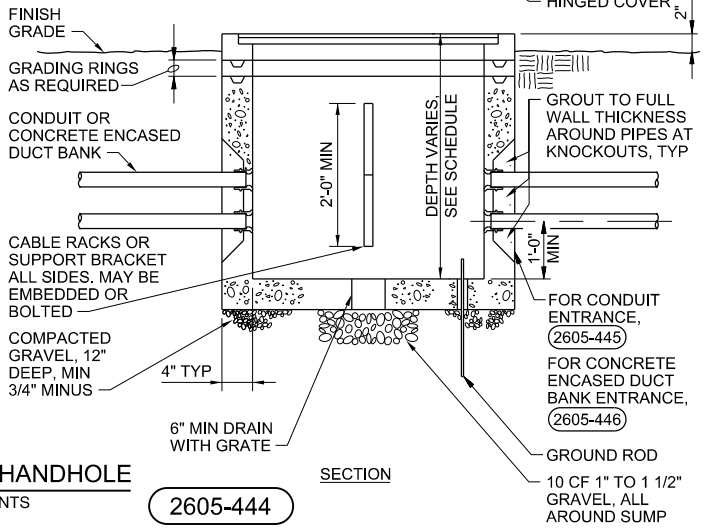
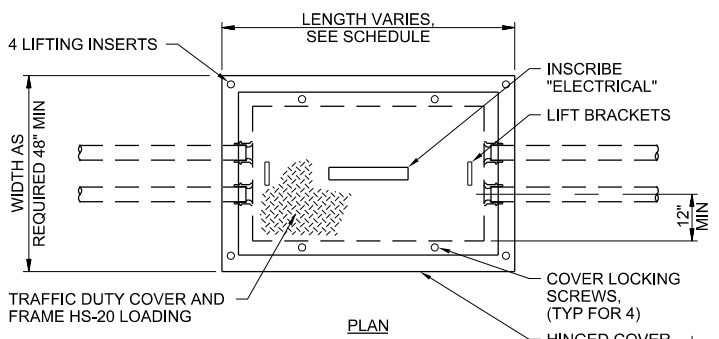
(2605-420)

UNDERGROUND CONDUIT IN NON-PAVED AREAS

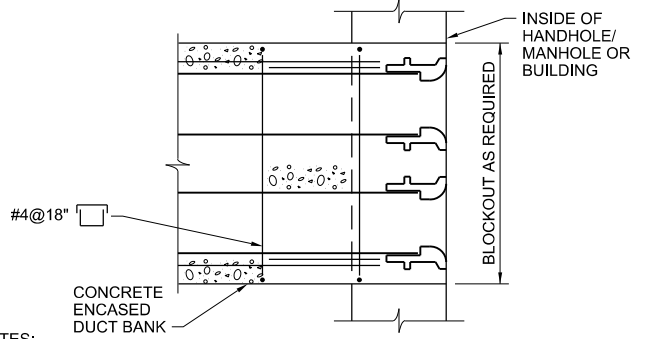


- NOTES:**
1. PROVIDE 6" MINIMUM COMPACTED GRAVEL, 3/4" MINUS, UNDER ALL CONCRETE ENCASED DUCT RUNS.

DUCT BANK (2605-400B)

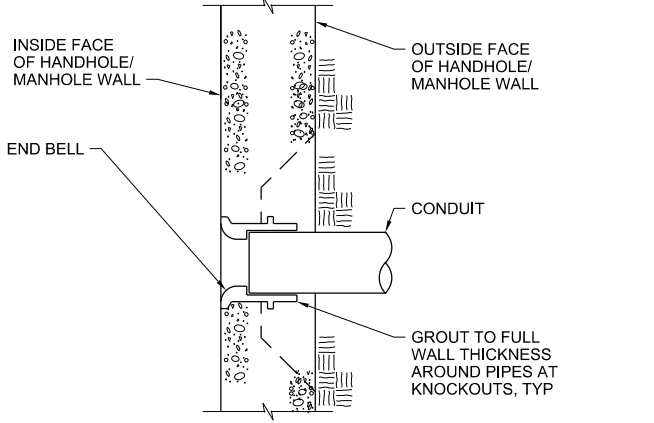


HANDHOLE (2605-444)

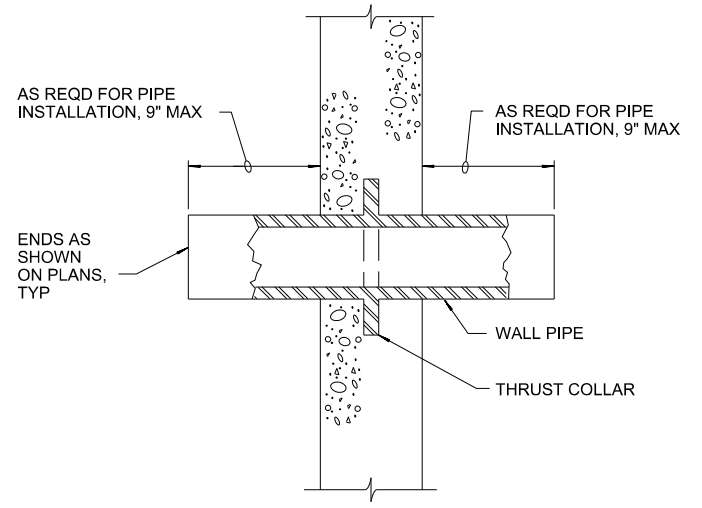


- NOTES:**
1. EXTEND REBAR A MINIMUM OF 2' BEYOND THE LIMIT OF EXCAVATION.

CONDUIT HANDHOLE/MANHOLE ENTRANCE (2605-446)

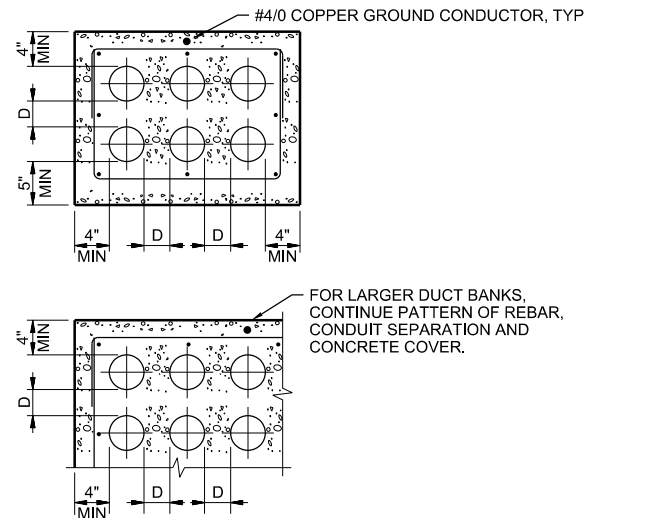


CONDUIT HANDHOLE/MANHOLE ENTRANCE (2605-445)



- NOTE:**
1. COAT WALL PIPE WITH EPOXY PAINT SYSTEM PRIOR TO CONCRETE PLACEMENT AS SPECIFIED IN SECTION 09 90 00.

DUCTILE IRON WALL PIPE (2642-599)



DUCT BANK (2605-400C)

CONSULTANT

ch2m

WARNING

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER

STEPHEN HARTLEY

NO. E21673

ELECTRICAL

STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/2/21

PK1-SD-005			
NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN			
GENERAL STANDARD DETAILS 2000 SERIES			
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 114 OF 132 SHEETS		WBS B-21059	
APPROVED:	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOJCZYNSKI PROJECT MANAGER	
FOR CITY ENGINEER: Rayhanah Martin	DATE: 6/2/21	PROJECT ENGINEER: THIEN-LONG TRAN	
PRINT DCE NAME: Rayhanah Martin	DATE: 6/2/21	PROJECT ENGINEER: 260-1709	
DESCRIPTION: Addendum A	BY: CH	APPROVED: 6/07/21	FILED: 1900-6269
		COORDINATE: CC327	
		COORDINATE: CC383	
		COORDINATE: 40381-1114-D	
CONTRACTOR		DATE STARTED	
INSPECTOR		DATE COMPLETED	

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM B



FOR

PURE WATER PROGRAM: NORTH CITY WATER RECLAMATION PLANT FLOW EQUALIZATION BASIN

BID NO.:	<u>K-21-1791-DBB-3-A</u>
SAP NO. (WBS/IO/CC):	<u>B-21059</u>
CLIENT DEPARTMENT:	<u>2000</u>
COUNCIL DISTRICT:	<u>1</u>
PROJECT TYPE:	<u>BO</u>

BID DUE DATE:

**2:00 PM
JULY 21, 2021**

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.**

B. ADDENDUM

1. To Addendum A, ATTACHMENTS, **DELETE** Wage Rates, pages 12 through 39, in their entirety and **SUBSTITUTE** with pages 3 through 37 of this Addendum.

James Nagelvoort, Director
Engineering & Capital Projects Department

Dated: *June 29, 2021*
San Diego, California

JN/RWB/lir

9. WAGE RATES This contract shall be subject to the following Davis-Bacon Wage Decisions:

"General Decision Number 8 CA20210001 06/25/2021

Superseded General Decision Number: CA20200001

State: California

Construction Types: Building, Heavy (Heavy and Dredging),
Highway and Residential

County: San Diego County in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS; RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	01/08/2021
2	03/05/2021
3	03/19/2021
4	04/09/2021
5	04/23/2021
6	06/04/2021
7	06/11/2021
8	06/25/2021

ASBE0005-002 07/06/2020

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 45.39	23.74
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 28.92	18.73

ASBE0005-004 07/01/2019

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not)....	\$ 20.63	12.17

BOIL0092-003 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 46.03	38.81

BRCA0004-008 11/01/2019

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 39.60	18.05

BRCA0018-004 06/01/2019

	Rates	Fringes
MARBLE FINISHER.....	\$ 33.43	14.11
TILE FINISHER.....	\$ 28.23	12.65
TILE LAYER.....	\$ 40.07	18.36

BRCA0018-010 09/01/2020

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 33.66	14.20
TERRAZZO WORKER/SETTER.....	\$ 41.60	14.73

CARP0409-002 07/01/2016

	Rates	Fringes
Diver		
(1) Wet.....	\$ 712.48	17.03
(2) Standby.....	\$ 356.24	17.03
(3) Tender.....	\$ 348.24	17.03
(4) Assistant Tender.....	\$ 324.24	17.03

Amounts in "'Rates' column are per day

CARP0409-008 08/01/2010

	Rates	Fringes
Modular Furniture Installer.....	\$ 17.00	7.41

CARP0547-001 07/01/2018

	Rates	Fringes
CARPENTER		
(1) Bridge.....	\$ 42.34	19.17
(2) Commercial Building....	\$ 37.11	19.17
(3) Heavy & Highway.....	\$ 42.21	19.17
(4) Residential Carpenter..	\$ 29.69	19.17
(5) Residential Insulation Installer.....	\$ 18.00	8.16
MILLWRIGHT.....	\$ 42.71	19.17
PILEDRIVERMAN.....	\$ 42.34	19.17

CARP0547-002 07/01/2017

	Rates	Fringes
Drywall		
(1) Work on wood framed construction of single family residences, apartments or condominiums under four stories		
Drywall Installer/Lather...\$	22.95	18.85
Drywall Stocker/Scrapper...\$	12.50	12.27
(2) All other work		
Drywall Installer/Lather...\$	32.00	17.63
Drywall Stocker/Scrapper...\$	12.50	12.27

ELEC0569-001 08/31/2020

	Rates	Fringes
Electricians (Tunnel Work)		
Cable Splicer.....\$	54.36	3%+14.88
Electrician.....\$	53.61	3%+14.88
Electricians: (All Other Work, Including 4 Stories Residential)		
Cable Splicer.....\$	48.40	3%+14.88
Electrician.....\$	47.65	3%+14.88

ELEC0569-004 06/01/2021

	Rates	Fringes
ELECTRICIAN (Sound & Communications Sound Technician).....\$	35.20	13.84
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use		

furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.

 ELEC0569-005 06/01/2021

	Rates	Fringes
Sound & Communications		
Sound Technician.....	\$ 35.20	13.84
SCOPE OF WORK Assembly, installation, operation, service and maintenance of components or systems as used in closed circuit television, amplified master television distribution, CATV on private property, intercommunication, burglar alarm, fire alarm, life support and all security alarms, private and public telephone and related telephone interconnect, public address, paging, audio, language, electronic, background music system less than line voltage or any system acceptable for class two wiring for private, commercial, or industrial use furnished by leased wire, frequency modulation or other recording devices, electrical apparatus by means of which electricity is applied to the amplification, transmission, transference, recording or reproduction of voice, music, sound, impulses and video. Excluded from this Scope of Work - transmission, service and maintenance of background music. All of the above shall include the installation and transmission over fiber optics.		

SOUND TECHNICIAN: Terminating, operating and performing final check-out

 ELEC0569-006 02/22/2021

Work on street lighting; traffic signals; and underground systems and/or established easements outside of buildings

	Rates	Fringes
Traffic signal, street light and underground work		
Utility Technician #1.....\$	35.17	9.01
Utility Technician #2.....\$	28.60	8.80

STREET LIGHT & TRAFFIC SIGNAL WORK:

UTILITY TECHNICIAN #1: Installation of street lights and traffic signals, including electrical circuitry, programmable controller, pedestal-mounted electrical meter enclosures and laying of pre-assembled cable in ducts. The layout of electrical systems and communication installation including proper position of trench depths, and radius at duct banks, location for manholes, street lights and traffic signals.

UTILITY TECHNICIAN #2: Distribution of material at jobsite, installation of underground ducts for electrical, telephone, cable TV land communication systems. The setting, leveling, grounding and racking of precast manholes, handholes and transformer pads.

ELEC0569-008 08/31/2020

	Rates	Fringes
ELECTRICIAN (Residential, 1-3 Stories).....\$	35.74	7.68

* ELEC1245-001 06/01/2021

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..\$	60.19	21.94
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....\$	48.08	20.73
(3) Groundman.....\$	36.76	20.33
(4) Powderman.....\$	51.87	18.79

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

 ELEV0018-001 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 59.32	35.825+a+b

FOOTNOTE:

- a. PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
- b. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0012-003 07/01/2020

	Rates	Fringes
OPERATOR: Power Equipment		
(All Other Work)		
GROUP 1.....	\$ 48.25	27.20
GROUP 2.....	\$ 49.03	27.20
GROUP 3.....	\$ 49.32	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 48.96	25.25
GROUP 6.....	\$ 51.03	27.20
GROUP 8.....	\$ 51.14	27.20
GROUP 9.....	\$ 49.29	25.25
GROUP 10.....	\$ 51.26	27.20
GROUP 11.....	\$ 49.41	25.25
GROUP 12.....	\$ 51.43	27.20
GROUP 13.....	\$ 51.53	27.20
GROUP 14.....	\$ 51.56	27.20
GROUP 15.....	\$ 51.64	27.20
GROUP 16.....	\$ 51.76	27.20
GROUP 17.....	\$ 51.93	27.20
GROUP 18.....	\$ 52.03	27.20
GROUP 19.....	\$ 52.14	27.20
GROUP 20.....	\$ 52.26	27.20
GROUP 21.....	\$ 52.43	27.20
GROUP 22.....	\$ 52.53	27.20
GROUP 23.....	\$ 52.64	27.20
GROUP 24.....	\$ 52.76	27.20
GROUP 25.....	\$ 52.93	27.20

	Rates	Fringes
OPERATOR: Power Equipment (Cranes, Piledriving & Hoisting)		
GROUP 1.....	\$ 49.60	27.20
GROUP 2.....	\$ 50.38	27.20
GROUP 3.....	\$ 50.67	27.20
GROUP 4.....	\$ 50.81	27.20
GROUP 5.....	\$ 51.03	27.20
GROUP 6.....	\$ 51.14	27.20
GROUP 7.....	\$ 51.26	27.20
GROUP 8.....	\$ 51.43	27.20
GROUP 9.....	\$ 51.60	27.20
GROUP 10.....	\$ 52.60	27.20
GROUP 11.....	\$ 53.60	27.20
GROUP 12.....	\$ 54.60	27.20
GROUP 13.....	\$ 55.60	27.20

OPERATOR: Power Equipment (Tunnel Work)		
GROUP 1.....	\$ 50.10	27.20
GROUP 2.....	\$ 50.88	27.20
GROUP 3.....	\$ 51.17	27.20

	Rates	Fringes
GROUP 4.....	\$ 51.31	27.20
GROUP 5.....	\$ 51.53	27.20
GROUP 6.....	\$ 51.64	27.20
GROUP 7.....	\$ 51.76	27.20

PREMIUM PAY:

\$3.75 per hour shall be paid on all Power Equipment Operator work on the following Military Bases: China Lake Naval Reserve, Vandenberg AFB, Point Arguello, Seely Naval Base, Fort Irwin, Nebo Annex Marine Base, Marine Corp Logistics Base Yermo, Edwards AFB, 29 Palms Marine Base and Camp Pendleton

Workers required to suit up and work in a hazardous material environment: \$2.00 per hour additional. Combination mixer and compressor operator on gunite work shall be classified as a concrete mobile mixer operator.

SEE ZONE DEFINITIONS AFTER CLASSIFICATIONS

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Bargeman; Brakeman; Compressor operator; Ditch Witch, with seat or similar type equipment; Elevator operator-inside; Engineer Oiler; Forklift operator (includes loed, lull or similar types under 5 tons; Generator operator; Generator, pump or compressor plant operator; Pump operator; Signalman; Switchman

GROUP 2: Asphalt-rubber plant operator (nurse tank operator); Concrete mixer operator-skip type; Conveyor operator; Fireman; Forklift operator (includes loed, lull or similar types over 5 tons; Hydrostatic pump operator; oiler crusher (asphalt or concrete plant); Petromat laydown machine; PJU side dum jack; Screening and conveyor machine operator (or similar types); Skiploader (wheel type up to 3/4 yd. without attachment); Tar pot fireman; Temporary heating plant operator; Trenching machine oiler

GROUP 3: Asphalt-rubber blend operator; Bobcat or similar type (Skid steer); Equipment greaser (rack); Ford Ferguson (with dragtype attachments); Helicopter radioman (ground); Stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman; Backhoe operator (mini-max or similar type); Boring machine operator; Boxman or mixerman (asphalt or concrete); Chip spreading machine operator; Concrete cleaning decontamination machine operator; Concrete Pump Operator (small portable); Drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum); Equipment greaser (grease truck); Guard rail post driver operator; Highline cableway signalman; Hydra-hammer-aero stomper; Micro Tunneling (above ground tunnel); Power concrete curing machine operator; Power concrete saw operator; Power-driven jumbo form setter operator; Power sweeper operator; Rock Wheel Saw/Trencher; Roller operator (compacting); Screed operator (asphalt or concrete); Trenching machine operator (up to 6 ft.); Vacuum or much truck

GROUP 5: Equipment Greaser (Grease Truck/Multi Shift).

GROUP 6: Articulating material hauler; Asphalt plant engineer; Batch plant operator; Bit sharpener; Concrete joint machine operator (canal and similar type); Concrete planer operator; Dandy digger; Deck engine operator; Derrickman (oilfield type); Drilling machine operator,

bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum); Drilling machine operator; Hydrographic seeder machine operator (straw, pulp or seed), Jackson track maintainer, or similar type; Kalamazoo Switch tamper, or similar type; Machine tool operator; Maginnis internal full slab vibrator, Mechanical berm, curb or gutter (concrete or asphalt); Mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar); Micro tunnel system (below ground); Pavement breaker operator (truck mounted); Road oil mixing machine operator; Roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck); Self-propelled tar pipelining machine operator; Skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.); Slip form pump operator (power driven hydraulic lifting device for concrete forms); Tractor operator-bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types); Tugger hoist operator (1 drum); Ultra high pressure waterjet cutting tool system operator; Vacuum blasting machine operator

GROUP 8: Asphalt or concrete spreading operator (tamping or finishing); Asphalt paving machine operator (Barber Greene or similar type); Asphalt-rubber distribution operator; Backhoe operator (up to and including 3/4 yd.), small ford, Case or similar; Cast-in-place pipe laying machine operator; Combination mixer and compressor operator (gunite work); Compactor operator (self-propelled); Concrete mixer operator (paving); Crushing plant operator; Drill Doctor; Drilling machine operator, Bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum); Elevating grader operator; Grade checker; Gradall operator; Grouting machine operator; Heavy-duty repairman; Heavy equipment robotics operator; Kalamazoo balliste regulator or similar type; Kolman belt loader and similar type; Le Tourneau blob compactor or similar type; Loader operator (Athey, Euclid, Sierra and similar types); Mobark Chipper or similar; Ozzie padder or similar types; P.C. slot saw; Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pumpcrete gun operator; Rock Drill or similar types; Rotary drill operator (excluding caisson type); Rubber-tired earth-moving equipment operator (single engine,

caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck); Rubber-tired scraper operator (self-loading paddle wheel type-John Deere, 1040 and similar single unit); Self-propelled curb and gutter machine operator; Shuttle buggy; Skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.); Soil remediation plant operator; Surface heaters and planer operator; Tractor compressor drill combination operator; Tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar-bulldozer, tamper, scraper and push tractor single engine); Tractor operator (boom attachments), Traveling pipe wrapping, cleaning and bending machine operator; Trenching machine operator (over 6 ft. depth capacity, manufacturer's rating); trenching Machine with Road Miner attachment (over 6 ft depth capacity): Ultra high pressure waterjet cutting tool system mechanic; Water pull (compaction) operator

GROUP 9: Heavy Duty Repairman

GROUP 10: Drilling machine operator, Bucket or auger types (Calweld 200 B bucket or similar types-Watson 3000 or 5000 auger or similar types-Texoma 900 auger or similar types-drilling depth of 105' maximum); Dual drum mixer, dynamic compactor LDC350 (or similar types); Monorail locomotive operator (diesel, gas or electric); Motor patrol-blade operator (single engine); Multiple engine tractor operator (Euclid and similar type-except Quad 9 cat.); Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Pneumatic pipe ramming tool and similar types; Prestressed wrapping machine operator; Rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck); Rubber tired earth moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), Tower crane repairman; Tractor loader operator (crawler and wheel type over 6-1/2 yds.); Woods mixer operator (and similar Pugmill equipment)

GROUP 11: Heavy Duty Repairman - Welder Combination, Welder - Certified.

GROUP 12: Auto grader operator; Automatic slip form operator; Drilling machine operator, bucket or auger types (Calweld, auger 200 CA or similar types - Watson, auger 6000 or

similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum); Hoe ram or similar with compressor; Mass excavator operator less than 750 cu. yards; Mechanical finishing machine operator; Mobile form traveler operator; Motor patrol operator (multi-engine); Pipe mobile machine operator; Rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck); Rubber-tired self-loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 13: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 14: Canal liner operator; Canal trimmer operator; Remote-control earth-moving equipment operator (operating a second piece of equipment: \$1.00 per hour additional); Wheel excavator operator (over 750 cu. yds.)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine-up to and including 25 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 17: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck); Tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 18: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 19: Rotex concrete belt operator (or similar types); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck); Rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 24: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck); Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 25: Concrete pump operator-truck mounted; Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Hydraulic boom truck; Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist and/or manlift operator; Polar gantry crane operator; Self Climbing scaffold (or similar type); Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds., M.R.C.)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Self erecting tower crane operator maximum lifting capacity ten tons

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc), Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson;

Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy Duty Repairman

GROUP 7: Tunnel mole boring machine operator

ENGINEERS ZONES

\$1.00 additional per hour for all of IMPERIAL County and the portions of KERN, RIVERSIDE & SAN BERNARDINO Counties as defined below:

That area within the following Boundary: Begin in San Bernardino County, approximately 3 miles NE of the intersection of I-15 and the California State line at that point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Continue W in a straight line to that point which is the SW corner of the northwest quarter of Section 6, T27S, R42E, Mt. Diablo Meridian. Continue North to the intersection with the Inyo County Boundary at that point which is the NE corner of the western half of the northern quarter of Section 6, T25S, R42E, MDM. Continue W along the Inyo and San Bernardino County boundary until the intersection with Kern County, as that point which is the SE corner of Section 34, T24S, R40E, MDM. Continue W along the Inyo and Kern County boundary until the intersection with Tulare County, at that point which is the SW corner of the SE quarter of Section 32, T24S, R37E, MDM. Continue W along the Kern and Tulare County boundary, until that point which is the NW corner of T25S, R32E, MDM. Continue S following R32E lines to the NW corner of T31S, R32E, MDM. Continue W to the NW corner of T31S, R31E, MDM. Continue S to the SW corner of T32S, R31E, MDM. Continue W to SW corner of SE quarter of Section 34, T32S, R30E, MDM. Continue S to SW corner of T11N, R17W, SBM. Continue E along south boundary of T11N, SBM to SW corner of T11N, R7W, SBM. Continue S to SW corner of T9N, R7W, SBM. Continue E along south boundary of T9N, SBM to SW corner of T9N, R1E, SBM. Continue S along west boundary of R1E, SMB to Riverside County line at the SW corner of T1S, R1E, SBM. Continue E along south boundary of T1S, SBM (Riverside County Line) to SW corner of T1S, R10E, SBM. Continue S along west boundary of R10E, SBM to

Imperial County line at the SW corner of T8S, R10E, SBM. Continue W along Imperial and Riverside county line to NW corner of T9S, R9E, SBM. Continue S along the boundary between Imperial and San Diego Counties, along the west edge of R9E, SBM to the south boundary of Imperial County/California state line. Follow the California state line west to Arizona state line, then north to Nevada state line, then continuing NW back to start at the point which is the NW corner of Section 1, T17N, R14E, SBM

\$1.00 additional per hour for portions of SAN LUIS OBISPO, KERN, SANTA BARBARA & VENTURA as defined below:

That area within the following Boundary: Begin approximately 5 miles north of the community of Cholame, on the Monterey County and San Luis Obispo County boundary at the NW corner of T25S, R16E, Mt. Diablo Meridian. Continue south along the west side of R16E to the SW corner of T30S, R16E, MDM. Continue E to SW corner of T30S, R17E, MDM. Continue S to SW corner of T31S, R17E, MDM. Continue E to SW corner of T31S, R18E, MDM. Continue S along West side of R18E, MDM as it crosses into San Bernardino Meridian numbering area and becomes R30W. Follow the west side of R30W, SBM to the SW corner of T9N, R30W, SBM. Continue E along the south edge of T9N, SBM to the Santa Barbara County and Ventura County boundary at that point which is the SW corner of Section 34. T9N, R24W, SBM, continue S along the Ventura County line to that point which is the SW corner of the SE quarter of Section 32, T7N, R24W, SBM. Continue E along the south edge of T7N, SBM to the SE corner to T7N, R21W, SBM. Continue N along East side of R21W, SBM to Ventura County and Kern County boundary at the NE corner of T8N, R21W. Continue W along the Ventura County and Kern County boundary to the SE corner of T9N, R21W. Continue North along the East edge of R21W, SBM to the NE corner of T12N, R21W, SBM. Continue West along the north edge of T12N, SBM to the SE corner of T32S, R21E, MDM. [T12N SBM is a thin strip between T11N SBM and T32S MDM]. Continue North along the East side of R21E, MDM to the Kings County and Kern County border at the NE corner of T25S, R21E, MDM, continue West along the Kings County and Kern County Boundary until the intersection of San Luis Obispo County. Continue west along the Kings County and San Luis Obispo County boundary until the intersection with Monterey County. Continue West along the Monterey County and San Luis Obispo County boundary to the beginning point at the NW corner of T25S, R16E, MDM.

\$2.00 additional per hour for INYO and MONO Counties and the Northern portion of SAN BERNARDINO County as defined below:

That area within the following Boundary: Begin at the intersection of the northern boundary of Mono County and the California state line at the point which is the center of Section 17, T10N, R22E, Mt. Diablo Meridian. Continue S then SE along the entire western boundary of Mono County, until it reaches Inyo County at the point which is the NE corner of the Western half of the NW quarter of Section 2, T8S, R29E, MDM. Continue SSE along the entire western boundary of Inyo County, until the intersection with Kern County at the point which is the SW corner of the SE 1/4 of Section 32, T24S, R37E, MDM. Continue E along the Inyo and Kern County boundary until the intersection with San Bernardino County at that point which is the SE corner of section 34, T24S, R40E, MDM. Continue E along the Inyo and San Bernardino County boundary until the point which is the NE corner of the Western half of the NW quarter of Section 6, T25S, R42E, MDM. Continue S to that point which is the SW corner of the NW quarter of Section 6, T27S, R42E, MDM. Continue E in a straight line to the California and Nevada state border at the point which is the NW corner of Section 1, T17N, R14E, San Bernardino Meridian. Then continue NW along the state line to the starting point, which is the center of Section 18, T10N, R22E, MDM.

REMAINING AREA NOT DEFINED ABOVE RECIEVES BASE RATE

 ENGI0012-004 08/01/2020

	Rates	Fringes
OPERATOR: Power Equipment		
(DREDGING)		
(1) Leverman.....	\$ 56.40	30.00
(2) Dredge dozer.....	\$ 50.43	30.00
(3) Deckmate.....	\$ 50.32	30.00
(4) Winch operator (stern winch on dredge).....	\$ 49.77	30.00
(5) Fireman-Oiler, Deckhand, Bargeman, Leveehand.....	\$ 49.23	30.00
(6) Barge Mate.....	\$ 49.84	30.00

IRON0433-006 07/01/2020

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 34.58	24.81
Ornamental, Reinforcing and Structural.....	\$ 41.00	33.45

PREMIUM PAY:

\$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland, Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

\$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

\$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

LABO0089-001 07/01/2020

	Rates	Fringes
LABORER (BUILDING and all other Residential Construction)		
Group 1.....	\$ 34.18	20.48
Group 2.....	\$ 34.86	20.48
Group 3.....	\$ 35.57	20.48
Group 4.....	\$ 36.37	20.48
Group 5.....	\$ 38.30	20.48
LABORER (RESIDENTIAL CONSTRUCTION - See definition below)		
(1) Laborer.....	\$ 30.82	18.80
(2) Cleanup, Landscape, Fencing (Chain Link & Wood).....	\$ 29.53	18.80

RESIDENTIAL DEFINITION: Wood or metal frame construction of single family residences, apartments and condominiums - excluding (a) projects that exceed three stories over a garage level, (b) any utility work such as telephone, gas, water, sewer and other utilities and (c) any fine grading work, utility work or paving work in the future street and public right-of-way; but including all rough grading work at the job site behind the existing right of way

LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete Screeding for Rought Strike-off; Concrete, water curing; Demolition laborer; Flagman; Gas, oil and/or water pipeline laborer; General Laborer; General clean-up laborer; Landscape laborer; Jetting laborer; Temporary water and air lines laborer; Material hoseman (walls, slabs, floors and decks); Plugging, filling of Shee-bolt holes; Dry packing of concrete; Railroad maintenance, Repair Trackman and road beds, Streetcar and railroad construction trac laborers; Slip form raisers; Slurry seal crews (mixer operator, applicator operator, squeegee man, Shuttle man, top man), filling of cracks by any method on any surface; Tarman and mortar man; Tool crib or tool house laborer; Window cleaner; Wire Mesh puling-all concrete pouring operations

GROUP 2: Asphalt Shoveler; Cement Dumper (on 1 yard or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute man, pouring concrete, the handling of the cute from ready mix trucks, such as walls, slabs, decks, floors, foundations, footings, curbs, gutters and sidewalks; Concrete curer-impervious membrane and form oiler; Cutting torch operator (demoliton); Guinea chaser; Headboard man-asphlt; Laborer, packing rod steel and pans; membrane vapor barrier installer; Power broom sweepers (small); Riiprap, stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller; Tank sealer and cleaner; Tree climber, faller, chain saw operator, Pittsburgh Chipper and similar type brush shredders; Underground laborers, including caisson bellower

GROUP 3: Buggymobile; Concrete cutting torch; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2 1/2 feet drill steel or longer; Dri Pak-it machine; High sealer (including drilling of same); Hydro seeder and similar type; Impact wrench, mult-plate; Kettlemen, potmen

and mean applying asphalt, lay-kold, creosote, line caustic and similar type materials (applying means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operators of pneumatic, gas, electric tools, vibratring machines, pavement breakers, air blasting, come-along, and similar mechanical tools not separately classified herein; Pipelayers back up man coating, grouting, making of joints, sealing, caulking, diapering and inclduing rubber gasket joints, pointing and any and all other services; Rotary Scarifier or multiple head concrete chipping scaarifier; Steel header board man and guideline setter; Tampers, Barko, Wacker and similar type; Trenching machine, handpropelled

GROUP 4: Asphalt raker, luterman, ironer, apshalt dumpman and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), Grinder or sander; Concrete saw man; cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Laser beam in connection with laborer's work; Oversize concrete vibrator operator 70 pounds and over; Pipelayer performing all services in the laying, installation and all forms of connection of pipe from the point of receiving pipe in the ditch until completion of oepration, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit, and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid, gas, air or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzleman), Porta shot-blast, water blasting

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all pwder and explosives of whatever type, regardless of method used for such loading and placing; Driller-all power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power.

LABO0089-002 11/01/2020

	Rates	Fringes
LABORER (MASON TENDER)	\$ 33.00	19.23

LABO0089-004 07/01/2020

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
Laborers:		
Group 1	\$ 35.30	20.48
Group 2	\$ 35.76	20.48
Group 3	\$ 36.17	20.48
Group 4	\$ 37.01	20.48
Group 5	\$ 40.28	20.48

LABORER CLASSIFICATIONS

GROUP 1: Laborer: General or Construction Laborer, Landscape Laborer. Asphalt Rubber Material Loader. Boring Machine Tender (outside), Carpenter Laborer (cleaning, handling, oiling & blowing of panel forms and lumber), Concrete Laborer, Concrete Screeding for rough strike-off, Concrete water curing. Concrete Curb & Gutter laborer, Certified Confined Space Laborer, Demolition laborer & Cleaning of Brick and lumber, Expansion Joint Caulking; Environmental Remediation, Monitoring Well, Toxic waste and Geotechnical Drill tender, Fine Grader, Fire Watcher, Limbers, Brush Loader, Pilers and Debris Handlers. flagman. Gas Oil and Water Pipeline Laborer. Material Hoseman (slabs, walls, floors, decks); Plugging, filling of shee bolt holes; Dry packing of concrete and patching; Post Holer Digger (manual); Railroad maintenance, repair trackman, road beds; Rigging & signaling; Scaler, Slip-Form Raisers, Filling cracks on any surface, tool Crib or Tool House Laborer, Traffic control (signs, barriers, barricades, delineator, cones etc.), Window Cleaner

GROUP 2: Asphalt abatement; Buggymobile; Cement dumper (on 1 yd. or larger mixers and handling bulk cement); Concrete curer, impervious membrane and form oiler; Chute man, pouring concrete; Concrete cutting torch; Concrete pile

cutter; driller/Jackhammer, with drill steel 2 1/2 feet or longer; Dry pak-it machine; Fence erector; Pipeline wrapper, gas, oil, water, pot tender & form man; Grout man; Installation of all asphalt overlay fabric and materials used for reinforcing asphalt; Irrigation laborer; Kettleman-Potman hot mop, includes applying asphalt, lay-klold, creosote, lime caustic and similar tyhpes of materials (dipping, brushing, handling) and waterproofing; Membrane vapor barrier installer; Pipelayer backup man (coating, grouting, making of joints, sealing caulkiing, diapering including rubber basket joints, pointing); Rotary scarifier, multiple head concrete chipper; Rock slinger; Roto scraper & tiller; Sandblaster pot tender; Septic tank digger/installer; Tamper/wacker operator; Tank scaler & cleaner; Tar man & mortar man; Tree climber/faller, chainb saw operator, Pittsburgh chipper & similar type brush shredders.

GROUP 3: Asphalt, installation of all frabrics; Buggy Mobile Man, Bushing hammer; Compactor (all types), Concrete Curer - Impervious membrane, Form Oiler, Concrete Cutting Torch, Concrete Pile Cutter, Driller/Jackhammer with drill steel 2 1/2 ft or longer, Dry Pak-it machine, Fence erector including manual post hole digging, Gas oil or water Pipeline Wrapper - 6 ft pipe and over, Guradrail erector, Hydro seeder, Impact Wrench man (multi plate), kettleman-Potman Hot Mop includes applying Asphalt, Lay-Kold, Creosote, lime caustic and similar types of materials (dipping, brushing or handling) and waterproofing. Laser Beam in connection with Laborer work. High Scaler, Operators of Pneumatic Gas or Electric Tools, Vibrating Machines, Pavement Breakers, Air Blasting, Come-Alongs and similar mechanical tools, Remote-Controlled Robotic Tools in connection with Laborers work. Pipelayer Backup Man (Coating, grouting, m makeing of joints, sealing, caulking, diapering including rubber gasket joints, pointing and other services). Power Post Hole Digger, Rotary Scarifier (multiple head concrete chipper scarifier), Rock Slinger, Shot Blast equipment (8 to 48 inches), Steel Headerboard Man and Guideline Setter, Tamper/Wacker operator and similar types, Trenching Machine hand propelled.

GROUP 4: Any worker exposed to raw sewage. Asphalt Raker, Luteman, Asphalt Dumpman, Asphalt Spreader Boxes, Concrete Core Cutter, Concrete Saw Man, Cribber, Shorer, Head Rock Slinger. Installation of subsurface instrumentation,

monitoring wells or points, remediation system installer; Laborer, asphalt-rubber distributor bootman; Oversize concrete vibrator operators, 70 pounds or over. Pipelayer, Prefabricated Manhole Installer, Sandblast Nozzleman (Water Blasting-Porta Shot Blast), Traffic Lane Closure.

GROUP 5: Blasters Powderman-All work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Horizontal directional driller, Boring system, Electronic tracking, Driller: all power drills excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and all other types of mechanical drills without regard to form of motive power. Environmental remediation, Monitoring well, Toxic waste and Geotechnical driller, Toxic waste removal. Welding in connection with Laborer's work.

LABO0300-005 03/01/2021

	Rates	Fringes
Asbestos Removal Laborer.....	\$ 37.49	21.88

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste, encapsulation, enclosure and disposal of asbestos- containing materials and toxic waste by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

LABO0345-001 07/01/2020

	Rates	Fringes
LABORER (GUNITES)		
GROUP 1.....	\$ 45.05	19.62
GROUP 2.....	\$ 44.10	19.62
GROUP 3.....	\$ 40.56	19.62

FOOTNOTE: GUNITES PREMIUM PAY: Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates. Workers doing gunite and/or

shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis. Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0" above base level and which work must be performed in whole or in part more than 75'-0" above base level, that work performed above the 75'-0" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Rodmen, Nozzlemen

GROUP 2: Gunmen

GROUP 3: Reboundmen

LABO1184-001 07/01/2020

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 37.85	15.99
(2) Vehicle Operator/Hauler..	\$ 38.02	15.99
(3) Horizontal Directional Drill Operator.....	\$ 39.87	15.99
(4) Electronic Tracking Locator.....	\$ 41.87	15.99
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 39.06	19.01
GROUP 2.....	\$ 40.36	19.01
GROUP 3.....	\$ 42.37	19.01
GROUP 4.....	\$ 44.11	19.01

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment; equipment repair technician

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweeper

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and equipment

LABO1414-003 08/05/2020

	Rates	Fringes
LABORER		
PLASTER CLEAN-UP LABORER....\$	36.03	21.01
PLASTER TENDER.....\$	38.58	21.01

Work on a swing stage scaffold: \$1.00 per hour additional.

Work at Military Bases - \$3.00 additional per hour:

Coronado Naval Amphibious Base, Fort Irwin, Marine Corps Air Station-29 Palms, Imperial Beach Naval Air Station, Marine Corps Logistics Supply Base, Marine Corps Pickle Meadows, Mountain Warfare Training Center, Naval Air Facility-Seeley, North Island Naval Air Station, Vandenberg AFB.

PAIN0036-001 07/01/2020

	Rates	Fringes
Painters: (Including Lead Abatement)		
(1) Repaint (excludes San Diego County).....	\$ 29.59	17.12
(2) All Other Work.....	\$ 33.12	17.24

REPAINT of any previously painted structure. Exceptions: work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities.

PAIN0036-010 10/01/2020

	Rates	Fringes
DRYWALL FINISHER/TAPER		
(1) Building & Heavy Construction.....	\$ 36.69	18.90
(2) Residential Construction (Wood frame apartments, single family homes and multi-duplexes up to and including four stories).....	\$ 27.11	17.51

PAIN0036-012 10/01/2020

	Rates	Fringes
GLAZIER.....	\$ 45.55	18.06

PAIN0036-019 01/01/2021

	Rates	Fringes
SOFT FLOOR LAYER.....	\$ 33.52	17.59

PLAS0200-005 08/07/2019

	Rates	Fringes
PLASTERER.....	\$ 43.73	16.03

NORTH ISLAND NAVAL AIR STATION, COLORADO NAVAL AMPHIBIOUS
 BASE, IMPERIAL BEACH NAVAL AIR STATION: \$3.00 additional
 per hour.

 PLAS0500-001 07/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
GROUP 1.....	\$ 26.34	21.12
GROUP 2.....	\$ 27.99	21.12
GROUP 3.....	\$ 30.07	21.12

CEMENT MASONS - work inside the building line, meeting the
 following criteria:

GROUP 1: Residential wood frame project of any size; work
 classified as Type III, IV or Type V construction;
 interior tenant improvement work regardless the size of the
 project; any wood frame project of four stories or less.

GROUP 2: Work classified as type I and II construction

GROUP 3: All other work

 PLUM0016-006 09/01/2020

	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Camp Pendleton; Vandenberg Air Force Base.....	\$ 55.88	23.66
Work ONLY on new additions and remodeling of commercial buildings, bars, restaurants, and stores not to exceed 5,000 sq. ft. of floor space.....	\$ 50.70	23.73

	Rates	Fringes
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 38.73	22.06
All other work except work on new additions and remodeling of bars, restaurant, stores and commercial buildings not to exceed 5,000 sq. ft. of floor space and work on strip malls, light commercial, tenant improvement and remodel work.....	\$ 52.28	24.71

PLUM0016-011 09/01/2020		
	Rates	Fringes
PLUMBER/PIPEFITTER Residential.....	\$ 41.62	20.63

PLUM0345-001 09/01/2020		
	Rates	Fringes
PLUMBER Landscape/Irrigation Fitter....	\$ 35.30	24.10
Sewer & Storm Drain Work....	\$ 39.39	21.48

ROOF0045-001 03/01/2021		
	Rates	Fringes
ROOFER.....	\$ 36.25	9.49

SFCA0669-001 04/01/2021		
	Rates	Fringes
SPRINKLER FITTER.....	\$ 43.01	24.62

SHEE0206-001 07/01/2020

	Rates	Fringes
SHEET METAL WORKER		
Camp Pendleton.....	\$ 42.62	29.55
Except Camp Pendleton.....	\$ 40.62	29.55
Sheet Metal Technician.....	\$ 30.51	9.49

SHEET METAL TECHNICIAN - SCOPE:

a. Existing residential buildings, both single and multi-family, where each unit is heated and/or cooled by a separate system b. New single family residential buildings including tracts. c. New multi-family residential buildings, not exceeding five stories of living space in height, provided each unit is heated or cooled by a separate system. Hotels and motels are excluded. d. LIGHT COMMERCIAL WORK: Any sheet metal, heating and air conditioning work performed on a project where the total construction cost, excluding land, is under \$1,000,000 e. TENANT IMPROVEMENT WORK: Any work necessary to finish interior spaces to conform to the occupants of commercial buildings, after completion of the building shell

 TEAM0166-001 09/01/2019

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 18.90	34.69
GROUP 2.....	\$ 26.49	34.69
GROUP 3.....	\$ 26.69	34.69
GROUP 4.....	\$ 26.89	34.69
GROUP 5.....	\$ 27.09	34.69
GROUP 6.....	\$ 27.59	34.69
GROUP 7.....	\$ 29.09	34.69

FOOTNOTE: HAZMAT PAY: Work on a hazmat job, where hazmat certification is required, shall be paid, in addition to the classification working in, as follows: Levels A, B and C - +\$1.00 per hour. Workers shall be paid hazmat pay in increments of four (4) and eight (8) hours.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Fuel Man, Swamper

GROUP 2: 2-axle Dump Truck, 2-axle Flat Bed, Concrete Pumping Truck, Industrial Lift Truck, Motorized Traffic Control, Pickup Truck on Jobsite

GROUP 3: 2-axle Water Truck, 3-axle Dump Truck, 3-axle Flat Bed, Erosion Control Nozzleman, Dump Crete Truck under 6.5 yd, Forklift 15,000 lbs. and over, Prell Truck, Pipeline Work Truck Driver, Road Oil Spreader, Cement Distributor or Slurry Driver, Bootman, Ross Carrier

GROUP 4: Off-road Dump Truck under 35 tons 4-axles but less than 7-axles, Low-Bed Truck & Trailer, Transit Mix Trucks under 8 yd, 3-axle Water Truck, Erosion Control Driver, Grout Mixer Truck, Dump Crete 6.5yd and over, Dumpster Trucks, DW 10, DW 20 and over, Fuel Truck and Dynamite, Truck Greaser, Truck Mounted Mobile Sweeper 2-axle Winch Truck

GROUP 5: Off-road Dump Truck 35 tons and over, 7-axles or more, Transit Mix Trucks 8 yd and over, A-Frame Truck, Swedish Cranes

GROUP 6: Off-Road Special Equipment (including but not limited to Water Pull Tankers, Athey Wagons, DJB, B70 Wuclids or like Equipment)

GROUP 7: Repairman

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons

resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average

rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour

Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM C



FOR

PURE WATER PROGRAM: NORTH CITY WATER RECLAMATION PLANT FLOW EQUALIZATION BASIN

BID NO.:	<u>K-21-1791-DBB-3-A</u>
SAP NO. (WBS/IO/CC):	<u>B-21059</u>
CLIENT DEPARTMENT:	<u>2000</u>
COUNCIL DISTRICT:	<u>1</u>
PROJECT TYPE:	<u>BO</u>

BID DUE DATE:

**2:00 PM
JULY 28, 2021**

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 Engineers:

Mark Elliott
1) Registered Engineer

7/12/2021
Date



DIGITALLY SIGNED: 7/12/2021


2) For City Engineer

7/13/2021
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. On drawing 12-D-504 section A, please provide the distance between the existing flanges so the size and quantity of FRP spacers can be determined.

A1. Distance between existing flanges is approximately 1'-7". Field verification is required for exact measurements.

Q2. DB 76 & DB 80, listed on drawing ES-114 in the conduit schedule, have notes that state that existing conduits may be used for these circuits if available. Please clarify for the basis of bid that this will be available and no new duct bank runs will need to be installed for DB 76 or DB 80

A2. Notes in duct bank schedule on sheet PK1-ES-501 for DB76 and DB80 state for contractor to investigate for existing spare conduit. These are not guaranteed available for basis of bid.

Q3. DB 83 on drawing ES-114 appears to be tying in to an existing stub-out. Drawing ES-501 lists DB 83 coming from 12JB01. Is there an existing junction box on the new basin side of the screen wall that DB 83 can connect to? If not, please confirm that conduits in DB 83 are to be routed over the screen wall before entering the electrical equipment room, as stated in note 4.

A3. DB83 transitions to exposed conduit where it ends at the stair-tower wall. The linework shown in the background is underground piping unrelated to DB83. There is no existing junction box. Note 4 applies to DB83 as well. See revised drawing as part of Addendum C to revise DB83 to connect to junction box per circuit schedule.

Q4. Please clarify where there exists a chain link fence once conduits exit electrical equipment area as stated in note 4 on page ES-114. Are the

conduits allowed to penetrate the wall through core drill in order to feed into the new equalization basin #3?

- A4. There are chain-link gates on either side of concrete stair-tower with open sides. The conduit routes are along the concrete wall above the gates but not on the chain-link. Screen wall has unknown locations for seismic joints, particularly near to the stair-tower. Maintain as designed routing.
- Q5. Where is existing electrical controller, shown on page CX-114, to be relocated once storm drain is installed? In order to extend existing run of the controller, please specify what size of conduit and wires are needed in order to extend controller.
- A5. Box shown on PK1-CX-114 is a handhole for power to irrigation controller on other side of gate. Handhole is in the way of the storm drain. Remove, provide new, and splice conductors from new handhole location to irrigation controller. Provide new conduit from new handhole to irrigation controller. See revised electrical drawing as part of Addendum C.
- Q6. Drawing 12-E-100 shows circuit 12/027 and calls it out as DB 84, which contains the feeders for the 100A Basin 3 receptacles from 12DP2. Circuits 12/014, 12/017, 12/020 & 12/023 on drawing 12-E-610 also contain feeders for the 100A Basin 3 receptacles from 12SWBD6509 and are not shown on the drawings. Please confirm whether the the 100A Basin 3 receptacles are fed from 12DP2 or 12SWBD6509, and if fed from 12SWBD6509, clarify routing of the circuits as these are not shown on drawings.
- A6. Updated circuit schedule will be provided in Addendum C to show circuits from 12SWBD6509. Routing is shown via note 4 on PK1-ES-114 and circuits are shown on PK1-12-E-110 on the lower right.
- Q7. Drawing 12-D-502 detail 1, please clarify where the cathodic protection in note1 is required.
- A7. Cathodic protection for the new buried piping at the Flow Eq Basin is required by Section 26 42 00.

- Q8. Drawing Y-114 shows to relocate the 10" landfill gas line. Who is the owner and third party operator of this line as referenced in spec 40 27 00.09 sheet 1? Is the Contractor responsible for isolation and purging of this line? If so, please provide locations of isolation valves and any shutdown constraints.
- A8. The owner and operator is the City of San Diego. Coordinate with the City on isolation and shutdown constraints.
- Q9. The Geotechnical Report states the following: "Backfill placed within 5 feet of structural walls was to consist of clean well-graded granular material with a maximum particle size of 4-inches and no more than 5 percent passing the No. 200 sieve." Please clarify if native backfill is acceptable or if this imported granular material will be required within 5 feet of the walls of the equalization basins and/or the existing screen wall.
- A9. Depending on the depth of excavation, soil materials generated from excavation in the young colluvial deposits may be highly plastic and expansive, and may not be considered suitable for use as structural fill. Soil materials generated from the very old paralic deposits and the conglomerate facies of the Scripps Formation are likely to contain abundant gravel and cobbles, and may require selective screening of oversize materials if they are utilized as structural fill. In lieu of screening, contractor may consider using select import granular fill materials for backfill within 5 feet of the walls of the equalization basins and/or the existing screen wall.
- Q10. Typical trench detail 3123-110 and 3123-915 in Part 3 of the Drawings Package refers to a minimum trench width. This conflicts with the Specification 31 23 16, sub-section 3.03 – A. "Minimum Width of Trenches". Please clarify the minimum trench widths to be followed for the trenches in this project.
- A10. Technical Specification 31 23 16, sub-section 3.03 controls minimum width of trench up to 18" diameter and the detail 3123-915 controls pipes greater than 18" diameter.
- Q11. Note 5 on Drawing Y-114 states to remove the conflicting portion of the existing Fiber Optic Duct Bank. Please provide the dimensions and elevation of this ductbank.

- A11. The dimensions and elevation of the ductbank are unknown.
- Q12. SECTION 40 27 00.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS calls for schedule 80 PVC pipe which shall be manufactured with titanium dioxide for ultraviolet protection. Please confirm UV protection is required since the PVC pipe will be located inside the tank.
- A12. Yes, UV protection is required.
- Q13. Note 3 on drawing Y-114 states that "Pothole locations S34A-1 and S34A-2 indicate that the 10" landfill gas line is underneath an unknown concrete encased utility." Please confirm this unknown concrete encased utility is crossing perpendicular to the landfill gas line at this pothole location and is not above the landfill gas line along the same alignment.
- A13. The alignment of the unknown concrete encased utility is unknown.
- Q14. Can Perry Fiberglass Products, Inc. be added as a named supplier?
- A14. Substitutions (materials and/or suppliers) will need to meet the requirements of the specifications and plans, and requests for substitutions will be evaluated in accordance to SSP 4-6.
- Q15. According to the plan documents any parking spaces that are lost due to construction need to be replaced at a 1:1 ratio. If space is available after that requirement is met are we able to use the lot designed for "alternative parking areas" located South West of the bioreactor/filter support facility for additional crew parking and trailer laydown area?
- A15. The area southwest of the bioreactor is unavailable for additional crew parking and trailer laydown area.
- Q16. Specification section 08 45 00 2.03.A.2 indicates a translucent wall panel thickness of 2.75". The plan detail of the translucent wall panel measures 4" thick. Which thickness is correct?
- A16. 4" thickness will be required. See changes in this Addendum C.
- Q17. The plans details shows the door with an aluminum tube frame of 4" x 9.5". Will a 4" x 8" aluminum tube frame for the door be deemed acceptable?

- A17. This is acceptable.
- Q18. Drawing E-110 indicates "12PNL03". There is no information for this panel available on the one-line drawings or within the specifications. Please advise.
- A18. 12PNL03 is a control panel shown on PID PK1-N01-N-111E, N01-I-118B. It is shown powered from 12LP1 on drawing PK1-12-E-613. Note, on drawing PK1-12-E-110 that 12PNL03 is shown with a connection symbol indicating it is not by division 26.
- Q19. Drawing E-101 Note 1 states "Connect similar devices on Basins 1 and 2". Is it to be assumed the conduit layout as-shown on drawing E-101 shall be duplicated for both Basins 1 and 2, as there are no electrical layouts provided?
- A19. Location of level instruments shall be similar to locations shown on E-101. See Note 4 on ES-113 for direction on how to route raceways. Basins 1 and 2 are existing structures and will need to have raceways coordinated with existing raceway locations.
- Q20. What type of epoxy lining is allowable for the 16" BLSD-PLDI process line?
- A20. Only polyurethane lining is acceptable for the 16" BLSD pipe. See technical specification sections 40 27 00.01 and 09 90 00.
- Q21. Per Section A / PK1-12-D-503, there is a pipe support sitting on a WF Beam calling out Detail 4005-520. However, Detail 4005-520 / PK1-SD-009 only shows a pipe stanchion. Could you provide Detail / Size of the Seat beam?
- A21. The beam size depends on the size of the pipe support base. The dimensions shown in detail 4005-520 will dictate the size of the beam in order to mount the pipe support base.
- Q22. The planet bids website for this project states a duration of 1,420 working days and Attachment E Supplementary Special Provisions 6-9.3 Final Acceptance and Completion is 530 working days. Please confirm which is correct.

A22. The milestones required completion dates shall be as specified in the Solicitation Document, Supplementary Special Provisions Section 6-9.

The Project Duration has been updated on the PlanetBids Bid Information tab.

Q23. Referencing General Standard Details shown on PK1-SD-008 (Sheet 117 of 132), Concrete Marker Type 'A' 3305-957. Which underground pipe system on this project requires this marker and associated details?

A23. Concrete marker post 3305-957 is not required on this project.

Q24. Referencing Yard Pipe Detail 3 on PK1-Y-501 and PK1-Y-114, the yard pipe drawing shows one location where the expansion joint is required. Note 3 of the detail says, "this expansion joint encasement detail applies to all pipe sizes". The yard pipe and process drawings only indicate that the 42" PEF system has this expansion detail. If other pipe systems require it, please provide the location and system required to have the detail.

A24. The expansion joint is only applicable where called out in the plans.

Q25. Referencing drawing PK1-12-D-503 Detail 1 and Section A. Section A shows a clear transition of how the 8" UWHP risers reach the upper washdown headers. Please provide a similar section view of how the 10" UWHP transitions from under the slab to the lower washdown header.

A25. Section B on PK1-12-D-301 shows the 10" UWHP transition from below grade to the washdown header.

Q26. Referencing drawing PK1-Y-114, 10" LG system. The documents indicate we are to relocate the existing 10" LG system away from the new tank site. Please describe the actions the Owner will take to shutdown and clear the line, so the system is made safe for the necessary relocation work.

A26. See Technical Specification 40 27 00.09 for contractor requirements.

Q27. Referencing Section 01 91 14-1.05.A and Attachment E Supplementary Special Provisions 6-9.3. Special Provision 6-9 says the Substantial Completion is to be 477 working days and Final Acceptance and Completion is 530 working days. The duration in between the

Substantial and Final Acceptance is 53 working days. Section 01 91 14-1.05.A states this project will be integrated with NCPWF, Morena Pump Station and Metropolitan Biosolids Center and systems being constructed by others, such as the communications and control interface and CMNET upgrade.

- a. Should the other facilities mentioned in Section 01 91 14-1.05.A be delayed in construction and the Owner will not be able to complete the integration procedures, will this impact the Owner providing Final Completion to the Contractor for this project?
 - b. How will the Owner compensate the Contractor for extended overhead should Final Completion be delayed due to the delay of the other integrated projects?
- A27.
- a. No delay is anticipated to the Flow Equalization Basin Substantial Completion or Final Acceptance and Completion due to any potential delays from other Contractors.
 - b. Any modification to the scheduled completion of the Flow Equalization Basin Substantial Completion or Final Acceptance and Completion due to other Contractors will be considered a change or mitigated through alternate testing, commissioning, and integration. This would not apply to any delay or extension due to the Contractor's own delay on the Flow Equalization Basin project for which they are responsible.
- Q28. Referencing Section 01 45 16.13-3.03.A, please confirm that the CQC Systems Manager will be able to perform other activities other than those listed in section 01 45 16.13.
- A28. There is no issue if the individual has dual or multiple roles on the project, so long as the responsibilities and requirements of all intended roles are met.
- Q29. Referencing Section 01 32 00-1.03.A, please confirm that the required full-time Senior Project Scheduler will be able to perform other activities other than those listed in section 01 45 16.13 from NTP through Final Completion.

- A29. There is no issue if the individual has dual or multiple roles on the project, so long as the responsibilities and requirements of all intended roles are met.
- Q30. Referencing Attachment E Supplementary Special Provision 5-7.2.1.2.1 please confirm that the required full-time Safety and Health Representative will be able to perform other activities other than those listed in Special Provision 5-7.2.1.2.1 from NTP through Final Completion.
- A30. The Contractor's Safety and Health Representative shall be assigned only to this project and whose sole duty is monitoring and supervising the Contractor's and Subcontractors' Safety, Health, and Environmental Program, and who shall be on-site when any work is in progress as specified.
- Q31. Does the City consider all work done inside the Basin a confined space condition?
- A31. Yes.
- Q32. Referencing drawing PK1-G-030, please provide the Geotechnical report noted in Foundations Note 1.
- A32. The geotechnical report has been provided in Attachment E Supplementary Special Provisions, Section 3-9 Technical Studies and Subsurface Data.
- Q33. We have been requested to bid the stainless steel & carbon Steel for the North City WRP Flow Equalization Project. We do not currently have an ISO 9001:2000 certification, Lloyd's registry certification, or SPFA certification. We do, however, meet the experience requirements for the project. We wanted to ask if we could get an exception so we may bid on the project.
- A33. Exceptions cannot be made.
- Q34. Referencing Section 40 27 02-2.04.A and Drawing PK1-12-D-102, confirm the following related to the 42" Double Disc Gate Valve (12FV542).
- a. Confirm that the listed manufactures can provide valve 12FV542 with flanged ends as shown on 12-D-102.

- b. Confirm that the listed product's lay lengths will fit in the existing Valve Vault pipe configuration and there will be no need for any additional modifications to make the valve fit. For example, adding an additional filler flange.
 - c. Confirm that the Valve Vault has adequate space available above the valve as shown in Section A on 12-D-102.
 - d. Confirm no additional pipe supports will be required.
 - e. What is the shutdown protocol for installing the valve? Will bypass pumping be required?
- A34.
- a. M&H and Clow do not offer a 42" double disc gate valve with FLxFL ends. Crispin Valve does offer a 42" double disc gate valve with FLxFL ends.
 - b. The need for additional modifications, such as filler flanges, will be dependent on the valve model and field measurements.
 - c. Confirmed.
 - d. Confirmed.
 - e. Shutdown protocol and procedures shall be coordinated with the construction manager. A shutdown of up to 4 hours is allowed per Specification Section 01 31 13.
- Q35. Referencing Section 01 50 00-B.1 and Drawing PK1-CG-114. Section 01 50 00 states the contractor is to "Erect a temporary security fence at locations shown on the Drawings". Drawing CG-114, notes "Fence, NIC, See NCWRP Expansion". Will the fence shown on CG-114 exist prior to this contract's mobilization? Is the contract construction site secure, if not where will temporary fencing be required to secure the site?
- A35. The fence shown on CG-114 is in the final location and will be built with package 2. The package 1 contractor shall provide temporary fencing within the property at a location that allows them to construct the package. The contractor shall provide a submittal showing proposed temporary fence location prior to constructing the fence.

- Q36. Will site access be allowed via Miramar Road?
- A36. No. Please see Addendum A.
- Q37. Drawing PK1-Y-501, shows the detail for a typical perimeter drain, is this required around the perimeter of the tank?
- A37. Yes, water needs to drain away. Perimeter drains are typical.
- Q38. Referencing Section 01 50 00-3.03.B.1, confirm no acoustical barriers are required. If they are, provide the location and extent required.
- A38. Contractor shall ensure noise levels during construction do not exceed City of San Diego requirements as well as project permit requirements as provided by the City.
- Q39. Referencing Drawing PK1-C-001, confirm the "Staging Area for PK1 Contractor" is free and clear of all trees, bushes and utilities for placement of materials, temporary facilities, etc..
- A39. The Staging Area in question is not devoid of vegetation. It shall be assumed that it must be cleared prior to use.
- Q40. Referencing Section 33 05 01.01-1.05.H, "Onsite Observation of MPS Field Service Representative". Please confirm that the MPS is required to be onsite for a minimum of 15 days for installation of ~85lineal feet of the 42" PEF system.
- A40. Confirmed.
- Q41. Referencing Section 33 05 01.01.G, confirm that retained services for testing the coating and lining systems will be paid for by the Owner per Section 01 45 33.
- A41. Section 01 45 33 is for Special Inspection as defined in Chapter 17 of the California Building Code.
- Q42. Confirm that per Section 01 45 33, all inspections will be paid for by the Owner, no matter what other specifications may or may not state.
- A42. Contractor is responsible for inspections as indicated in the contract documents unless specifically stated otherwise.

- Q43. Detail 2 on Sheet PK1-12-S-504 calls for a 30 mil EPDM Liner below the two feet of crushed rock. The note indicates to be by "Watersaver Company or Equal". This product/company has not been able to be found. Please confirm that this liner should meet the specification requirements of the 2018 Whitebook, Section 1002-3.
- A43. Liner is not required, see changes to detail in Addendum C.
- Q44. Technical Specification Section 03 35 00 Concrete Finishing describes requirements for the use of Clear Liquid Sealer Dust Proofer and Dry Shake Hardeners. Please indicate where these concrete finishes are to be utilized.
- A44. This specification is not applicable. See Technical Specification Section 03 30 00.
- Q45. Technical Specification Section 03 39 00 Concrete Curing makes several references to an Interior Finish Schedule as shown on Drawings. Please provide a copy of the referenced Interior Finish Schedule.
- A45. See Specification Section 03 30 00 for the prestressed tank finish. There are no coatings for the prestressed tank that would require an Interior Finish Schedule to be shown on the drawings. There is a liner and that is called out on PK1-12-S-301, the requirements of which are included in the bid documents.
- Q46. Drawing CX-114 calls for the removal and replacement of an existing fence gate. Please provide the gate details and specifications.
- A46. The existing fence gate should only be removed as necessary for the construction of package 1, and should be put back in place when done. Temporary security fencing may be necessary it cannot be maintained at the current gate location.
- Q47. Are the contractors suppose access the site for construction thru the existing plant or are we to access the project direct from Miramar Rd?
- A47. The City has prohibited the use of Miramar Road. See Addendum A.
- Q48. Sheet 81 indicates there are 3ea – 5'x7' hatches and 1 ea – 5'x5' hatch in the reservoir roof. We were unable to locate an applicable specification section, please provide the specification for reservoir roof hatches.

- A48. See addition to Specification 05 50 00 in this Addendum C for hatch requirements.
- Q49. Sheet 89, detail A depicting the foul air vent cover references Specification Section 07 70 01. This section seems to govern penthouse gravity vents, please confirm whether there is an approved manufacturer or specification for the foul air vent cover.
- A49. Approved manufacturer and model shall be Varec Model 220 24 11. See changes in this Addendum C.
- Q50. Sheet 89, detail 1 depicting the aluminum gravity vent references Specification Section 23 21 16.16 for FRP ducting. Please confirm the gravity vent material and whether Section 23 21 16.16 is applicable to the reservoir roof vent.
- A50. Either aluminum or FRP is acceptable as indicated on sheet 89. For FRP, an acceptable manufacturer would be Fiber-Aire Model MA (as specified) or Poly Composite Products (PCP) Fiberglass Louvered Penthouse. See specification Sections 23 34 00 and 23 31 16.16.
- Q51. Sheet 46, detail 2 and Sheet 59, detail A show a perimeter drain detail. Please confirm whether the perimeter drain is required at the reservoir foundation and confirm location of tie in.
- A51. Confirmed that perimeter drain is required. See changes in this Addendum C.
- Q52. Sheet 64, note 12 states that the design of pipe anchors and bracing shall be per contractor. Please confirm this note only applies to the pipe support detail depicted on Sheet 90, detail 1, and that the pipe support details provided in the drawings are applicable.
- A52. Note 12 on sheet 64 applies to any pipe anchors/bracing that attach to the Flow Equalization Basin.
- Q53. Reference Specification 03 30 00, paragraph 2.03.C.2. Per the concrete suppliers, 15-20% fly ash will be needed to mitigate Alkali-Silica reaction (ASR) in the mixes. Fly ash improves the workability of plastic concrete, and the strength and durability of hardened concrete. Please confirm fly ash can be permitted as a constituent in reservoir mix designs.

- A53. See modification to this Addendum.
- Q54. Reference Specification 03 31 40, paragraph 1.04.A. Paragraph 1 states ...” All tanks listed for the Subcontractor’s experience requirements must have been built in the Subcontractor’s own name. Experience of personnel associated with the Subcontractor or hired by the Subcontractor are not acceptable. Subcontractor shall submit the name and location of the City and the completion dates of three tanks meeting the requirements listed above and on which the proposed qualifying “stressing machine” and automated shotcrete equipment has been used.” In order ensure a bidder is responsive to the intent of the specifications, please confirm that the above-mentioned experience submittal is required to be submitted with the bid.
- A54. Confirmed.
- Q55. Drawing Y-501, detail 2 shows a perforated perimeter drain which is not shown on the plan view yard piping drawing. Please confirm this perforated drain with geotextile fabric and granular drain material is required around the perimeter of the tank.
- A55. The perimeter drain is required. See changes in this Addendum C.
- Q56. Drawing Y-114 shows to relocate the 16" BSLD line. Spec 01 31 13, 1.06.H states that this line may be shut down for eight hours.
- Does this line require a bypass? If so, please provide details on bypass suction and discharge locations.
 - Is the Contractor required to isolate and drain this line prior to relocation tie-ins? If so, please provide locations of isolation valves and clarify if the existing sludge can be flushed down the line.
- A56. If all relocation and tie-in work take longer than 8 hours, a bypass will be required. Bypass would be temporary and designed by the contractor. The contractor is required to isolate and drain the line prior to relocation.

- Q57. Spec. Section 40 90 00 1.01 C refers to an existing DCS being upgraded by the City's DCS provider, (Emerson Process Management).
- a. Does the City have a direct Contract with Emerson, (EPM)?
 - b. Do we include said Contract price in our quote?
 - c. Can the City provide a copy/scope from Emerson?
- A57.
- a. Yes.
 - b. No.
 - c. The EQ Basins are a part of the DCS Upgrade Project that EPM is performing for the City under a separate contract. This involves the work related to the DCS only. The EQ Basin contractor is responsible for providing all requirements related to the I&C systems as specified in the Plans and Specifications, including, but not limited to, 40 90 00- 1.01.C.
- Q58. Drawing 12-S-504, detail 2 calls out a 30 mil PVC liner below the 2 feet of crushed rock under the tank. There is no spec section for this liner and the perforated pvc drain line below the tank runs below this elevation. Please clarify if this 30 mil PVC liner is required below the crushed rock and clarify the intent of the liner.
- A58. There is no liner, detail is revised as part of this Addendum C.
- Q59. Spec 40 27 00.01 states that gaskets in contact with potable water shall be NSF 61 certified. Will the gaskets used in the UWHP system be required to be NSF 61 certified?
- A59. UWHP gaskets are required to be NSF 61 certified.
- Q60. Bidding Documents, Attachment E – Supplementary Special Provisions 7-3.1 it unclear if this project is financed by revenue bonds. Please confirm this project is subject to the California Acts of God statute which relieves the contractor from the cost associated with damage caused by an earthquake exceeding 3.5 on the Richter Scale in excess of 5% of the contractor's bid.
- A60. All Pure Water projects are exempt from mandatory requirements of California Public Contract Code 7105 (a).

Q61. Bidding Documents, Performance Bond, Labor and Materialmen's Bond Form. It would appear that a new sentence has been added to the existing bond form that automatically eliminates the ability of the Surety to consider using the Principal as its completion contractor. While we understand that the preceding sentence provides the City with the ability to reject any contractor proposed by the Surety, specifically eliminating the ability of the Surety to utilize the Principal may be prejudicial to the Surety and to the completion of the project itself. When a Surety makes the decision to utilize its Principal to complete the project, it does so after an independent investigation of, among other things, the most cost effective and expeditious means of completing the work. Effectively, the Surety becomes the intermediary between the Principal and the City and the City's future communication regarding project completion is directly with the Surety, as opposed to having to maintain a direct relationship with the Principal. As a result, it may be in the best interests of the City and the Surety to discuss the use of a particular completion contractor during the course of the Surety's investigation, as opposed to foreclosing the option at the outset. Accordingly, please consider the below revision:

~~"The Surety shall not utilize the Principal in completing the improvements and work specified in the Agreement in the event the City terminates the Principal for default.."~~

A61. Bid as specified.

Q62. Addendum A – PK1-ES-113 Note 4 indicates "Conduit routing shall follow existing raceway routing that extends up the sides of Basin No 1 and 2." These conduits are assumed disconnect/reconnect, as there is no routing or circuit information. Please advise if new conduit feeds need to be installed for instruments 12LET501 and 12LET521

A62. Provide new conduit, following the same pathway as the existing. Routing/Circuit information is noted on detail 3 on drawing 12-E-501, note 1 on 12-E-101, and sheet 12-E-612.

Q63. PK1-ES-114 Note 2 indicates "Remove and reinstall power pedestal to accommodate new piping installation. Provide new buried conduit to extent necessary to reconnect pedestal at new location." Please provide power requirements and existing/new location of pedestal.

A63. See revisions in this Addendum C. See City Record drawings for existing power requirements.

C. ATTACHMENTS

1. To Attachment E, Supplementary Special Provisions, Section 3, Control of the Work, Section 3-9 Technical Studies and Subsurface Data, Item 5, Page 130, **ADD** the following:

c. The Stormwater Pollution Prevention Plan (SWPPP) for the North City Water Reclamation Plant Expansion Package 1 – Flow Equalization Basin, dated June 2017, prepared by O’Day Consultants Inc. The Contractor shall implement and update this SWPPP as required by the Contract Documents. The SWPPP is available at the following link:

https://drive.google.com/drive/folders/1Uc03KDqL_IVP315fLBrfVpzSvIF8LEb-?usp=sharing

2. To Technicals (Volume 1), Section 01 31 13, Project Coordination, Part 1 General, Item 1.06 Facility Operations, Sub-Item H, numeral 1, letter c, Page 196, **ADD** the following:

1. Coordinate with Owner and Construction Manager for locations of isolation valves. Include activity duration as part of Contractor’s schedule.

3. To Technicals (Volume 1), Section 01 31 13, Project Coordination, Part 1 General, Item 1.06 Facility Operations, Sub-Item H, Page 197, **ADD** the following:

4. Provide temporary fiber optic communications for MBC and PPS systems. Disruption of existing fiber communications associated with the MBC and PPS systems shall be limited to 24 hours.

4. To Technicals (Volume 1), Section 01 50 00, Temporary Facilities and Controls, Part 1 General, Item 1.02 Submittals, Sub-Item A, Informational Submittals, numeral 4, Temporary Utility Submittals, Page 287, **ADD** the following:

d. Fiber routing plan and protection plan.

5. To Technicals (Volume 1), Section 01 50 00, Temporary Facilities and Controls, Part 3 Execution, Item 3.01 Temporary Utilities, page 290, **ADD** the following:
 - H. Fiber Optic Communications: Provide fiber optic installation between manholes shown on the Drawings. Keep fiber optic protected for construction duration. Maintain fiber optic communications for PPS and MBC systems per Section 01 31 13, Project Coordination.

6. To Technicals (Volume 2), Section 03 30 00, Cast-In-Place Concrete, Part 2 Products, Item 2.03 Concrete Mix Design, Sub-Item C, Proportions, numeral 2, Page 470, **DELETE** in its entirety and **SUBSTITUTE** the following:
 2. Where fly ash is included in mix, minimum fly ash content shall be a minimum 15 percent of weight of total cementitious materials and maximum of 20 percent of weight of total cementitious materials.]

7. To Technicals (Volume 2), Section 03 31 40, Prestressed Concrete Tank, Part 1 General, Item 1.01 Work Included, Sub-Item D, Page 498, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - D. Concrete work for the construction of the tank. Concrete work shall conform to the provisions of Section 03 30 00, Cast-In-Place Concrete, as supplemented and modified by this section.

8. To Technicals (Volume 2), Section 05 50 00, Metal Fabrications, Part 2 Products, Page 575, **ADD** the following:

2.12 FLOOR HATCHES

- A. Load Capacity: 300 PSF with maximum deflection of 1/150th of span.

- B. Component Fabrication:
 1. Access Door Leaf(s): ¼-inch thick aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.

2. Angle Frame: ¼-inch thick extruded aluminum angle frame with concrete anchors and integral neoprene gasket strip.
- C. Door Hardware:
1. Hinges: Hinges: Heavy-duty brass or stainless steel with stainless steel pins, through-bolted to cover plate with tamper-proof stainless-steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts
 2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless-steel torsion lift springs
 3. Hold-Open Arm:
 - a. Locks automatically in open position.
 - b. Disengages with slight pull on vinyl grip with one hand.
 - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
 4. Snap Lock:
 - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
 - b. Threaded plug for flush outside surface with key wrench removed
- D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.
- E. Manufacturers and Products:
1. Bilco Co., New Haven, CT; K Series.
 2. Nystrom Products Co., Minneapolis, MN; FH Series.

3. U.S.F. Fabrication, Hialeah, FL; A Series.
 4. ITT Flygt Corporation, Trumbull, CT; FLE Series.
 5. Thompson Fabricating Co., Birmingham, AL; TI Series.
 6. Halliday Products, Orlando, FL; SS Series.
 7. Or approved equal.
9. To Technicals (Volume 2), Section 07 70 01, Roof Specialties and Accessories, Part 2 Products, Item 2.04, Ancillary Materials, Page 615, **ADD** the following:
- G. Foul Air Vent Cover: Varec Model 220 24 11, or approved equal.
10. To Technicals (Volume 2), Section 08 45 00, Translucent Wall and Roof Assemblies, Part 2 Products, Item 2.03 Fabrication, Sub-Item A, Translucent Wall Panels (TWP) numeral 2, Page 641, **DELETE** in its entirety and **SUBSTITUTE** with the following:
2. Uniform Thickness: 4 inches.
11. To Technicals (Volume 2), **ADD** Section 40 95 34, Fiber Optics and Installation pages 23 to 45 in this Addendum.

D. PLANS

1. The following Drawing sheets have been modified as shown below. See pages 46 through 63 of this Addendum.
 - a. **DELETE** in their entirety and **REPLACE** with the following:
 - 40381-1007-D, No. PK1-G-005B
 - 40381-1032-D, No. PK1-C-001
 - 40381-1034-D, No. PK1-CG-100
 - 40381-1035-D, No. PK1-CX-114
 - 40381-1037-D, No. PK1-CG-114
 - 40381-1040-D, No. PK1-SW-101
 - 40381-1041-D, No. PK1-Y-100
 - 40381-1043-D, No. PK1-Y-114
 - 40381-1049-D, No. PK1-ES-100
 - 40381-1051-D, No. PK1-ES-113

40381-1052-D, No. PK1-ES-114
40381-1057-D, No. PK1-12-A-201
40381-1059-D, No. PK1-12-A-301
40381-1060-D, No. PK1-12-A-501
40381-1069-D, No. PK1-12-S-504
40381-1094-D, No. PK1-12-E-110
40381-1100-D, No. PK1-12-E-610
40381-1102-D, No. PK1-12-E-612

- b. **ADD** the following new drawing sheet. See page 64 of this Addendum.

40381-1106A-D, No. PK1-N01-N-201

James Nagelvoort, Director
Engineering & Capital Projects Department

Dated: *July 15, 2021*
San Diego, California

JN/RWB/lir

SECTION 40 95 34
FIBER OPTICS AND INSTALLATION

PART 1 GENERAL

1.01 WORK IN THIS SECTION

- A. The Work of the following divisions and sections applies to the Work of this section. Other sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this Work.
1. Division 00, General Conditions.
 2. Division 01, General Requirements.
 3. Division 26, Electrical.
 4. Division 40, Process Interconnections.
- B. Fiber optic cable shall consist of optical fibers, strength members, and jacketing. Associated components shall include optical fiber connectors and splice closures as indicated. Fiber optic cables shall be installed exclusively in inner duct. The Fiber Optic Contractor (FC) shall install the fiber optic cabling in new, or existing, raceways, concrete-encased duct-banks, conduits, manhole systems in strict accordance with drawings, notes and other specification sections where applicable. Where new raceway is required within structures to support fiber optic cables, those conduits shall be either EMT, GRC or PVC coated GRC, as appropriate for the process area and as specified in Division 26, Electrical. Fiber optic Termination Panels and Patch panels are located in existing buildings in strict accordance with Drawings, notes and other specification sections where applicable.
- C. References in this section to ‘cable’ shall refer to fiber optic cable.
- D. FC shall provide LC connectors unless otherwise specified.

1.02 SCOPE

- A. The intent of this Specification is that the Fiber Optic Contractor (FC) will provide a complete and operational, turn-key Fiber Optic based communication between both the Penasquitos PS and the NCWRP network and the Metropolitan Biosolids Center (MBC) and the NCWRP network, as shown on the Drawings.
- B. The FC shall furnish all materials, tools, equipment, consumables, and supplies and shall perform all labor required to complete the Work in this Specification.

- C. The FC shall integrate the fiber optic backbone network, with each existing facility DCS LAN and WAN, Wide Area Network, Firewalls, Switches and Routers, as shown on Drawings and as directed by City COMNET network support staff.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ASTM International (ASTM):

- 1. C338 (1993; R 2003), Standard Test Method Softening Point of Glass.
- 2. D4976 (2004a), Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

B. Building Industry Consulting Service International (BICSI):

- 1. Telecommunications Distribution Methods Manual.
- 2. Cabling Installation Manual.

C. Electronic Industries Alliance (EIA):

- 1. 455-168A (1992) FOTP-168, Chromatic Dispersion Measurement of Multimode Graded-Index and Single-Mode Optical Fibers by Spectral Group Delay Measurement in the Time Domain.
- 2. 455-169A (2001) FOTP-169, Chromatic Dispersion Measurement of Optical Fibers by the Phase-Shift Method.
- 3. 455-25C (1996) FOTP-25, Repeated Impact Testing of Single-Mode Fiber Optic Cables and Cable Assemblies.
- 4. 455-30B (1991), Frequency Domain Measurement of Multitude Optical Fiber Information Transmission Capacity.
- 5. 455-33A (1988) FOTP-33, Fiber Optic Cable Tensile Loading and Bending Test.
- 6. 455-41 (1993) FOTP-41, Compressive Loading Resistance of Fiber Optic Cables.
- 7. 455-46A (1990) FOTP-46, Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers.
- 8. 455-47B (1992) FOTP-47, Output For Field Radiation Pattern Measurement.
- 9. 455-51A (2001) FOTP-51, Pulse Distortion Measurement of Multimode Glass Optical Fiber Information Transmission Capacity.
- 10. 455-53A (2001) FOTP-53, Attenuation by Substitution Measurement for Multimode Graded-Index Optical Fibers or Fiber Assemblies Used in Long Length Communications Systems.
- 11. 455-80B (1996) FOTP-80, Cutoff Wavelength of Un-cabled Single-Mode Fiber by Transmitted Power.
- 12. 455-81B (2000) FOTP-81, Compound Flow (Drip) Test for Filled Fiber Optic Cable.

13. 455-82B (1991) FOTP-82, Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable.
- D. Independent Electrical Contractors (IEC): 60793-2-50, Type B1.3.
- E. International Organization for Standardization (ISO): ISO/IEC 11801 (2002), Information Technology – General Cabling for Customer Premises.
- F. International Telecommunication Union (ITU): T G.652, Characteristics of single-mode optical fiber and cable.
- G. National Fire Protection Association (NFPA): 70, National Electric Code.
- H. Telecommunications Industries Association (TIA):
1. EIA/TIA 455-165A (1993), Standard for Mode-Field Diameter Measurement by Near-Field Scanning Technique.
 2. TIA455-104A (1993, R 2005), Standard for Fiber Optic Cable Cyclic Flexing Test.
 3. TIA 455-78B (2002), Optical Fibers - Part 1-40: Measurement Methods and Test Procedures – Attenuation.
 4. TIA/EIA 492, AAAA.
 5. TIA/EIA 492, CAAB.
 6. ANSI/TIA/EIA-526-7, Optical Power Loss Measurements of Installed Single-mode Fiber Cable Plant.
 7. ANSI/TIA/EIA-526-14-A, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
 8. ANSI/TIA/EIA-568, Commercial Building Telecommunications Cabling Standard.
 9. TIA/EIA-568-B.2, Transmission performance specification for 4 pair 100 Ohm Category 6 cabling.
 10. ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces.
 11. ANSI/TIA 569-B, Commercial Building Standard for Telecommunications Pathways and Spaces.
 12. ANSI/TIA/EIA-606, The Administration Standards for the Telecommunications Infrastructure of Commercial Building.
 13. ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.
 14. ANSI/TIA/EIA-TSB-67, Telecommunications System Bulletin Technical Systems Bulletin, Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems.
- I. UL: All Fiber Optic Cable and equipment furnished by the FC in this section shall be listed by and shall bear the label of UL or of an independent testing laboratory acceptable to the City of San Diego (City).

1.04 SUBMITTALS

A. General:

1. All submittals shall be provided in accordance with Section 01 33 00, Submittal Procedures, as a minimum, and in accordance with specialty submittal requirement below.
2. All submittal of this section shall be provided with six hard copies and one soft copy CD/DVD.

B. Informational Submittals:

1. Preconstruction Submittals: The following preconstruction submittals shall be submitted to the City's Representative for approval and approved prior to installation of any fiber optic cable:
 - a. Qualifications of personnel working with fiber optic cable.
 - b. Quality Assurance Plan:
 - 1) Pre-Installation Test Plan, Fiber Optic Cabling.
 - 2) Post-Installation Test Plan, Fiber Optic Cabling.
 - 3) Primavera P6 Fiber Optic Cable Master Installation Schedule, inclusive of all work related to this section.
2. Product Data: The following product submittals shall be submitted to the City's Representative for approval and approved prior to issuing any Purchase Orders for all applicable Fiber Optic Products. Data shall include a complete list (Bill of Material – BOM) of all material, parts, special tools, consumables and supplies, each with current unit prices, source of supply, and vendors contact information, including telephone numbers. Manufacturer's product data shall be submitted for the following items:
 - a. Fiber Optic Cable.
 - b. Splice Closures.
 - c. Inner Duct.
 - d. Fire stopping material.

C. Action Submittals:

1. Test Reports:
 - a. FC shall submit test reports for approval, to the City's Representative, not later than 14 calendar days after the completion of each test. Test Reports shall be submitted as follows:
 - 1) Factory Test Certificates.
 - 2) Fiber Optic Cable Bi-Directional, Optical Time Domain Reflectometer (OTDR) pre-installation tests, "on-reel" on site. No cable installation shall occur until the "on-reel" test

- report has been submitted and approved by City Representative.
- 3) Fiber Optic Cable Bi-Directional, Optical Time Domain Reflectometer (OTDR) post-installation tests, installed and terminated.
 - 4) Unidirectional End-to-End Attenuation Tests.
 - 5) Unidirectional End-to-End Bandwidth Tests.
 - a) The OTDR, Attenuation and Bandwidth ‘tests’ result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test, and immediately transferred to CD/DVD in the presence of the City Representative, to provide non-volatile backup. The CD/DVC shall be transmitted to the City Representative immediately upon completion of daily testing.
 - b) The test result records saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records.
 - c) These results shall be transferred to the PC or laptop unaltered, i.e., “as saved by the tester” at the end of each test. The popular ‘csv’ format (comma separated value format) does not provide adequate protection and shall not be acceptable. The database for the completed job shall be stored and delivered to the City Representative on CD/DVD; this CD/DVD shall include the software tools, complete with applicable licenses, required to view, inspect, and print any selection of test reports.
2. Pulling Plan: The FC shall submit a proposed Fiber Optic Cable Pulling Plan. The Pulling Plan shall be submitted for approval to the City’s Representative not later than 21 calendar days prior to the scheduled start of cable placement.
- a. The Pull Plan: Will identify all fiber raceway segments to be pulled.
 - b. Will identify the proposed methodology of placement for each segment.
 - c. Will show proposed ‘Unique Reel Number Identifications’, ‘cable start and stop footage measurements’, Cable(s) ID number, as well as cable type and fiber count.
 - d. Will show calculated pulling tension for the segment and proposed methodology for measuring pulling tension in each segment.

- e. State manufactures maximum allowed pulling tension for each segment.

1.05 QUALIFICATIONS

- A. FC may place cable with his/her own forces or through a subcontractor. However, all personnel installing inner-duct work, or cable shall be performed by personnel experienced in placing fiber optic cabling in conduit, cable trays, and underground duct systems of project of similar scope.
- B. Fiber optic cable splices, terminations, and testing shall be made by certified cable splicers who are experienced in fusion and in-line compression splicing and terminating fiber optic cables or projects of similar scope. Personnel working pursuant to this section, may, at the City's Representative option, be required to demonstrate technical competence by performing sample work and/or by displaying their state qualifications/certificates. FC personnel may be required, at no additional cost to the City, to provide sample work shall involving performing a minimum of ten acceptable sample splices and ten terminations, in the presence of the City's Representative.

1.06 QUALITY ASSURANCE PLAN

- A. FC shall prepare a Quality Assurance Plan. The Plan shall include as a minimum:
 - 1. Shall include a schedule of when tests will be performed relative to installation milestones, specific test procedure that will be used, a list of test equipment that will be used including manufacturer, model number, range, resolution accuracy, and shall conform to the specified requirements.
 - 2. List and show all test equipment calibration certificates, valid within the last 180 calendar days.
 - 3. Show detailed procedures defining methods to ensure compliance to contract drawings and specifications by drawing control, inspection, and procurement records.
 - 4. Show when and how each system will be tested, material testing procedures, and certification records.
 - 5. Shall address whether cladding modes have been stripped prior to testing, source wavelength (peak), spectral width full width/half maximum (FWHM), mode structure, fiber end preparation, and bandwidth measurements of fiber links both greater and less than 1 kilometer.
- B. Test plan shall be submitted and approved by the City's Representative in a timely fashion to the PMT, and 'Approved' at least 30 calendar days prior to the start of the Earliest Test Plan item.

1.07 STORAGE AND HANDLING

- A. Care shall be exercised in handling materials during construction.
- B. The FC shall be solely responsible for proper handling and storage of all fiber optic cabling and Fiber Optic apparatus. The FC shall ensure that all Fiber Optic cable reels are ordered, received and stored with hard reel-shields in place. Reels received without reel-shields may, at the sole discretion of the City, be required to be returned.
- C. Fiber Optic cabling shall be stored in a clean, dry environment, approved by the City's Representative, until installation. Fiber Optic cable reels shall be stored with proper orientations such that large reels do not create a crush-weight on fiber.
- D. Adequate care shall be exercised when handling and storing reels of cable to prevent damage to the cable. Cable with dents, flat spots, or other sheath distortions shall not be installed.
- E. Fiber Optic ancillary apparatus, such as connectors, splice cases, , , etc., shall be stored indoors in a clean, dry environment at all times.

PART 2 PRODUCT

2.01 OPTICAL FIBERS

- A. Named Types:
 - 1. Single Mode Type: Single-Mode (SM) fiber must be the equivalent graded index optical glass. Core diameter of the fiber shall be approximately 8.7 (μm) micrometer. Cladding diameter shall be 125 (μm) plus or minus 3 micrometer (μm). Core cladding offset shall be less than 1 micrometer. Minimum tensile strength of the fiber after primary protective coating shall be greater than 350,000 kilopascal (50,000 psi). Softening point of the clad material of the optical fiber shall be 1,630 degrees C plus or minus 50 degrees C in accordance with ASTM C338, or the optical fiber shall meet the requirements in paragraph entitled, "Splice Compatibility Test." Corning's SMF-28e single-mode, or approved equal.
- B. Fiber Primary Protective Coating: Optical fiber shall be coated with suitable material to preserve the intrinsic high tensile strength of the glass fiber. Outside diameter of the coated optical fiber shall be 250 plus or minus 15 micrometers. Coating material shall be readily removable, mechanically or chemically, without damaging the optical fibers when the removal is desired.

- C. Optical Fiber Color-Code Coating: Primary protective coated SM and MM fibers shall be coated with a color-code coating for individual fiber identification. Maximum outside diameter of color-code coated fiber shall be less than 300 micrometers.
- D. Colorants: Color concentrates or inks used to color code the optical fibers and the loose buffer tube shall not be susceptible to migration and chemical reaction with surrounding compounds.

2.02 FIBER OPTIC CABLE

- A. Fiber Optic Cable specified under this section shall be provided and staged by the DCSP. However, the fiber optic cable shall be installed by the fiber optic subcontractor and that Work shall be performed under Division 26, Electrical, inclusive of all fiber terminations, fiber optic pre-installation testing, and fiber optic post installation testing. All testing to be witnessed by the City's Representative and the DCSP.
- B. Cable Length: Cable shall be manufactured continuous with no factory splices. FC, at his discretion, may use 'master-reels', or individual segment reels, as long as proper identification, handling and storage methods are utilized. All cable reels shall have factory-affixed reel identifiers.
- C. Materials and Construction:
 - 1. Materials used within a given cable shall be compatible with all other materials used in the same cable when such materials come into intimate contact. All cable components used shall have no adverse effect on optical transmission or on the mechanical integrity characteristics of the fiber placed in the cable. All materials used shall be nontoxic, noncorrosive, and shall present no dermal hazard.
 - 2. Minimum required material components applied to fiber optic cable construction shall be central core member, color-coded optical fiber, color-coded loose tube design with:
 - a. Gel-filling, gel-filling around loose tube, inner jacket, pulling strength members, and outer jacket.
 - b. Or, designed to comply with ICEA S-104-696, "Standard for Indoor-Outdoor Optical Fiber Cable."
 - c. In addition, variations in sequence and construction structural components will be considered when necessary.
 - d. The fiber shall be manufactured by the outside vapor deposition (OVD) process.
- D. Central Core Member: A central core member shall be included to serve as a cable core foundation to reduce strain on the fibers but not to serve as a

pulling strength member. Material of the central core member shall be non-metallic.

E. Named Types:

1. 24-fiber or above, shall contain single mode (SM) fibers, as required and as shown on drawings. Cable core configuration shall be comprised of loose buffer tubes, each containing six fibers. Six fibers in each loose buffer tube shall be color coded using the first colors of the standard Munsell color code, blue, orange, green, and brown. Loose buffer tubes shall be color coded using the standard Munsell color code, blue, orange, green, and brown.

F. Loose Tube Buffering: Color-code coated fibers shall be surrounded with a loose tube buffering for protection from external mechanical and environmental influences. Loose tube buffering shall be color coded for the tube identification.

G. Inner Jacket: Buffer tubes shall be located concentrically around the cable central core member and covered with a polyethylene inner jacket. Polyethylene inner jacket shall be polyethylene in accordance with ASTM D4976. Space between the buffer tubes and inner jacket shall be filled with a gel compound, or swellable yarns to prevent moisture, or water intrusion in the inner jacket.

H. Pulling Strength Member: Aramid type material shall be used as pulling strength members in the cable to provide pulling strength of at least 1,800 Newton (400 pounds) for the cable, during the installation process.

I. Cable Outer Jacket: Black, high-molecular weight, polyethylene materials in accordance with ASTM D4976 shall be applied longitudinally over all the inner jacket and sheathing strength member to form the cable outer jacket. Outer jacket shall be smooth, concentric, non-nutrient to fungus, and free from holes, splits, blisters, or other imperfections.

J. Overall outside diameter of any cable type shall not exceed 0.75 inch.

2.03 CABLE IDENTIFICATION SYMBOL

A. General:

1. An ID shall be hot stamped on the outer jacket of the fiber optic cable at periodic intervals shall be at least every 5 feet.
2. Color shall be white.

B. Identification Approach:

1. Some cable identification is easily stamped on the cabling at the factory, while other information is not so easily accomplished.
 - a. Each cable shall have embossed on the outer jacket of the cable, in white lettering, the following:
 - 1) The manufacturer's ID or model number of the cable. The Type of cable, e.g., MM or SM. The number of fibers in the cable. The footage marker of the cable. All of the above shall be stamped on the cable at intervals of 5 feet.
 - b. At FC option, each cable shall have the ISA Cable Identification Number, as shown on Drawings, either: (1) embossed on the outer jacket of the cable, in white lettering, or (2) alternately place onto the cable a printed label, of the wrap-on self-laminating type, which contains the unique ISA Cable Identification Number. If option 1 is used, cable identification stamping shall be at intervals of 5 feet. If option 2 is used, Cable Identification tags shall be placed at each end of the cable within 5 feet of the terminus and at the entrance and exit points of all intermediate points as follows:
 - 1) Pull-boxes, handholes, manholes, cable-tray, splice cases, etc.

C. Cable Reel Identifier:

1. Each cable reel shall be uniquely identified on the exterior of each fiber optic reel by the manufacturer. In addition, the beginning and ending cable reel footage identifiers shall be placed on the exterior of the reel by the manufacturer.
2. When preparing the Pulling Plan, the FC shall use this unique cable identifier, as well as the proposed starting and ending footages, for each conduit segment to be pulled.

2.04 SPLICE CLOSURES, UNDERGROUND

- A. Function: Enclose inline splices in underground applications.
- B. Available in canister (butt) and in-line styles to fit most applications.
- C. Sizes:
 1. Small: Accommodate up to 72 single-fiber splices or 144 ribbon-fiber splices using 12-fiber ribbons.
 2. Medium: Accommodate up to 288 single-fiber splices or 432 ribbon-fiber splices.
 3. Large: Accommodate up to 480 single-fiber splices or 864 ribbon-fiber splices.

- D. Housing:
 - 1. Nonmetallic, resistant to solvents, stress cracking, and creep.
 - 2. Material shall be compatible with chemicals and other materials to which they might be exposed in normal applications.

- E. End Caps:
 - 1. Feature two express ports for uncut feeder cables.
 - 2. Capable of accepting additional cables without removal of sheath retention or strength-member-clamping hardware on previously installed cables or disturbing existing splices.

- F. Quick-seal mechanical seal drop ports.

- G. Optical Fiber Closure:
 - 1. Capable of accepting optical fiber cable commonly used in interoffice, outside plant, and building entrance facilities.
 - 2. Provide clamping mechanism to prevent pistoning of central member or strength members, and to prevent cable sheath slip or pullout.
 - 3. Ability to double cable capacity of installed canister splice closure by use of a kit. Such a conversion shall not disturb existing cables or splices.

- H. Encapsulation shall not be required to resist water penetration.

- I. Re-enterable.

- J. Bonding:
 - 1. Provide hardware to facilitate bonding and grounding of metal components in closure and armored cable sheath.
 - 2. Cable bonding hardware shall be able to accommodate a copper conductor equal to or larger than 6 AWG.

- K. Installation shall not require specialized tools or equipment other than those normally carried by installation crews.

- L. Manufacturer and Product: Preformed Line Products Coyote splice closures.

2.05 FIBER OPTIC CONNECTORS

- A. FOT fiber optic single mode yellow connectors (LC/APC – angle polish) shall be suitable for optical circuits.
 - 1. Connectors: Attenuation per mated pair shall not exceed 0.75 dB (individual) and 0.5 dB (average). They shall sustain a minimum of 200 mating cycles per EIA/TIA – 455-21 without violating specifications. Connectors shall meet the following performance criteria:

Test	Procedure	Max. Attenuation Change (dB)
Cable Retention	FOTP-6	0.2 dB
Durability	FOTP-2	0.2 dB
Impact	FOTP-3	0.2 dB
Thermal Shock	FOTP-6	0.2 dB
Humidity	FOTP-5	0.2 dB

- B. Manufacturers:
 - 1. ACON.
 - 2. Sumitomo Electric.
 - 3. Tyco.
 - 4. Or approved equal.

2.06 FIBER OPTIC LINE/PATCH CABLES

- A. All fiber optic patch cords shall be duplex zip cords, factory terminated, and 100 percent tested.
- B. All fiber optic patch cords shall match fiber optic panel termination connector, i.e., green SC/APC to green SC/APC for angle polish.

2.07 FIBER OPTIC INNER DUCT

- A. This Specification applies to the following:
 - 1. Flexible, plenum and riser-rated inner duct.
 - 2. Flexible, plenum and riser-rated MaxCell cells.

- B. Pull Cord: Each inner duct shall come with pull cord. Pull cord shall be 1/4-inch polypropylene or equivalent with a minimum tensile strength of 1,250 pounds. Pull cord shall be installed in the inner duct prior to delivery to the construction site. The pull cord shall extend 6 feet beyond the termination at each end.
- C. Conduit and Inner Duct Plugs: The fiber optic conduit plugs will be Jack Moon Duct Plug from Tyco, or approved equal. Inner duct will be affixed to the interior of the duct plug by an approved means, in accordance with MaxCell or Tyco technical bulletins.

PART 3 EXECUTION

3.01 FACTORY TEST

- A. Fiber optical cable shall comply with the optical and mechanical test requirements of this section.
- B. The manufacturer shall certify OTDR test, optical, and mechanical performance for each reel. Manufacturers' Certification shall be delivered with the fiber optic cable when it arrives.
 - 1. Factory testing documentation shall be submitted to the City's Representative upon receipt of cable, and before any onsite OTDR testing commences.
- C. Optical Performance:
 - 1. Single-Mode Fibers in the Cable:
 - a. Optical attenuation of each optical fiber in the cable (reeled) shall be no greater than 0.5 dB/Km at 850 nm, plus or minus 50 nm, optical spectrum window. Attenuation shall be measured on completed cable reel length, and normalized linearly to 1 Km. Measurement method shall be in accordance with TIA 455-78B, at central wavelength 850 nm nominal.
 - b. Pulse dispersion of each optical fiber in the cable (reeled) shall be no greater than 3.5 picoseconds/nm-Km within the emissive region of 1,285 nm to 1,330 nm. Measurement method shall be in accordance with EIA 455-168A and EIA 455-169A.
 - c. Mode field diameter at 850 nm optical spectrum window shall be within 10 plus or minus 1 micrometer. Measurement method shall be in accordance with EIA/TIA 455-165A at central wavelength 850 nm nominal. When this requirement is not met, the fusion splice compatibility test shall be applied.

- d. Cut-off wavelength for 850 nm optical spectrum window shall be within 1,200 plus or minus 70 nm. Measurement method shall be in accordance with EIA 455-80B.

D. Mechanical Performance:

1. Minimum Bend Radius: Cable shall be able to withstand bending to a minimum radius of 10 times the cable outer diameter without tensile load applied, and of 20 times the cable outer diameter with maximum tensile load applied (during installation), without damage to cable components or degradation of the optical fiber performance at room temperature.
2. Tensile Strength: Fiber optical cable shall withstand a pull force of at least 1,800 Newtons (400 pounds force per square inch) to be applied to the pulling strength member during the installation, and a tensile load of at least 300 Newtons during operation without incurring any damage or detriment to fiber optical cable and optical performance. Tensile strength test shall be in accordance with EIA 455-33A.
3. Flexing or Bending Cycles: Fiber optical cable shall withstand at least 20 bending cycles at minimum bend radius without damage to the fiber optic cable components or degrading optical performance. Cyclic flexing test shall be in accordance with TIA 455-104A.
4. Crush Resistance: Minimum crush resistance of the fiber optical cable shall be greater than 650 Newton/centimeter (cm) without damage to cable components or degrading optical performance. Crush resistance test shall be in accordance with EIA 455-41.
5. Impact Resistance: Fiber optical cable shall be capable of withstanding 20 impacts, at 5 Newton-meters force, without damage to cable components, or degradation of optical performance. Impact resistance test shall be in accordance with EIA 455-25C.
6. Gel Filling Compound Drip Test: Optical cable shall be tested for the ability of the gel filling compound in the interior of the inner jacket and loose tube buffer to resist flow at the temperature range of minus 40 degrees C to 60 degrees C in accordance with EIA 455-81B.
7. Fluid Penetration: Optical cable shall be capable of preventing the entry and axial migration of pressurized water when subjected to fluid penetration testing in accordance with EIA 455-82B.

3.02 TEMPERATURE ENVIRONMENT

- A. Fiber optical cable shall comply with the mechanical performance requirements herein while used in duct applications where the temperature varies from minus 8 degrees C to plus 38 degrees C. Optical performance degradation shall be less than 5 percent of the optical performance requirements in the temperature range of minus 20 degrees C to plus

60 degrees C. Fiber optical cable shall not be damaged in storage where the temperature may vary from minus 40 degrees C to plus 65 degrees C.

3.03 FIBER SPLICES

- A. The use of fiber optic splicing is to be minimized. The FC shall perform all cable splicing with certified personnel approved by the City's Representative. Outside plant fiber splices shall be fusion type and made along the fiber route where shown on the design drawings, or when FC reel lengths and related cable 'budget' are not a concern. FC shall ensure that splices shall exhibit an insertion loss not greater than 0.2 dB. All splice measurements shall be made at appropriate frequencies for cable type. All splices shall be mounted in trays within splice enclosures.
- B. Completed splice shall be covered with a protective sleeve heat shrink type to restore the protective properties of the fiber coating and buffering. Deviations to the splice, location and pulling plans, will be permitted upon approval by the City's Representative, and shall be provided at no additional cost to City.
- C. All fiber colors shall be continuous from end to end. No switching or staggering of color scheme within the cable at splice points shall be allowed.
- D. Cables shall be brought out of manhole, handhole or intermediate pull-box in a controlled environment to perform the fiber fusion splice operation. Splice shall be completed by returning the cable to the manhole, etc., such that the excess cable does not impede future entrance and utilization of the enclosure. Cable shall be secured within the enclosure at intervals not in excess of 3 feet utilizing standard galvanize racking hardware, provided by the FC. Racking hardware shall maintain minimum bend radius requirements.
- E. Field verification of all cable measurements end-to-end, before installation, is required to avoid any and all mid-span splices.

3.04 UNDERGROUND CABLE INSTALLATION

- A. It is the responsibility of the FC to install all fiber optic cabling, in raceway, ductbanks, etc., provided and installed by others, under Division 26, Electrical, of the Specifications. It is the responsibility of the FC to inspect all raceway and ensure that raceway has been installed in accordance with bend radius requirements, and that all raceway is mandreled and clean, ready of cable installation. When placing fiber optic cabling the FC shall ensure that proper roller stands and sheaves are used to prevent strain or damage to the cabling during installation.

- B. In the event that the FC's installation crews witness any anomaly to the fiber during installation they are to immediately stop installation and notify the City's Representative.
- C. Securing Cable:
1. Immediately after cable placement, a permanent identification tag shall be attached to visible cable sections. Cables shall be checked to ensure that the markings are intact.
 2. Cables and equipment shall be supported and secured as indicated on design drawings. Where the specific method of support is not shown, supports and fasteners shall be used to secure cables and equipment in position. Metallic supports and fasteners shall be stainless steel. All cables shall be routed along the interior sides of manholes and shall be secured such that no more than a 4-inch catenary is evident between fasteners.
 3. No fewer than four, and preferably eight, cable/racking hooks shall be required per manhole and shall be provided by the FC.
 4. Clamps and straps consisting of stainless steel clamps and black-nylon ty-wraps shall be used as necessary to properly secure the cable.
 5. Sequential cable markings along the cable, prior to and after each end of splice point, shall be recorded on the sequential cable form and submitted for approval.
- D. Bending:
1. Caution shall be used by the FC when bending cable to avoid kinks or other damage to the sheath. Bend radius shall be as large as possible with a minimum of 10 times the cable diameter. Minimum radius shall be increased when necessary to meet cable manufacturer's recommendation. Cables shall not rest against any sharp edges.
 2. Minimum bending radii shall not be exceeded as specified by the cable manufacturer during placement.
- E. Pulling:
1. Pulling lines shall be attached to both cable ends when cable is destined for bi-directional pull, and fitted with factory-installed pulling eyes. Cables not equipped with a pulling eye shall have the pulling line attached to the cable end by means of a cable grip. Core hitches shall not be used.
 2. Cable reels shall be located and aligned so that the cable is pulled out from the top of the reel into the duct or conduit in a long, smooth bend without twisting. Cable shall not be pulled from the bottom of the reel.

A cable feeder guide of proper dimensions shall be used at the mouth to guide the cable into the duct or conduit.

3. Rigging shall be set up at the pulling end so that the pulling line and cable exit on a line parallel with the duct or conduit to prevent either from rubbing against the edge or mouth. Cable ends shall not be pulled around sheave wheels. When the sheave or pulley cannot be positioned to obtain sufficient cable end slack for proper racking and splicing with the pulling line attached to the end of the cable, a split cable grip may be used to obtain the necessary slack.
4. Unless direct burial cable, conductors shall be protected from earth, concrete or asphalt during a pull by plastic or canvas tarp covering the ground.
5. The FC shall perform all cable installation in conformance with the cable manufacturer's installation guidelines. Do not exceed cable manufacturer's recommendations for maximum pulling tensions. Where indicated in the Pulling Plan cable tension shall be monitored with a manometer.

F. Lubricant:

1. The FC shall use pulling lubricant to minimize pulling tension and prevent sheath damage when pulling cables into ducts and conduits. Lubricant shall be applied to the cable sheath with a lubricator. When pulling has been completed, the exposed cable ends shall be wiped clean of lubricant.
2. Lubricants shall be compatible with and intended for use with plastic-sheathed cables. Soap and grease type lubricants shall not be allowed.
3. All equipment and the pulling set shall be checked to minimize interruptions once pulling begins. Cable shall be pulled without stopping until the required amount of the cable has been placed. When the pulling operation is halted before the pull is completed, the tension of the pulling line shall not be released. When pulling is resumed, the inertia of the cable shall be overcome by increasing the tension in small steps a few seconds apart until the cable is in motion. Cable shall be paid from the top of the reel by rotating the reel in the feed direction at the rate of pull. Cable shall not be stripped off the reel by hand-pulling.

G. Damage and Defects:

1. FC shall use a tension monitoring device (manometer) to ensure that the maximum pulling tension that may be applied to the cable to be pulled into a conduit section is not exceeded, unless cable is being pulled by hand. Any damage to the cable due to exceeding the maximum tension will require a new cable furnished by the FC at his cost.

2. Cable shall be carefully inspected by the FC for sheath defects or other irregularities as it is paid out from the reel. When defects are detected, pulling shall stop immediately and the cable section shall be repaired or replaced at the sole discretion of the City's Representative. A system of communications shall be maintained between pulling and feed locations so that pulling can be stopped instantly, when required.
3. Cable shall be hand guided through intermediate manholes and into the next duct section when making pull-through. Proper rigging shall be used in the intermediate manhole to keep the pulling line and cable aligned with the exit duct to prevent the line or cable from rubbing against the edge of the duct. Cables in pull-through manholes shall be set up and racked before the cable ends in adjacent manholes are set up and racked.
4. Cable ends pulled into manholes, vaults, or terminal locations that are not to be racked or otherwise permanently positioned immediately shall be tied in fixed positions to prevent damage to the cables and provide adequate working space.

H. Seal:

1. Ducts or inner duct in which cable is placed shall be sealed with appropriate plugs or seals as specified elsewhere. This material shall be inserted between the cable and the duct and in all unused ducts, in order to prevent damage to the cable sheath and to prevent the entrance of dirt or water into the ducts from the manhole or vault.
2. Cables shall be provided in continuous lengths as required to accomplish the required installation without splices from termination to termination, except where field splices are specifically shown on approved field installation design submittals.

3.05 CABLE INSTALLATION IN CABLE TRAYS

- A. Except where shown by Design Engineer, fiber optic cables shall not be installed in the same cable tray with ac power cables containing power in excess of 208 volts to ensure physical safety of FC installers, and subsequent safety of City personnel.
- B. The cable tray pathways shall be as specified in Division 26, Electrical.
- C. Cables placed in cable trays shall be installed in a neat and orderly manner.
- D. Cables in vertical trays shall be individually retained with Velcro straps at a maximum of 6 feet on center.
- E. Provide and install cable management and support as required.

3.06 CABLE INSTALLATION IN CONDUIT

- A. All conduits housing fiber optic cable shall be at least 3/4 inch in size. The conduit should be sized appropriately in accordance with the EIA/TIA 569A. Conduits are installed by others, under Division 26, Electrical.
- B. Any conduits housing fiber optic cable shall have an inside bend radius of at least ten times the internal diameter of the conduit or the manufacturers specified bend radius of the fiber, whichever is greater.
- C. All conduits housing fiber optic cable shall be terminated with an insulated bushing to prevent damage to the conductor during installation or shall be terminated with a Jack Moon (Tyco) sealing plug after cable installation.
- D. All conduits, and inner duct, installed for fiber optic cable must be installed by others with a nylon pull cord.
- E. All conduit and trays shall be supported to the structure, independent of other services. Refer to Division 26, Electrical, regarding conduit support.
- F. All conduits that are larger than two inches and will house fiber optic cable must be filled with inner duct or MaxCell equivalent cells prior to the installation of the fiber optic cable. See the following table:

Conduit Size	Number of Inner Ducts
3" conduit	3-1" inner ducts
4" conduit	3-1" plus 1-1-1/4" inner ducts
5" conduit	3-1" plus 2-1-1/4" inner ducts

3.07 BACKBONE CABLE SERVICE COILS

- A. Install backbone cable service coils with length of 10 feet and a coiled diameter as required by manufacturer at each end of all new fiber optic cables to control excess cable lengths before terminating fiber strands.
- B. Install backbone cable service coils in 24 feet by 24 feet by 6 feet NEMA 1 enclosure within four feet of cable entrance inside of room. Use four adhesive holders and hook and loop fasteners to bind fiber service coil in four places with separation of 90 degrees and secure the slack fiber to the interior of the junction box. Tie wraps are not permitted.

3.08 FIRE STOPPING

- A. Provide fireproof seals where required in accordance with the National Fire Protection Association (NFPA) and the National Electric Code (NEC), Article 200-221 and EIA/TIA 569 standards.
1. Fireproofing around raceways or conduits shall be provided by others as called for on design drawings and Division 26, Electrical.

3.09 TESTING

- A. Pre-Installation Testing, Fiber Optic Cables:
1. The FC is responsible for conducting full pre-installation testing of the fiber optic cabling in accordance with this section and Article Submittals.
 2. Pre-Installation testing will be accomplished, bi-directionally, utilizing an Optical Time Domain Reflectometer (OTDR) and will be accomplished on each fiber, of each cable while still on the shipping reel. Pre-installation testing will be accomplished without any apparatus, connectors, etc., with the exception of the OTDR launch cord/cable, affixed to the fiber under test.
 3. Prior to commencement of pre-installation testing, the FC will submit a Testing Plan which will address testing methodology for both Pre- and Post-Installation testing. This plan should specify all parameters under which the FC will be testing the cables. All test equipment, test procedures, and testing techniques shall be specified in the Test Plan.
Note: No fiber optic cable may be placed until:
 - a. The Test Plan is submitted and approved by City's Representative.
 - b. The Pre-Installation OTDR testing is complete for all cables.
 - c. The OTDR Test Report, CD/DVR, report software, etc., for Pre-Installation Testing has been submitted to the City's Representative.
 - d. The FC receives written notice that the City's Representative is ready and in place (Approval to Proceed).
 4. The City's Representative will witness all pre-installation fiber optic testing. The City's representative will perform no less than 25 percent spot-witnessing of pretesting and may, at their sole option, witness 100 percent of the testing.
 5. During testing the FC will log each cable, by reel and/or cable identification number, and will provide a testing sign-off sheet for each reel tested. FC will continue to reference this same reel and/or Cable ID number in his pulling plan such that testing data can be tracked to each cable segment(s) for post-installation testing.

6. During testing the City's Representative may suspend testing at any time, if in his sole opinion, testing is not being conducted in accordance with this section, or the Testing Plan.
7. During testing the City's Representative may fail any reel of cable that has obvious flaws as determined by the OTDR. Should the cable flaw be within the first or last 10 percent of the reel length being tested, or if in the sole opinion of the City's Representative there is sufficient usable length on the reel, the FC may be allowed to re-spool the usable cable and re-test it at another time. If in the sole opinion of the City's Representative a cable reel is 'rejected', the FC shall replace, and retest, that length of rejected cable at the FC's sole expense.
8. At the conclusion of Pre-Installation Testing the FC and the City representatives, will immediately sign each of the Reel Testing Sheets.
9. At the conclusion of Pre-Installation Testing the FC will immediately download the OTDR data, in the presence of the City's Representative, and burn that data to CD/DVD for record purposes. One copy of the disk will be turned over to the City's Representative.
10. The hard copy report of the Pre-Installation OTDR Test will be provided in accordance with the submittal requirements in Article Submittals.

B. Post-Installation Testing Fiber Optic Cables:

1. The FC is responsible for conducting full Post-Installation testing of the Fiber Optic Cabling in accordance with this section.
2. Post-Installation testing will be accomplished, bi-directionally, utilizing an Optical Time Domain Reflectometer (OTDR) and will be accomplished on each fiber, of each cable on the fully installed cable network. Post-Installation testing will be accomplished with each segment cable connectorized and attached to its respective bulkhead fitting at the Fiber Optic Patch Panel associated with each end of the cable. Additionally, the OTDR launch cord/cable will be affixed to the Patch Panel at one end of the fiber under test and a landing/cord cable at the other to make cable definition obvious.
3. Prior to commencement of post-installation testing, the FC will have submitted a Testing Plan which will address testing methodology for post installation testing. This plan should specify all parameters under which the FC will be testing the cables.
4. The FC shall provide written notice of his intent to perform Post-Installation Testing of Fiber Optic Cabling a minimum of 30 calendar days prior. Note: Submission of the Testing Plan or test reports does not constitute written notice for this purpose.
5. The FC shall not proceed with post-installation testing until he receives written notice that the City's Representative is ready and in place (Approval to Proceed).

6. The City's Representative will witness 100 percent of the post-installation testing.
7. During testing the FC will log each cable segment by cross-referencing to the pre-installation testing real and/or cable identification number, and will provide a testing sign-off sheet for each cable segment tested.
8. During testing the City's Representative may suspend testing at any time, if in his sole opinion, testing is not being conducted in accordance with this section or the Testing Plan.
9. During testing the City's Representative may fail any cable segment that has obvious flaws as determined by the OTDR. Should the cable flaw be associated with connectorization or faulty Patch Panel Bulkheads, the FC will be given the opportunity to repair and retest that segment at a later time. If in the sole opinion of the City's Representative a cable segment is 'rejected', the FC shall remove the defective cable, replace it with a new pre-tested cable, and retest that cable segment at the FC's sole expense.
10. At the conclusion of Post-Installation Testing the FC, and the City's Representative, will immediately sign each of the Cable Segment Testing Sheets.
11. At the conclusion of Post-Installation Testing the FC, will immediately download the OTDR data, in the presence of the City's Representative, and burn that data to CD/DVD for record purposes. One copy of the disk will be turned over to the City's Representative.
12. The hard copy report of the Post-Installation OTDR Test will be provided in accordance with the submittal requirements in Article Submittals.

3.10 TEST REQUIREMENTS

- A. Test equipment used for verifying installation testing shall be calibrated by a certified testing company within 30 days of use. Calibration certification shall be provided to the City's Representative immediately prior to the start of testing.
- B. Single mode OTDR Test: The OTDR shall conform to the following minimum requirements:
 1. Operating Wavelengths: All single-mode links shall be certified with test tools using laser light sources at 850 nm and 1,300 nm.
 2. Attenuation Range (one way): Minimum 5 dB at 1,300 nm.
 3. Attenuation Resolution: 0.01 dB.
 4. Accuracy: Plus 0.5 dB.
 5. OTDRs shall have digital readout capability and shall have a means of providing a permanent record in the form of both electronic and hard copy printout report displaying the OTDR trace graph.

6. Test Results:
 - a. Reflective events (connections) shall not exceed 0.5 dB.
 - b. Nonreflective events (splices) shall not exceed 0.3 dB.
 - c. End-to-End Attenuation Tests: An attenuation measurement test set shall consist of an optical power meter and an optical power source. Attenuation measurement test set shall be in accordance with the applicable National Bureau of Standards (NBS) standards for a stable optical source. Meter may be analog or digital. End-to-end attenuation test reading shall be included on the test reference loss. The attenuation/insertion loss test shall be in single-direction only, in accordance with TIA/EIA-526-7, Method A-1.
- C. Measurement test set shall conform to the following minimum requirements:
 1. Operating Wavelengths: Single-mode at 850 nanometers and 1,300 nanometers plus or minus 10 nanometers.
 2. Attenuation Range: At least 30 dB at 1,300 nm.
 3. Attenuation Resolution: 0.01 dB.
 4. Accuracy: The accuracy of the attenuation measurement test set shall be plus or minus 5 percent.
 5. Optical source shall be capable of coupling sufficient power into the fiber so that the light received at the meter is within the meter delectability limits.
- D. End-to-End Bandwidth Tests:
 1. Bandwidth test shall conform to the following minimum requirements:
 - a. Operating Wavelengths: Single-mode at 850 and 1,300 plus or minus 10 nanometers.
 - b. Bandwidth Range: Minimum 1,000 megahertz.
 - c. Bandwidth Resolution: 1 megahertz.
 - d. Accuracy: Plus or minus 0.5 megahertz.
 - e. Measurement Method: Swept frequency.
- E. Magnified Optical End Face inspection:
 1. Fiber end faces shall be inspected after connectorization but before termination at 250X or 400X magnifications. 250X magnification are suitable for inspecting single mode fibers. 400X magnification may be used for detailed examination of single mode fibers.
 2. Scratched, pitted, or dirty connectors shall be diagnosed and corrected.

END OF SECTION

**Table 10-5
Mitigation Measures – North City Pure Water Facility Influent Pump Station**

Mitigation Measure	Timing of Mitigation			Responsible Person	Location/Notes
	Pre Const.	During Const.	Post Const.		
MM-AQ-1 (construction BMPs)		X		Construction Manager	Entire site
MM-AQ-2 (construction NO _x)		X		Construction Manager	Entire site
MM-BIO-4 (Coastal California Gnatcatcher)	X	X		City of San Diego	Coastal sage scrub within the facility within MCAS Miramar and within the MHPA south of Miramar Road.
MM-BIO-9a (Qualified biologist)	X			Owner/permittee	Entire site
MM-BIO-9b (preconstruction meeting)	X			City of San Diego	Entire site
MM-BIO-9c (documentation)	X	X	X	Owner/Permittee	Entire site
MM-BIO-9d (biological construction mitigation/monitoring exhibit)	X			City of San Diego	Entire site
MM-BIO-9e (construction fencing)	X			City of San Diego	Entire site
MM-BIO-9f (on-site education)	X			City of San Diego	Entire site
MM-BIO-9g (biological monitoring)		X		City of San Diego	Entire site
MM-BIO-9j (BMPs/erosion/runoff)	X	X	X	City of San Diego	Entire site
MM-BIO-9k (toxics/project staging areas/equipment storage)		X	X	Construction Manager/owner	Entire site
MM-HAZ-2 (hazardous material reporting form)			X	City of San Diego	Entire site
MM-HIS-3 (archaeological monitoring)	X	X	X	Principal Investigator (Archaeologist)	Entire site
MM-NOI-4 (noise and vibration study)	X			Construction Contractor	Entire site
MM-PALEO-1 (paleontological monitoring)	X	X	X	Principal Investigator (Paleontologist)	Entire site

April 2017 10-35 9420-04

PK1-G-005B

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

**GENERAL
MITIGATION MONITORING AND
REPORTING PROGRAM (PAGES 34)**

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 7 OF 132 SHEETS

WBS B-21059

APPROVED: <i>Rayhanah Martin</i>	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSK PROJECT MANAGER
FOR CITY ENGINEER: Rayhanah Martin	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION	BY	APPROVED
ADDENDUM C	CH	<i>Rayhanah Martin</i>
		DATE: 7/07/21
		FILM
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE

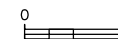
FOR
REFERENCE
ONLY

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____ 40381-1007-D

CONSULTANT



WARNING



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CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
ADDENDUM C	6/25/21	07, 32, 34, 35, 37, 40, 41, 43, 49, 51, 52, 57, 59, 60, 69, 94, 100, 102, 106A	

ADDENDUM C

THE CONTRACTOR SHALL MONITOR MOVEMENTS OF CRITICAL STRUCTURES AND FACILITIES WITHIN 100 FEET OF EXCAVATION. THE CONTRACTOR SHALL DESIGN, PROVIDE, AND MAINTAIN SHORING, SHEETING, AND BRACING AS NECESSARY TO SUPPORT THE SIDES OF EXCAVATIONS AND TO PREVENT DETRIMENTAL SETTLEMENT AND LATERAL MOVEMENT OF EXISTING FACILITIES, ADJACENT PROPERTY, AND COMPLETED WORK. THE EXCAVATION SUPPORT SHALL BE CARRIED OUT IN SUCH A MANNER AS TO PREVENT UNDERMINING OR DISTURBING FOUNDATIONS OF EXISTING STRUCTURES OF WORK ONGOING OR PREVIOUSLY COMPLETED. THE CONTRACTOR SHALL REMAIN RESPONSIBLE FOR THE ADEQUACY AND SAFETY OF THE MEANS, METHODS, AND SEQUENCING OF CONSTRUCTION.

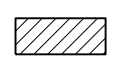


SEE SECTION 01 31 13 OF THE PROJECT SPECIFICATIONS FOR PROJECT COORDINATION AND CONSTRUCTION SEQUENCING

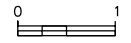
FACILITY LEGEND:

- 01 INFLUENT PUMP STATION
- 05 HEADWORKS
- 10 PRIMARY SEDIMENTATION TANKS
- 11 INTERMEDIATE PUMP STATION RAS PE MIXERS
- 12 FLOW EQUALIZATION BASINS
- 15 FIRST STAGE BIOREACTOR BASINS
- 16 SECOND STAGE BIOREACTOR BASINS
- 20 BIOREACTOR/FILTER SUPPORT FACILITY
- 21 FILTER INFLUENT STRUCTURE
- 23 SECONDARY CLARIFIERS
- 25 TERTIARY FILTERS
- 26 WASTE BACKWASH TANK
- 30 CHLORINE CONTACT BASIN
- 33 EFFLUENT DROP STRUCTURE
- 34 EFFLUENT PUMP STATION
- 36 NCPWF INFLUENT PUMP STATION
- 45 BLENDED SLUDGE PUMP STATION
- 50 STORMWATER PUMP STATION
- 51 OPERATIONS BUILDING
- 55 CHEMICAL BUILDING
- 56 NOT USED
- 57 DISINFECTION FEED FACILITY
- 58 CARBON CHEMICAL FACILITY
- 60 ODOR CONTROL FACILITY
- 61 - 67 ELECTRICAL SUBSTATIONS
- 64B NOT USED
- 68 ELECTRICAL MAIN PLANT SWITCHGEAR
- 69 ELECTRICAL SWITCHGEAR SUBSTATION
- 70 SECONDARY CLARIFIER ELECTRICAL BUILDING
- 72 ELECTRICAL SWITCHGEAR

TREE AND VEGETATION PRESERVATION NOTES:

- PROTECTION FOR EXISTING TREES AND VEGETATION TO REMAIN ON SITE SHALL BE PROVIDED AS FOLLOWS:
- TO PROTECT EXISTING TREES WITHIN THE TREE PRESERVATION AREA INDICATED ON THE DRAWINGS, INSTALL STURDY METAL CONSTRUCTION FENCING (5' HIGH MINIMUM) AROUND THE DRIP LINE OF THE ENTIRE CLUSTER OF TREES TO BE PRESERVED. TO PROTECT EXISTING VEGETATION IN OTHER AREAS (NOT IMPACTED BY CONSTRUCTION), INSTALL ORANGE TEMPORARY FENCING AROUND DRIP LINE OF ENTIRE VEGETATION CLUSTER.
 - THE FOLLOWING ACTIVITIES ARE FULLY RESTRICTED WITHIN THE FENCED PROTECTION AREAS: STOCKPILING, TOPSOIL DISTURBANCE, DIGGING OR EXCAVATION, FLOODING OR EROSION, EXCESSIVE WETTING OR DRYING, CHEMICAL SPILLS, VEHICULAR USE, FOOT TRAFFIC, AND STORAGE OF ANY KIND, INCLUDING CONSTRUCTION MATERIALS.
 - MAINTAIN THE EXISTING GRADE WITHIN THE DRIP LINE OF ALL TREES DESIGNATED FOR PRESERVATION.
 - PRUNING OF TREE CANOPY OR TREE ROOTS SHALL NOT BE PERMITTED WITHOUT WRITTEN RECOMMENDATION OF A CERTIFIED CONSULTING ARBORIST, SUBMITTED AND APPROVED BY THE CITY ENGINEER.
 - MAINTAIN AND DOCUMENT ADEQUATE WATERING SCHEDULE DURING ALL STAGES OF CONSTRUCTION FOR EXISTING TREE PROTECTION AREAS AND LANDSCAPE AREAS.
 - FAILURE TO PROPERLY PROTECT THE IDENTIFIED TREES WILL RESULT IN CHARGES TO THE CONTRACTOR BASED UPON THE DEGREE OF DAMAGE AS ASSESSED BY THE CERTIFIED CONSULTING ARBORIST. TREES THAT HAVE BEEN SEVERELY DAMAGED SHALL BE REPLACED WITH TREE OF IDENTICAL SPECIES AND CALIPER SIZE OR 6" MINIMUM CALIPER SIZED TREE OF THE SAME SPECIES.
 - DAMAGED OR DEAD SHRUBS AND GROUND COVER SHALL BE REPLACED WITH THE SAME SPECIES AND SIZES AS COORDINATED WITH THE PROJECT LANDSCAPE ARCHITECT.
 - SEE WHITEBOOK AND TREE PROTECTION SPECIFICATIONS SECTION 01 56 39 FOR ADDITIONAL INFORMATION.
 - EXISTING IRRIGATION SYSTEMS SHALL REMAIN OPERATIONAL TO ALL TREES WITHIN PRESERVATION AREAS, AS WELL AS OTHER MATURE VEGETATION IN OTHER AREAS OF THE SITE NOT IMPACTED BY CONSTRUCTION. IN ORDER TO REMAIN OPERATIONAL, SYSTEM COMPONENTS SHALL BE RELOCATED AND/OR REPAIRED AS NECESSARY TO PROVIDE ADEQUATE WATER FOR THE ON-GOING HEALTH AND VIGOR OF ALL PROTECTED PLANTINGS, DURING ALL STAGES OF CONSTRUCTION.
 - ENSURE EXISTING IRRIGATION CONTROL ZONES ARE FUNCTIONAL, OPERATING PROPERLY IN REGARD TO NOZZLE PERFORMANCE, HEAD TO HEAD COVERAGE, AND ARE SCHEDULED TO RUN ACCORDING TO SEASONAL WATER DEMAND.

-  ANY PARKING SPACES LOST DUE TO CONSTRUCTION IMPACTS SHALL BE REPLACED AT A 1:1 RATIO IN THE AREAS IDENTIFIED AS "ALTERNATIVE PARKING AREAS"
-  TREE PRESERVATION AREAS
-  MATURE VEGETATION PROTECTION AREAS

WARNING

 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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Civil Engineering
Planning
Processing
Surveying

REGISTERED PROFESSIONAL ENGINEER
 KEITH W. HANSEN
 NO. 60223
 CIVIL
 STATE OF CALIFORNIA

DIGITALLY SIGNED: 6/24/2021

PK1-C-001

CIVIL SITE STAGING PLAN

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

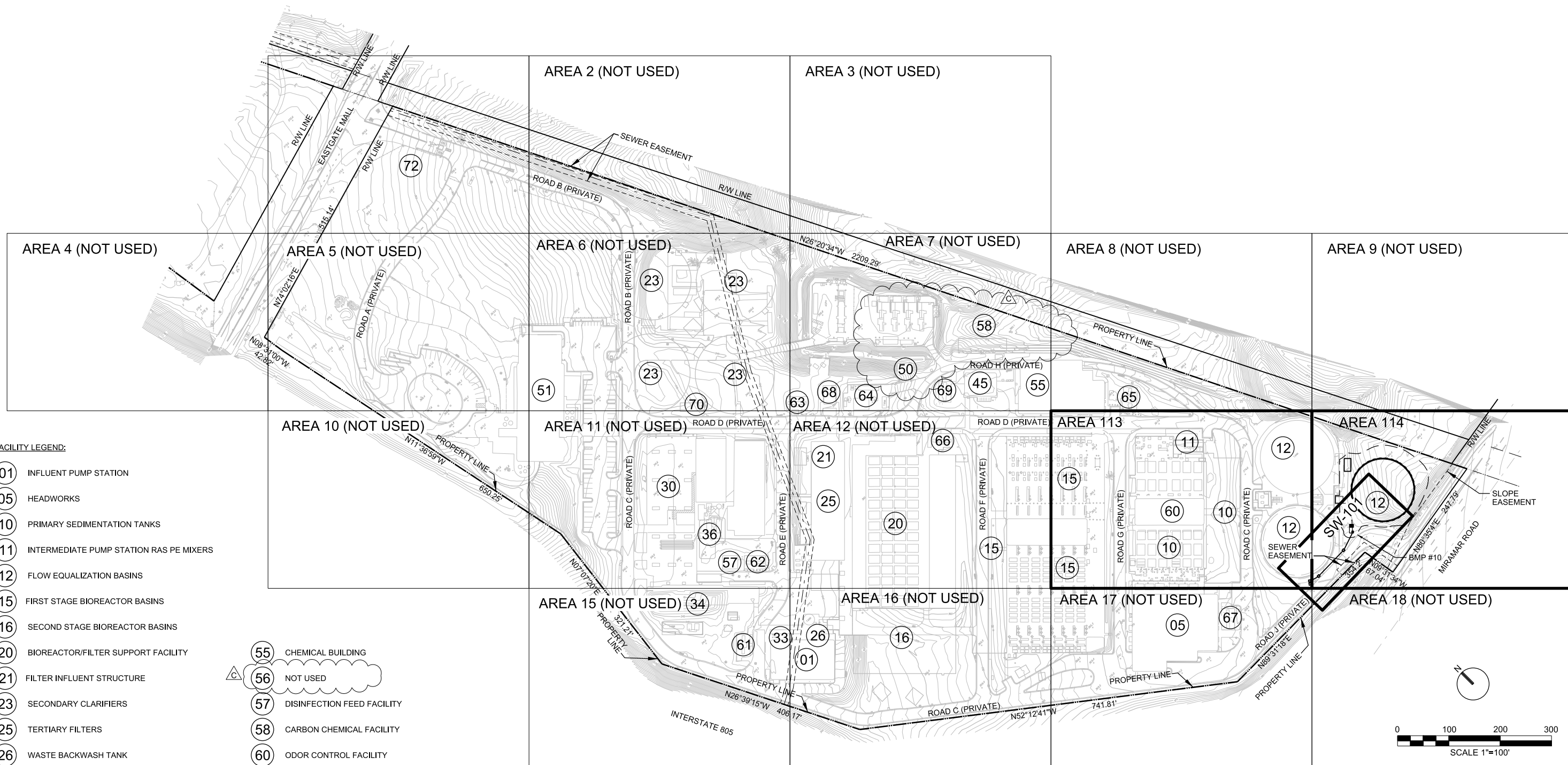
CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 32 OF 132 SHEETS

WBS: **B-21059**

APPROVED FOR CITY ENGINEER: <i>Reyhaneh Martin</i>	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSKI
PRINT DCE NAME: <i>Reyhaneh Martin</i>	RCE#: C89963	PROJECT MANAGER
DESCRIPTION: ADDENDUM C	BY: CH	THIEN-LONG TRAN
APPROVED: <i>Reyhaneh Martin</i>	DATE: 7/7/21	PROJECT ENGINEER
FILM		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE

CONTRACTOR: _____ DATE STARTED: _____
 INSPECTOR: _____ DATE COMPLETED: _____

40381-1032-D



FACILITY LEGEND:

- 01 INFLUENT PUMP STATION
- 05 HEADWORKS
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PK1-CG-100

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE
PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
SITE GRADING & LOCATION
PLAN - OVERALL

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 34 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Reyhaneh Martin</i> FOR CITY ENGINEER	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Reyhaneh Martin</i>	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION	BY	APPROVED
ADDENDUM C	CH	<i>Reyhaneh Martin</i>
		DATE: 7/07/21
		DATE STARTED
		DATE COMPLETED
		40381-1034-D

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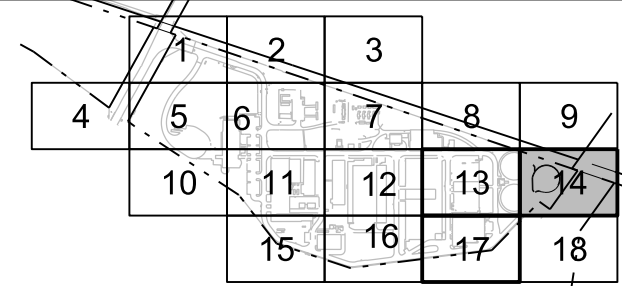
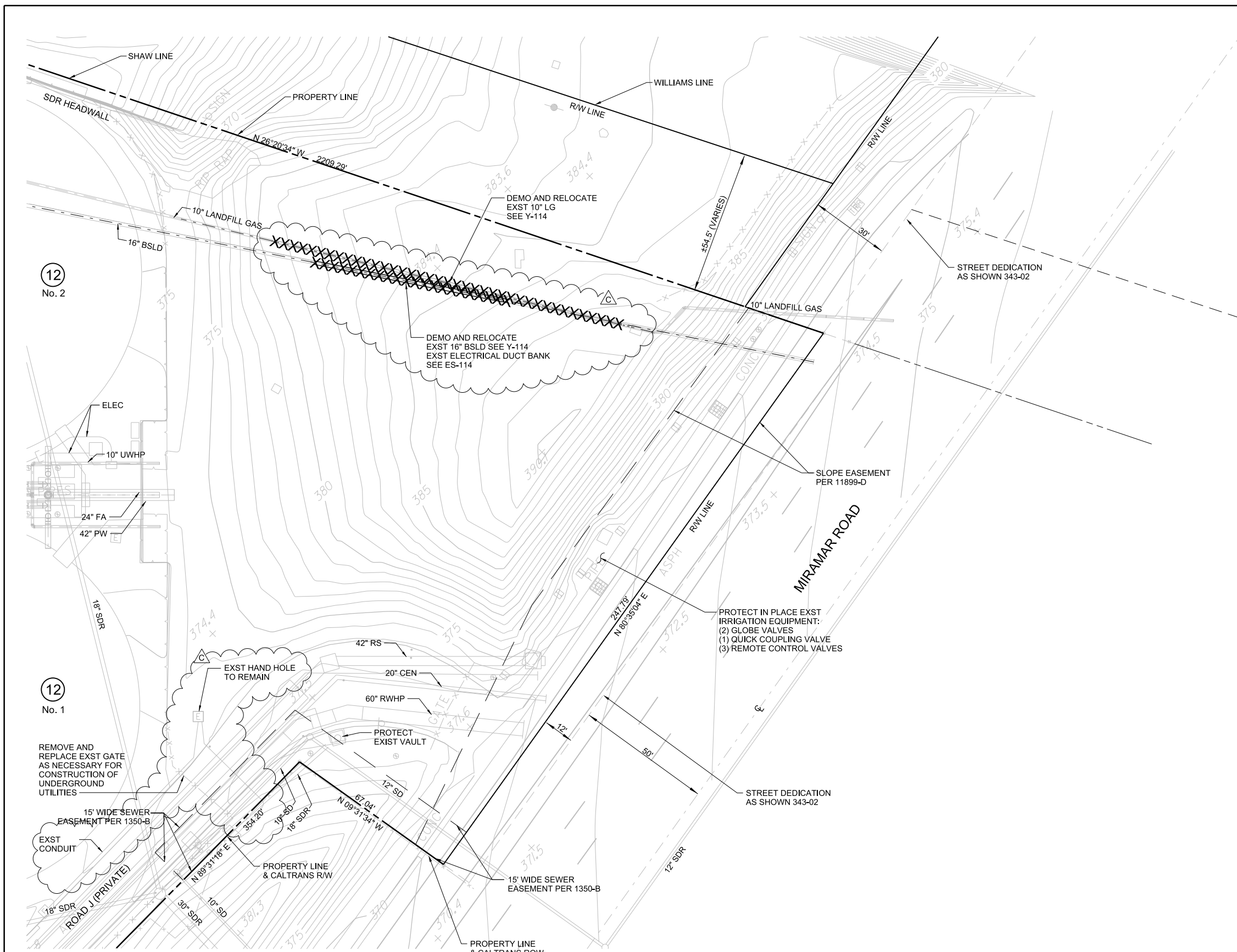
REGISTERED PROFESSIONAL ENGINEER
KEITH W. HANSEN
NO. 60223
Exp. 6-30-2022
CIVIL

DIGITALLY SIGNED 6/24/21

WARNING

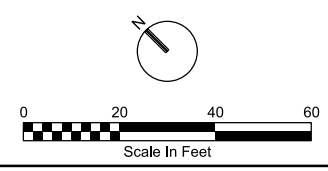
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KEYPLAN
NTS

- NOTES:**
- SEE YARD PIPING PLANS FOR EXISTING AND PROPOSED UNDERGROUND UTILITIES, UNLESS OTHERWISE NOTED.
 - COORDINATE DEMOLITION WITH REMOVAL OF YARD PIPING AND ELECTRICAL SHOWN ON Y AND ES DRAWINGS.
 - PROTECT IN PLACE 60" RWHP AND 20" CEN DURING INSTALLATION OF 30" PEF.
 - EASEMENT REFERENCES PER CITY MAPPING.
 - EXISTING IRRIGATION PIPING NOT SHOWN. DEMOLISH EXISTING IRRIGATION PIPING ENCOUNTERED DURING CONSTRUCTION. RESTORATION OF IRRIGATION LINES TO BE COMPLETED BY OTHERS.



PK1-CX-114

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
SITE DEMOLITION PLAN - AREA 14

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 35 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Reyhaneh Martin</i> FOR CITY ENGINEER	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Reyhaneh Martin</i>	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION	BY	APPROVED
ADDENDUM C	CH	<i>Reyhaneh Martin</i>
		DATE: 7/07/21
		FILM: 260-1709
		CCS27 COORDINATE: 1900-6269
		CCS83 COORDINATE:
CONTRACTOR	DATE STARTED	40381-1035-D
INSPECTOR	DATE COMPLETED	

CONSULTANT

O'Day
CONSULTANTS

2710 Loker Avenue West
Suite 100
Carlsbad, California 92010
760-931-7700
760-931-8680
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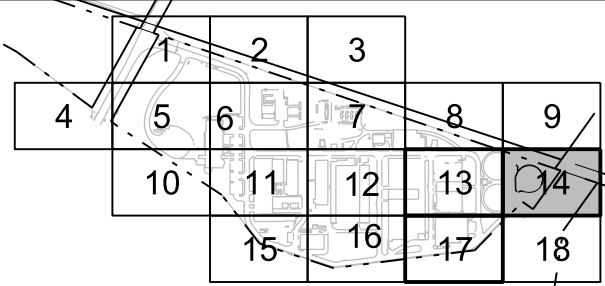
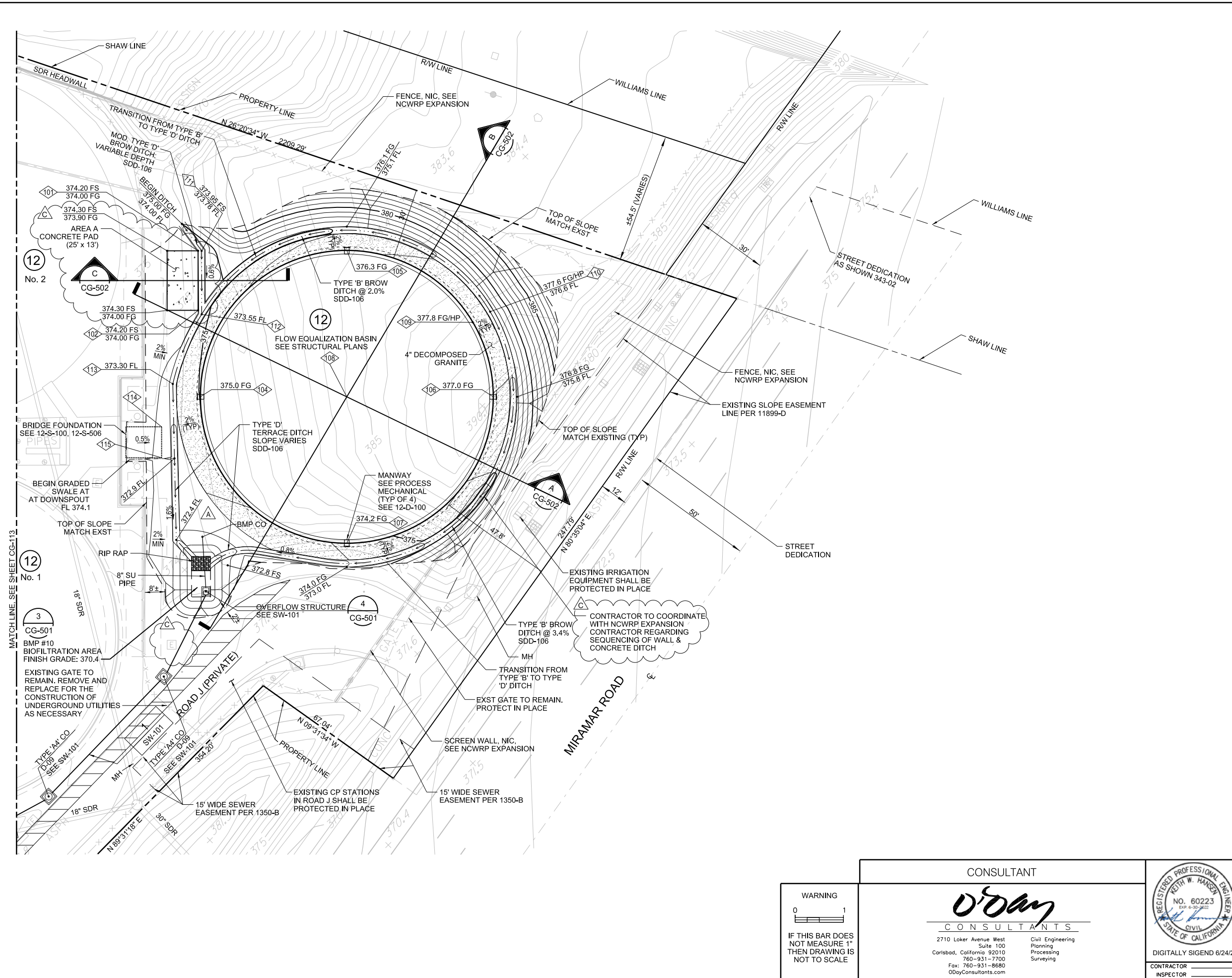
REGISTERED PROFESSIONAL ENGINEER
KEITH W. HANSEN
NO. 60223
Exp. 6-30-2022
CIVIL
STATE OF CALIFORNIA

DIGITALLY SIGNED 6/24/21

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

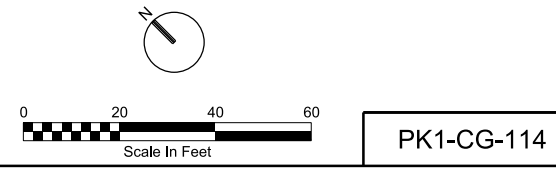


KEYPLAN
NTS

COORDINATE TABLE

NO	DESCRIPTION	NORTHING	EASTING
101	CONC PAD, TOP EDGE OF BROW DITCH	1899988.85	6271308.17
102	CONC PAD, TOP EDGE OF BROW DITCH	1899971.17	6271290.49
104	MANWAY CENTER @ OUTSIDE OF WALL	1899944.83	6271265.47
105	MANWAY CENTER @ OUTSIDE OF WALL	1899944.83	6271352.44
106	MANWAY CENTER @ OUTSIDE OF WALL	1899857.85	6271352.44
107	MANWAY CENTER @ OUTSIDE OF WALL	1899857.85	6271265.47
108	FACILITY 12 CENTER INSIDE CORE WALL Ø 120.0' OUTSIDE CORE WALL Ø 122.0' OUTSIDE FOOTING Ø 126.0'	1899901.34	6271308.95
109	HP AT FACE OF TANK	1899886.17	6271368.55
110	HP AT DITCH FL	1899884.07	6271376.79
111	CL DITCH	1899987.79	6271309.23
112	CL DITCH	1899968.93	6271290.37
113	CL DITCH	1899956.82	6271261.13
114	CORNER CONC PAD ELEV 375.7	1899947.41	6271245.08
115	CORNER CONC PAD ELEV 375.7	1899938.22	6271235.88

- NOTES:**
- SEE YARD PIPING PLANS FOR EXISTING AND PROPOSED UNDERGROUND UTILITIES.
 - THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.
 - GRADING DESIGN IS BASED ON AERIAL TOPOGRAPHY PROVIDED BY THE CITY OF SAN DIEGO. THE CONTRACTOR SHALL VERIFY EXISTING GRADES WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL GRADES ARE IN CONFLICT WITH THE PROPOSED WORK.
 - THE CITY OF SAN DIEGO PUBLIC UTILITIES DEPARTMENT WILL OWN AND MAINTAIN ALL STORM DRAINS. CONTRACTOR SHALL MAINTAIN STORM DRAINS DURING CONSTRUCTION.
 - FOR CORROSION TEST STATIONS SEE Y-114.



PK1-CG-114

NCWRP EXPANSION AND NCWPW INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
SITE GRADING & LOCATION PLAN - AREA 14

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 37 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Richard Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Richard Martin</i>	RCE#: C89963	CHECKED BY: THIEN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
ADDENDUM A	CH	<i>Richard Martin</i>
ADDENDUM C	CH	<i>Richard Martin</i>
		DATE FILM
		6/07/21
		7/07/21
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1037-D
INSPECTOR	DATE COMPLETED	

CONSULTANT

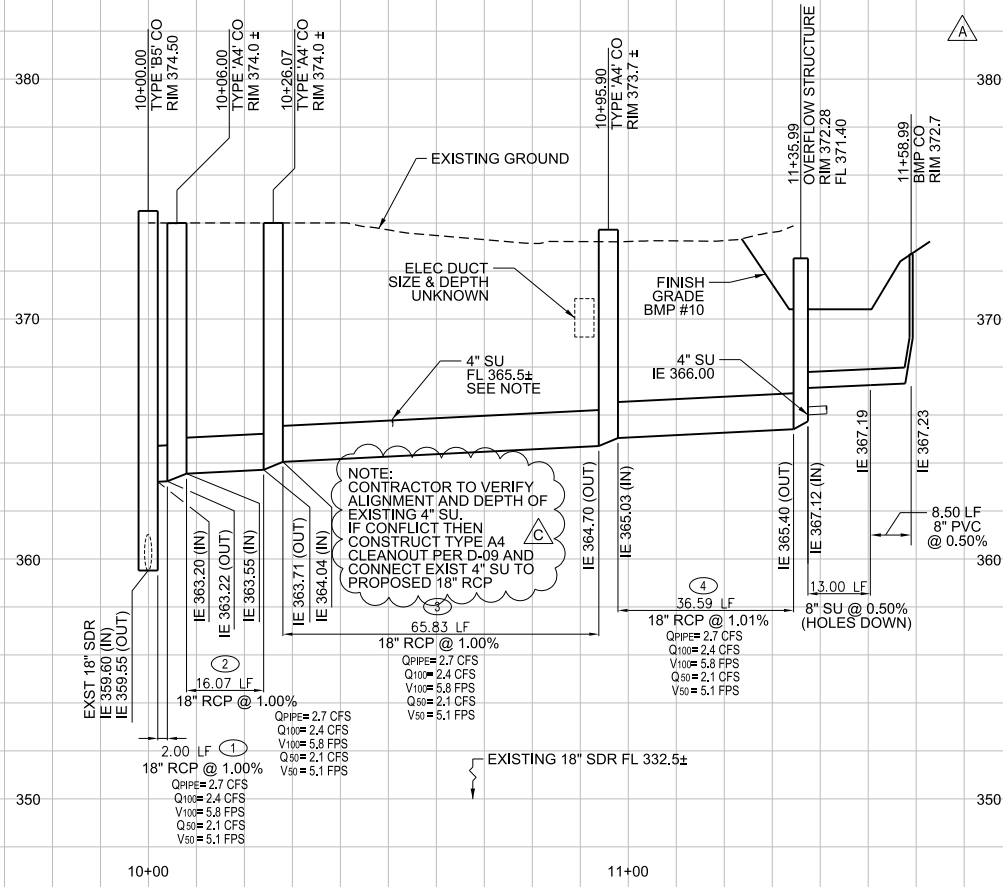
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Suite 100
Carlsbad, California 92010
760-931-7700
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OdayConsultants.com

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REGISTERED PROFESSIONAL ENGINEER
KEITH W. HANSEN
No. 60223
Exp. 6-30-2022
CIVIL
STATE OF CALIFORNIA

DIGITALLY SIGNED 6/24/21



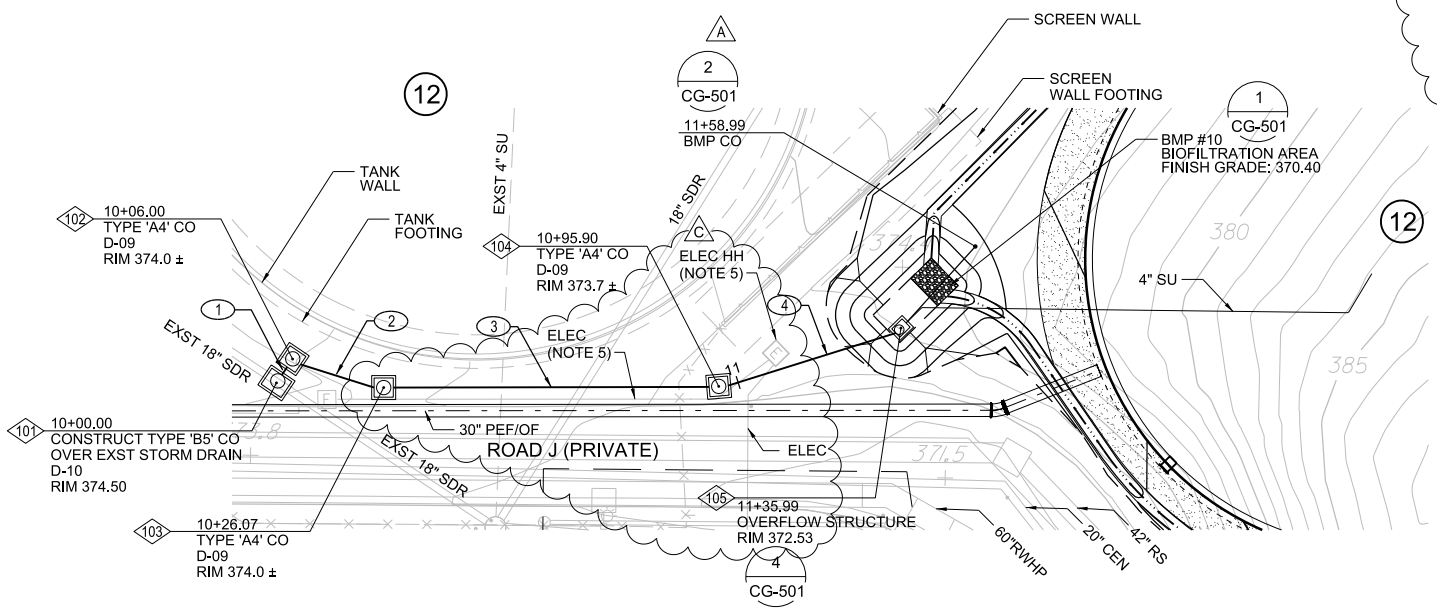
SCALE
1"=20' HORIZ.
1"=4' VERT.

PROFILE - STORM DRAIN '1'
SCALE: HORIZ. 1" = 20'
VERT. 1" = 4'

5. CONTRACTOR SHALL LOCATE AND POTHOLE BURIED UTILITIES AND YARD PIPING AND PROVIDE FINDINGS AND POTENTIAL CONFLICTS TO THE ENGINEER AND CONSTRUCTION MANAGER PRIOR TO FURNISHING MATERIALS AND BEFORE EXCAVATION ACTIVITIES. DURING POTHOLING VERIFY BEARING AND MATERIAL OF UTILITIES TO BE RELOCATED. IF MATERIAL DIFFERS FROM ASSUMED MATERIAL INDICATED IN THE DESIGN, SUPPLEMENTAL MATERIAL SPECIFICATION REQUIREMENTS WILL BE PROVIDED BY THE ENGINEER. ANY DIFFERENCE IN BEARING SHALL BE MODIFIED IN THE FIELD DURING CONSTRUCTION.

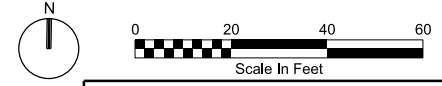
- NOTES:**
- SEE YARD PIPING PLANS FOR EXISTING AND PROPOSED UNDERGROUND UTILITIES.
 - THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING FACILITIES (ABOVEGROUND AND UNDERGROUND) WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL LOCATIONS ARE IN CONFLICT WITH THE PROPOSED WORK.
 - GRADING DESIGN IS BASED ON AERIAL TOPOGRAPHY PROVIDED BY THE CITY OF SAN DIEGO. THE CONTRACTOR SHALL VERIFY EXISTING GRADES WITHIN THE PROJECT SITE SUFFICIENTLY AHEAD OF GRADING TO PERMIT THE REVISION OF THE GRADING PLANS IF IT IS FOUND THAT THE ACTUAL GRADES ARE IN CONFLICT WITH THE PROPOSED WORK.
 - THE CITY OF SAN DIEGO PUBLIC UTILITIES DEPARTMENT WILL OWN AND MAINTAIN ALL STORM DRAINS. CONTRACTOR SHALL MAINTAIN STORM DRAINS DURING CONSTRUCTION.

NO	DELTA/BEARING	RADIUS	LENGTH	REMARKS
1	N 33°07'42" E	---	2.00'	18" RCP - D-1350
2	N 73°29'27" W	---	16.07'	" "
3	N 88°55'29" E	---	65.83'	" "
4	N 71°37'24" E	---	36.59'	" "



PLAN - STORM DRAIN '1'
SCALE: 1" = 20'

NO	DESCRIPTION	NORTHING	EASTING
101	CENTER OF TYPE 'B5' CO	1899871.77	6271079.39
102	CENTER OF TYPE 'A4' CO	1899876.80	6271082.67
103	CENTER OF TYPE 'A4' CO	1899871.17	6271101.75
104	CENTER OF TYPE 'A4' CO	1899872.59	6271171.55
105	CENTER OF OVERFLOW STRUCTURE	1899885.39	6271209.32



PK1-SW-101

NCWRP EXPANSION AND NCWPF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
CIVIL
STORM DRAINAGE PLAN AND PROFILE

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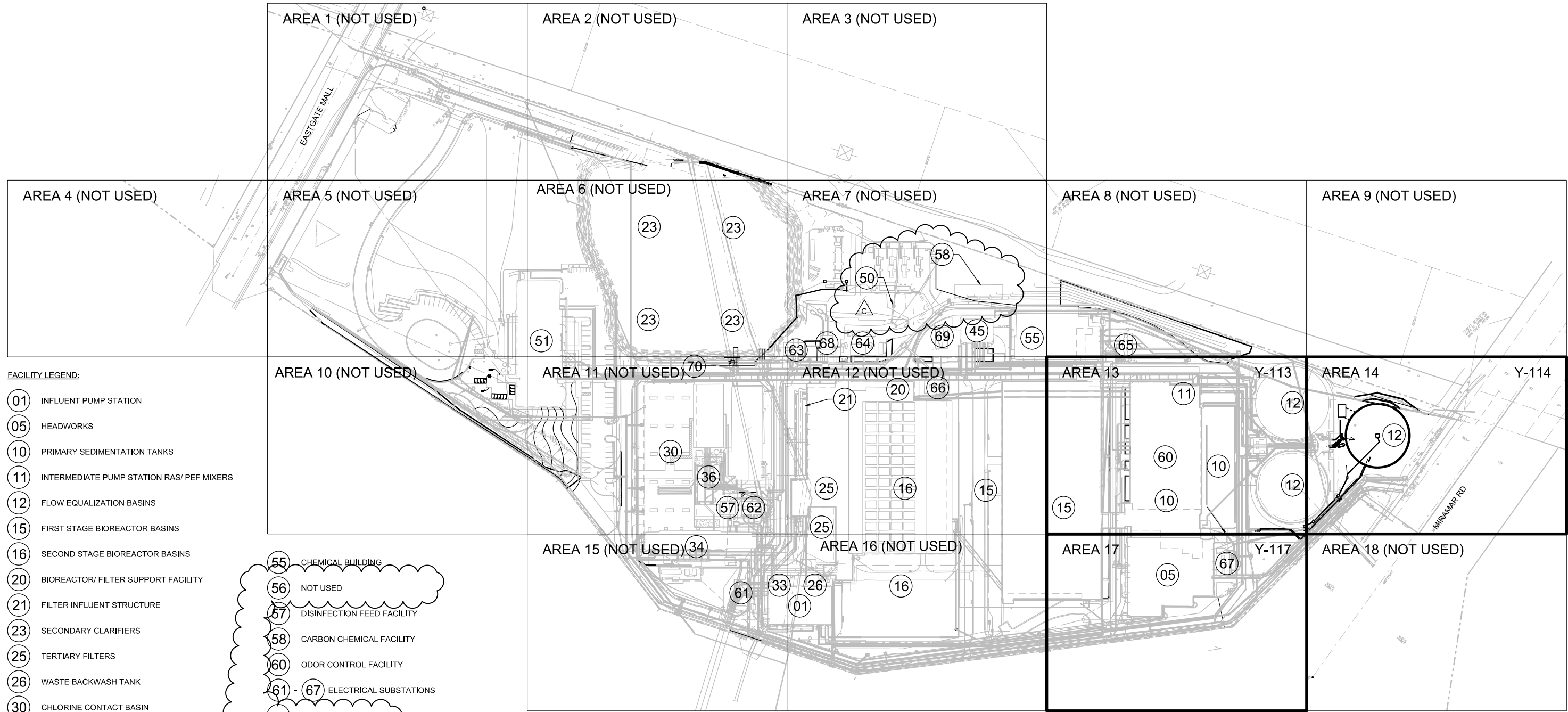
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CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 40 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOczynski PROJECT MANAGER
PRINT DCE NAME: <i>Raymond Martin</i>	PCE#: C89963	DRAWN BY: THIEN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
ADDENDUM A	CH	<i>Raymond Martin</i>
ADDENDUM C	CH	<i>Raymond Martin</i>
DATE	FILE	
6/07/21		260-1709
7/07/21		1900-6269
DATE STARTED		DATE COMPLETED
		40381-1040-D



FACILITY LEGEND:

- 01 INFLUENT PUMP STATION
- 05 HEADWORKS
- 10 PRIMARY SEDIMENTATION TANKS
- 11 INTERMEDIATE PUMP STATION RAS/ PEF MIXERS
- 12 FLOW EQUALIZATION BASINS
- 15 FIRST STAGE BIOREACTOR BASINS
- 16 SECOND STAGE BIOREACTOR BASINS
- 20 BIOREACTOR/ FILTER SUPPORT FACILITY
- 21 FILTER INFLUENT STRUCTURE
- 23 SECONDARY CLARIFIERS
- 25 TERTIARY FILTERS
- 26 WASTE BACKWASH TANK
- 30 CHLORINE CONTACT BASIN
- 33 EFFLUENT DROP STRUCTURE
- 34 EFFLUENT PUMP STATION
- 36 NCPWF INFLUENT PUMP STATION
- 45 BLENDED SLUDGE PUMP STATION
- 50 STORMWATER PUMP STATION
- 51 OPERATIONS BUILDING
- 55 CHEMICAL BUILDING
- 56 NOT USED
- 57 DISINFECTION FEED FACILITY
- 58 CARBON CHEMICAL FACILITY
- 60 ODOR CONTROL FACILITY
- 61 - 67 ELECTRICAL SUBSTATIONS
- 64B NOT USED
- 68 ELECTRICAL MAIN PLANT SWITCHGEAR
- 69 ELECTRICAL SWITCHGEAR SUBSTATION
- 70 SECONDARY CLARIFIER ELECTRICAL BUILDING

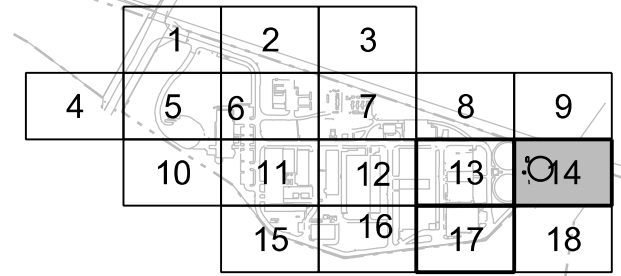
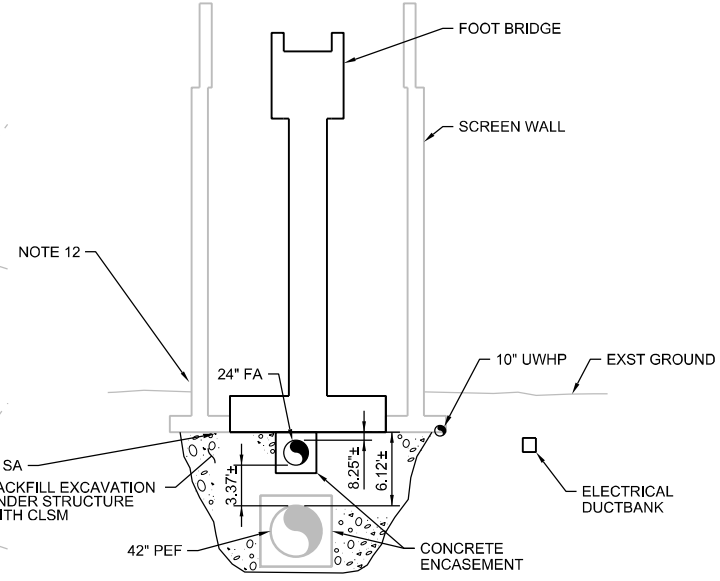
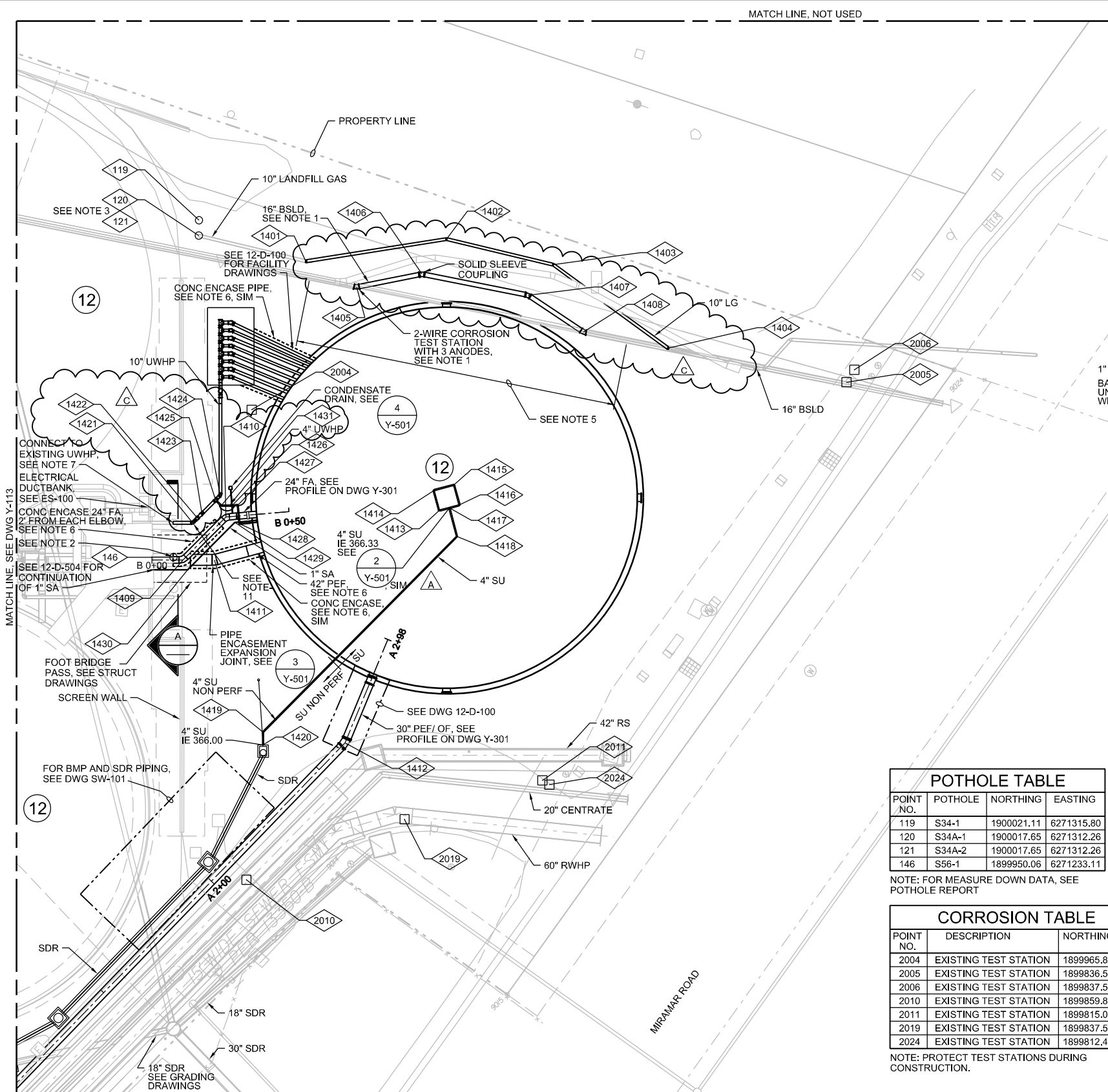
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WARNING
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DIGITALLY SIGNED: 08/24/2021

PK1-Y-100											
NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN YARD PIPING OVERALL PLAN											
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 41 OF 132 SHEETS	WBS B-21059										
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER DATE: 7/7/2021 PRINT DCE NAME: Raymond Martin RCE#: C89963	SUBMITTED BY: MONIKA SMOCZYNSK PROJECT MANAGER CHECKED BY: THIEN-TRAN LONG PROJECT ENGINEER 260-1709 CCS27 COORDINATE 1900-6269 CCS83 COORDINATE										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DESCRIPTION</th> <th>BY</th> <th>APPROVED</th> <th>DATE</th> <th>FIRM</th> </tr> </thead> <tbody> <tr> <td>ADDENDUM C</td> <td>CH</td> <td><i>Raymond Martin</i></td> <td>7/07/21</td> <td></td> </tr> </tbody> </table>	DESCRIPTION	BY	APPROVED	DATE	FIRM	ADDENDUM C	CH	<i>Raymond Martin</i>	7/07/21		DATE STARTED DATE COMPLETED
DESCRIPTION	BY	APPROVED	DATE	FIRM							
ADDENDUM C	CH	<i>Raymond Martin</i>	7/07/21								
CONTRACTOR INSPECTOR	40381-1041-D										

MATCH LINE, NOT USED



KEYPLAN
NTS

- NOTES:**
- THE SHUTDOWN OF THE 16" BSL SHALL BE COORDINATED WITH THE MOPO PLAN. THE RELOCATED 16" BSL SHALL HAVE A POLYURETHANE PROTECTIVE COATING, CATHODIC PROTECTION AND CONTINUITY BONDS INSTALLED AT EACH JOINT. SEE SPECIFICATION 26 42 00 GALVANIC ANODE CATHODIC PROTECTION SYSTEM. EXISTING 16" BSLD SHALL BE REMOVED UNDER PROPOSED EQ TANK LOCATION AND RELOCATED TO THE OUTSIDE OF EQ TANK FOOTING. INSTALL CORROSION TEST STATION AND ANODES PER DETAIL 1 ON SHEET CP-001. FIELD LOCATE TEST STATION AND ANODES AS NEEDED. INSTALL CONTINUITY BONDS PER CP-001
 - EXPOSE THE ENDS OF THE EXISTING 42" PEF, 24" FA AND 10" UWHP PIPES ADJACENT TO THE SCREEN WALL FOOTING. COORDINATE SHUTDOWN OF SERVICE AND REMOVE CAP FROM EACH PIPE. PREPARE PIPE ENDS FOR BELL CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. CONNECT PIPING TO PREPARED ENDS.
 - POTHOLE LOCATIONS S34A-1 AND S34A-2 INDICATE THAT THE 10" LANDFILL GAS LINE IS UNDERNEATH AN UNKNOWN CONCRETE ENCASED UTILITY.
 - FOR FLOW STREAMS NOT IDENTIFIED ON PIPE SCHEDULE, SEE G-014.
 - FIBER OPTIC DUCTBANK. CONFIRM NOT IN USE. REMOVE CONFLICTING DUCTBANK AS NEEDED FOR CONSTRUCTION OF NEW FLOW EQ TANK. ABANDON AND PLUG AT LIMITS OF CONFLICT.
 - CONCRETE ENCASE PIPE, SEE (0330-016A).
 - REMOVE CAP, PREPARE PIPE END PER MANUFACTURER'S RECOMMENDATION. CONNECT PIPE WITH EXISTING BELL, AND PROVIDE MECHANICAL THRUST RESTRAINT.
 - POTHOLING CONFIRMED A 42" STEEL PIPE 46" BELOW THE SURFACE. FIELD VERIFY DEPTH.
 - CONTRACTOR TO PROTECT EXISTING LANDFILL GAS LINE IN PLACE DURING CONSTRUCTION UNLESS SHOWN OTHERWISE.
 - PERIMETER DRAIN PIPE ADJACENT AND UNDER STRUCTURES SHALL BE PERFORATED. ALL OTHER CONNECTING PERIMETER DRAIN PIPE SHALL BE NON-PERFORATED. SEE (Y-501)
 - INSTALL THRUST BLOCK, BACKFILL FITTING WITH CONCRETE. SEE (Y-501)
 - PROVIDE SHORING OR TEMPORARY SUPPORT TO PROJECT EXISTING SCREEN WALL.

PIPING COORDINATE TABLE				
POINT NO.	DESCRIPTION	CL ELEV	NORTHING	EASTING
1401	10" LG, 22.5° BEND *	374.43	1899987.30	6271330.86
1402	10" LG, 22.5° BEND	374.35	1899980.38	6271367.94
1403	10" LG, 22.5° BEND	377.95	1899930.20	6271386.43
1404	10" LG, 22.5° BEND *	379.88	1899884.90	6271393.58
1405	16" BSLD, 22.5° BEND *	363.50	1899969.93	6271336.51
1406	16" BSLD, 22.5° BEND	363.50	1899960.64	6271350.41
1407	16" BSLD, 22.5° BEND	363.50	1899924.32	6271374.68
1408	16" BSLD, 22.5° BEND *	363.50	1899907.92	6271377.94
1409	24" FA, 45° BEND	370.08	1899947.25	6271234.67
1410	24" FA, 40° BEND	369.09	1899947.25	6271254.25
1411	42" PEF, 15° BEND	363.57	1899940.10	6271241.82
1412	30" PEF/OF, 22.5° BEND	368.25	1899868.59	6271229.90
1413	4" SU, 90° BEND	366.50	1899900.09	6271304.29
1414	4" SU, 90° BEND	366.50	1899906.01	6271307.71
1415	4" SU, 90° BEND	366.50	1899902.59	6271313.62
1416	4" SU, 90° BEND	366.50	1899896.67	6271310.21
1417	4" SU, TEE	366.50	1899898.38	6271307.25
1418	4" SU, 60° BEND	366.45	1899890.15	6271302.49
1419	4" SU, 45° BEND	366.06	1899889.72	6271213.61
1420	4" SU, END PIPE AT MH	366.00	1899886.81	6271210.73
1421	10" UWHP, 45° VERT BEND DOWN	371.92	1899953.51	6271245.37
1422	10" UWHP, 90° VERT BEND ROLLED UP	371.92	1899953.51	6271247.23
1423	10" UWHP, 90° BEND	369.60	1899953.51	6271249.55
1424	10" UWHP, 90° BEND	369.60	1899953.51	6271258.01
1425	10" x 4" UWHP TEE	369.60	1899953.51	6271255.76
1426	4" UWHP 45° BEND UP	369.68	1899948.41	6271258.26
1427	4" UWHP 90° BEND ROLLED DOWN 45°	371.45	1899947.29	6271259.65
1428	4" UWHP 90° BEND	371.45	1899942.59	6271255.79
1429	1" SA 45° BEND	370.34	1899943.99	6271255.06
1430	1" SA 45° BEND	370.34	1899943.99	6271233.46
1431	4" UWHP 45° BEND	369.60	1899950.93	6271255.76

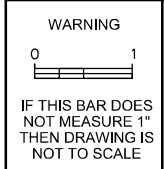
* LOCATIONS AND ELEVATIONS ARE APPROXIMATE, FIELD VERIFY

POTHOLE TABLE			
POINT NO.	POTHOLE	NORTHING	EASTING
119	S34-1	1900021.11	6271315.80
120	S34A-1	1900017.65	6271312.26
121	S34A-2	1900017.65	6271312.26
146	S56-1	1899950.06	6271233.11

NOTE: FOR MEASURE DOWN DATA, SEE POTHOLE REPORT

CORROSION TABLE			
POINT NO.	DESCRIPTION	NORTHING	EASTING
2004	EXISTING TEST STATION	1899965.86	6271284.59
2005	EXISTING TEST STATION	1899836.50	6271426.50
2006	EXISTING TEST STATION	1899837.55	6271431.11
2010	EXISTING TEST STATION	1899859.87	6271176.16
2011	EXISTING TEST STATION	1899815.03	6271266.33
2019	EXISTING TEST STATION	1899837.59	6271226.01
2024	EXISTING TEST STATION	1899812.47	6271266.93

NOTE: PROTECT TEST STATIONS DURING CONSTRUCTION.



CONSULTANT

REGISTERED PROFESSIONAL ENGINEER
MATTHEW JOHN BALDWIN
C 7181
CIVIL
STATE OF CALIFORNIA

DIGITALLY SIGNED: 06/28/2021

CONTRACTOR _____
INSPECTOR _____

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 43 OF 132 SHEETS

APPROVED: *Raymond Martin* DATE: 7/7/2021
FOR CITY ENGINEER: _____ DATE: C89963

PRINT DCE NAME: *Raymond Martin* PCE# _____

DESCRIPTION	BY	APPROVED	DATE	FIRM
ADDENDUM C	CH	<i>Raymond Martin</i>	7/7/21	

DATE STARTED _____
DATE COMPLETED _____

PK1-Y-114

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN

YARD PIPING PLAN - AREA 14

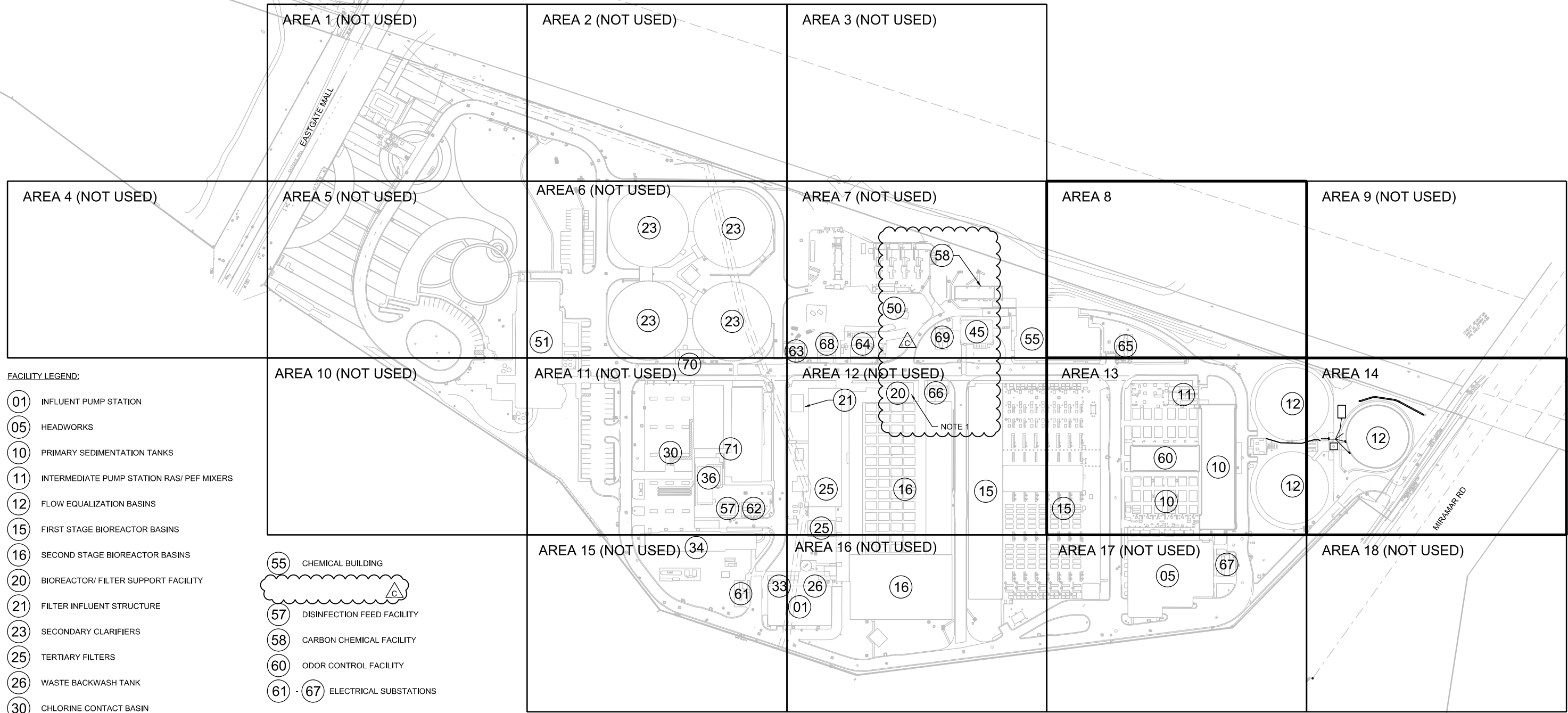
WBS: B-21059

MONIKA SMOCZYNSKI
PROJECT MANAGER

THIEN-TRAN LONG
PROJECT ENGINEER

260-1709
CCS27 COORDINATE
1900-6269
CCS83 COORDINATE

40381-1043-D



FACILITY LEGEND:

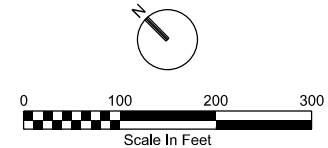
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- 61 - 67 ELECTRICAL SUBSTATIONS
- 68 ELECTRICAL MAIN PLANT SWITCHGEAR
- 69 ELECTRICAL SWITCHGEAR SUBSTATION
- 70 SECONDARY CLARIFIER ELECTRICAL BUILDING
- 71 NCPWF IPS ELECTRICAL SUBSTATION

NOTE:

NEW FACILITIES SHOWN ON AREA PLANS (NOT USED) ARE NIC AND PART OF WORK BY OTHERS.

1. LOCATION OF FIBER CONNECTION TO 20PCM03D SEE NOTES ON DRAWINGS ES-113 AND ES-114. SEE RECORD DRAWINGS FOR EXISTING DUCT BANK ROUTING



PK1-ES-100

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
ELECTRICAL
SITE PLAN - OVERALL

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 49 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Rayhanah Martin</i> FOR CITY ENGINEER	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Rayhanah Martin</i>	RCE#: C89963	PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION: ADDENDUM C	BY: CH	DATE: 7/07/21
APPROVED: <i>Rayhanah Martin</i>	DATE STARTED: 7/07/21	FILM: 260-1709
		1900-6269
		40381-1049-D

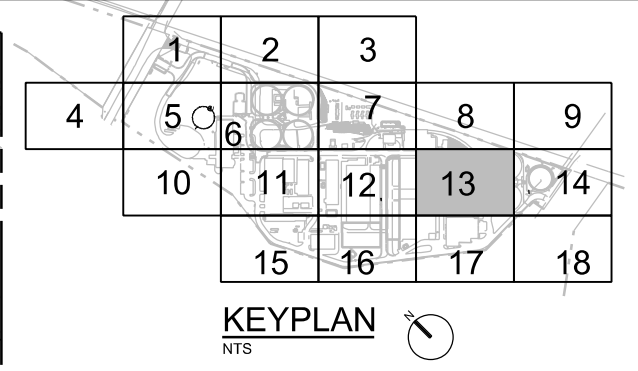
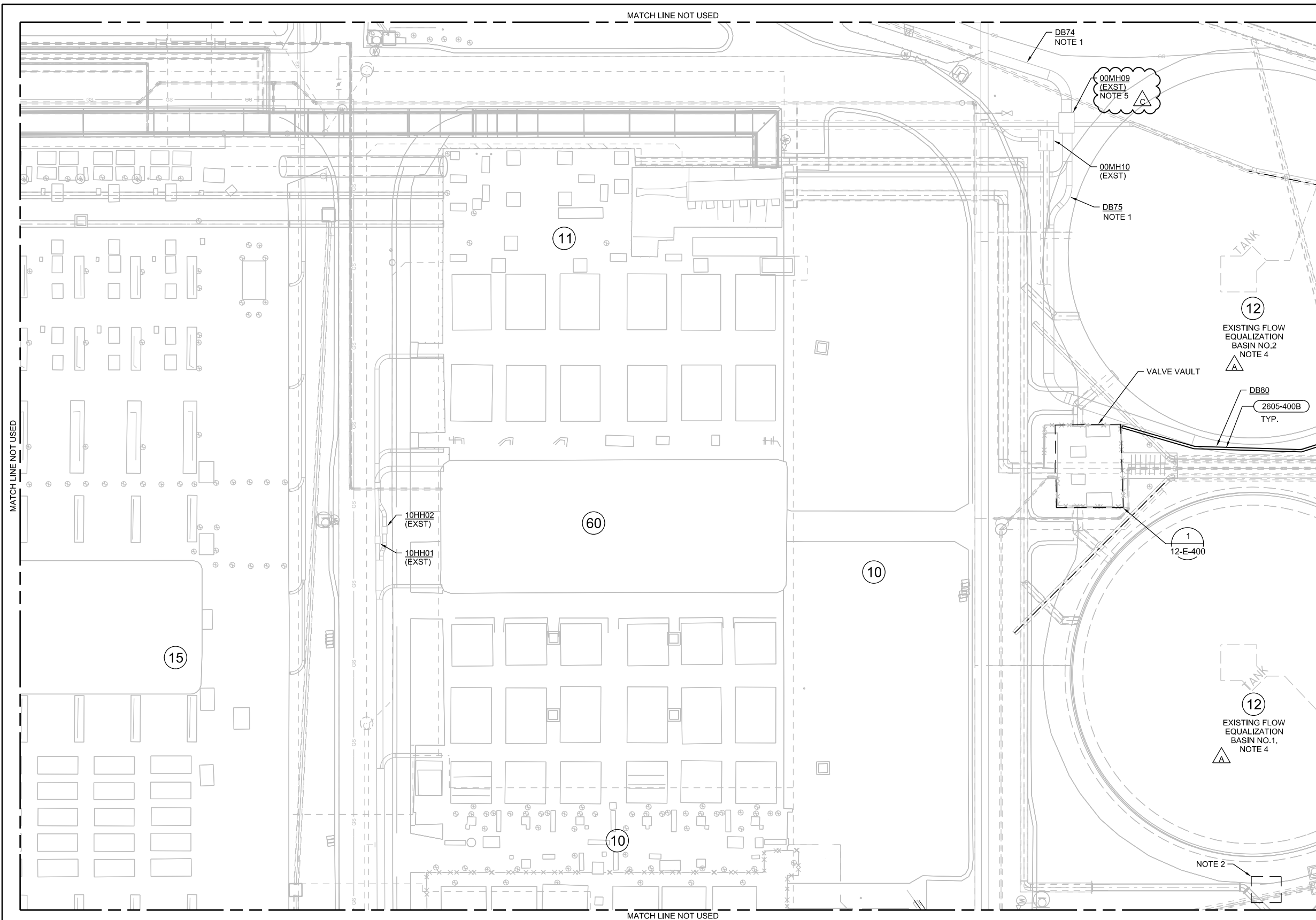
CONSULTANT

WARNING

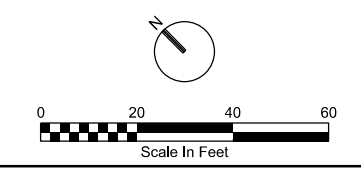
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REGISTERED PROFESSIONAL ENGINEER
STEVEN STEPHEN HANSEN
No. E21673
ELECTRICAL
STATE OF CALIFORNIA

DIGITALLY SIGNED 6/24/21



- GENERAL NOTES:**
- A. ALL EXTERIOR LIGHTING INSTALLATIONS AND LAMP TYPE SHALL COMPLY WITH CITY OF SAN DIEGO OUTDOOR LIGHTING REGULATION 142.0740.
- NOTES:**
1. UTILIZE EXISTING SPARE CONDUITS IN DUCTBANK FOR NEW INSTRUMENTATION AND CONTROL WIRING REQUIRED FOR NEW EQUALIZATION BASIN. REFER TO DUCTBANK AND CONDUIT ROUTE SCHEDULES.
 2. REMOVE AND REINSTALL EXISTING POWER PEDESTAL AND NEARBY BURIED CONDUITS AND CONDUCTORS TO ACCOMMODATE NEW PIPING INSTALLATION.
 3. SEE YARD PIPING AND GRADING DRAWINGS FOR ADDITIONAL PIPING.
 4. LOCATION OF LEVEL INSTRUMENTS ON BASINS NO.1 AND NO.2 SHALL BE AT ONE OF THE EXISTING FOUR FOUL AIR VENT COVERS. FOR BASIN NO.1, INSTRUMENT 12LET501 SHALL BE LOCATED AT THE EASTERN VENT COVER. FOR BASIN NO.2, INSTRUMENT 12LET521 SHALL BE LOCATED AT THE SOUTHERN VENT COVER. REFER TO DETAIL 4027-260 FOR INSTALLATION DETAILS. CONDUIT ROUTING SHALL FOLLOW EXISTING RACEWAY ROUTING THAT EXTENDS UP THE SIDES OF BASIN NO.1 AND 2.
 5. PRESERVE 2 EA 24 STRAND FIBER FOR PPS AND MBC COMMUNICATIONS LOCATED IN 00MH09. FIBER SHALL BE TEMPORARILY SPLICED AND ROUTED AROUND CONSTRUCTION FOR EQUALIZATION BASIN 3. SEE DRAWING ES-114 FOR OTHER CONNECTION OF TEMPORARY FIBER. PROVIDE NEW PERMANENT FIBER THROUGH RELOCATED DUCT BANK AND 00MH09 BACK TO 20PCM03D. SEE NETWORK DIAGRAMS AND SPECIFICATION SECTIONS 01 31 13, PROJECT CONTROL 2 AND 40 95 34, FIBER OPTICS AND INSTALLATION.



PK1-ES-113

NCWRP EXPANSION AND NCPWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN
ELECTRICAL
 SITE PLAN - AREA 13

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 51 OF 132 SHEETS		WBS B-21059
APPROVED FOR CITY ENGINEER Reyhaneh Martin PRINT DCE NAME	DATE 4/8/2021 C89963 RCE#	SUBMITTED BY MONIKA SMO CZYNSKI PROJECT MANAGER
DESCRIPTION	BY	APPROVED
ADDENDUM A	CH	Reyhaneh Martin
ADDENDUM C	CH	Reyhaneh Martin
DATE	FILM	
6/07/21		
7/07/21		
CONTRACTOR		DATE STARTED
INSPECTOR		DATE COMPLETED
		40381-1051-D

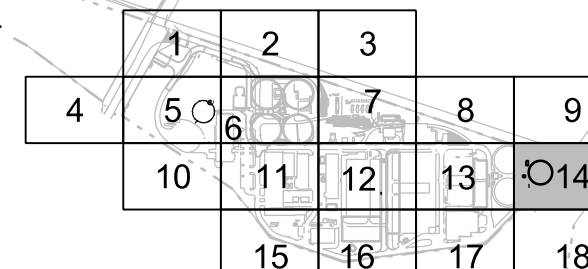
CONSULTANT

REGISTERED PROFESSIONAL ENGINEER
 STATE OF CALIFORNIA
 ELECTRICAL
 STEPHEN HARBERT
 No. E21673

DIGITALLY SIGNED 6/24/21

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MATCH LINE NOT USED



KEYPLAN
NTS

GENERAL NOTES:
A. ALL EXTERIOR LIGHTING INSTALLATIONS AND LAMP TYPE SHALL COMPLY WITH CITY OF SAN DIEGO OUTDOOR LIGHTING REGULATION 142.0740.

NOTES:
1. UTILIZE EXISTING SPARE CONDUITS IN DUCTBANK FOR NEW CONTROL/INSTRUMENTATION WIRING REQUIRED FOR NEW EQUALIZATION BASIN. REFER TO DUCTBANK AND CONDUIT ROUTE SCHEDULES.

2. FIELD VERIFY LOCATION OF EXISTING DUCT BANKS AND COORDINATE REMOVAL/RELOCATION OF DUCT BANKS WITH ROUTING OF NEW STORM DRAIN AND CLEAN OUTS SHOWN ON DRAWING SW-101. PROVIDE NEW BURIED CONDUIT TO EXTENT NECESSARY TO RECONNECT EXISTING PEDESTALS AND IRRIGATION CONTROLLER IN ACCORDANCE WITH DETAIL 2605-420. PROTECT AND RECONNECT EXISTING WIRING TO RECEPTACLES. REFER TO YARD PIPING SHEETS FOR NEW PIPING INSTALLATIONS. SEE RECORD DRAWINGS FOR EXTENT OF EXISTING CONDUIT.

3. SEE YARD PIPING AND GRADING DRAWINGS FOR ADDITIONAL PIPING.

4. CONDUITS SHALL EXIT ELECTRICAL EQUIPMENT AREA ABOVE THE EXISTING CHAIN LINK GATES, ROUTED ALONG THE NORTH FACE OF THE SCREEN WALL. ONCE CLEAR OF THE ELECTRICAL EQUIPMENT AREA, TURN CONDUITS UP AND EXTEND OVER THE TOP OF THE WALL AND DOWN THE WALL INTO THE DUCTBANKS AS INDICATED. PROVIDE NECESSARY LB'S OR JUNCTION BOXES TO FACILITATE PULL POINTS.

5. REFER TO 12-E-101 FOR EXTENSION OF CONDUITS UP TANK WALL.

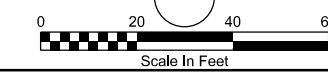
6. REFER TO 12-E-100 FOR EXTENSION OF CONDUITS AROUND TANK.

7. PROVIDE TRAFFIC RATED CONCRETE BOX.

8. LOCATION OF LEVEL INSTRUMENTS ON BASINS NO.1 AND NO.2 SHALL BE AT ONE OF THE EXISTING FOUR FOUL AIR VENT COVERS. FOR BASIN NO.1, INSTRUMENT 12LET501 SHALL BE LOCATED AT THE EASTERN VENT COVER, FOR BASIN NO.2, INSTRUMENT 12LET521 SHALL BE LOCATED AT THE SOUTHERN VENT COVER, REFER TO DETAIL 4027-260 FOR INSTALLATION DETAILS. CONDUIT ROUTING SHALL FOLLOW EXISTING RACEWAY ROUTING THAT EXTENDS UP THE SIDES OF BASIN NO.1 AND 2.

9. PRESERVE 2 EA 24 STRAND FIBER FOR PPS AND MBC COMMUNICATIONS LOCATED IN EXISTING HANDHOLE MWWDF-FO. FIBER SHALL BE TEMPORARILY SPLICED AND ROUTED AROUND CONSTRUCTION FOR EQUALIZATION BASIN 3. SEE DRAWING ES-113 FOR OTHER CONNECTION OF TEMPORARY FIBER. PROVIDE NEW PERMANENT FIBER THROUGH RELOCATED DUCT BANK AND 00MH09 BACK TO 20PCM03D. SEE NETWORK DIAGRAMS AND SPECIFICATION SECTIONS 01 31 13, PROJECT CONTROLS AND 40 95 34, FIBER OPTICS AND INSTALLATION.

10. CUT EXISTING CONCRETE ENCASED FIBER DUCT BANK AT POINTS SHOWN. CUT FIBER AT NORTH END AND COIL BACK TO EXISTING MWWDF-FO HANDHOLE FOR TEMPORARY SPLICE. PRESERVE A MINIMUM OF 30' OF EXISTING FIBER IN HANDHOLE FOR TEMPORARY AND PERMANENT USE. NEW FIBER SHALL BE SPLICED FROM EXISTING HANDHOLE MWWDF-FO TO 20PCM03D.



PK1-ES-114

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC UTILITIES DEPARTMENT
SHEET 52 OF 132 SHEETS
ELECTRICAL
SITE PLAN - AREA 14

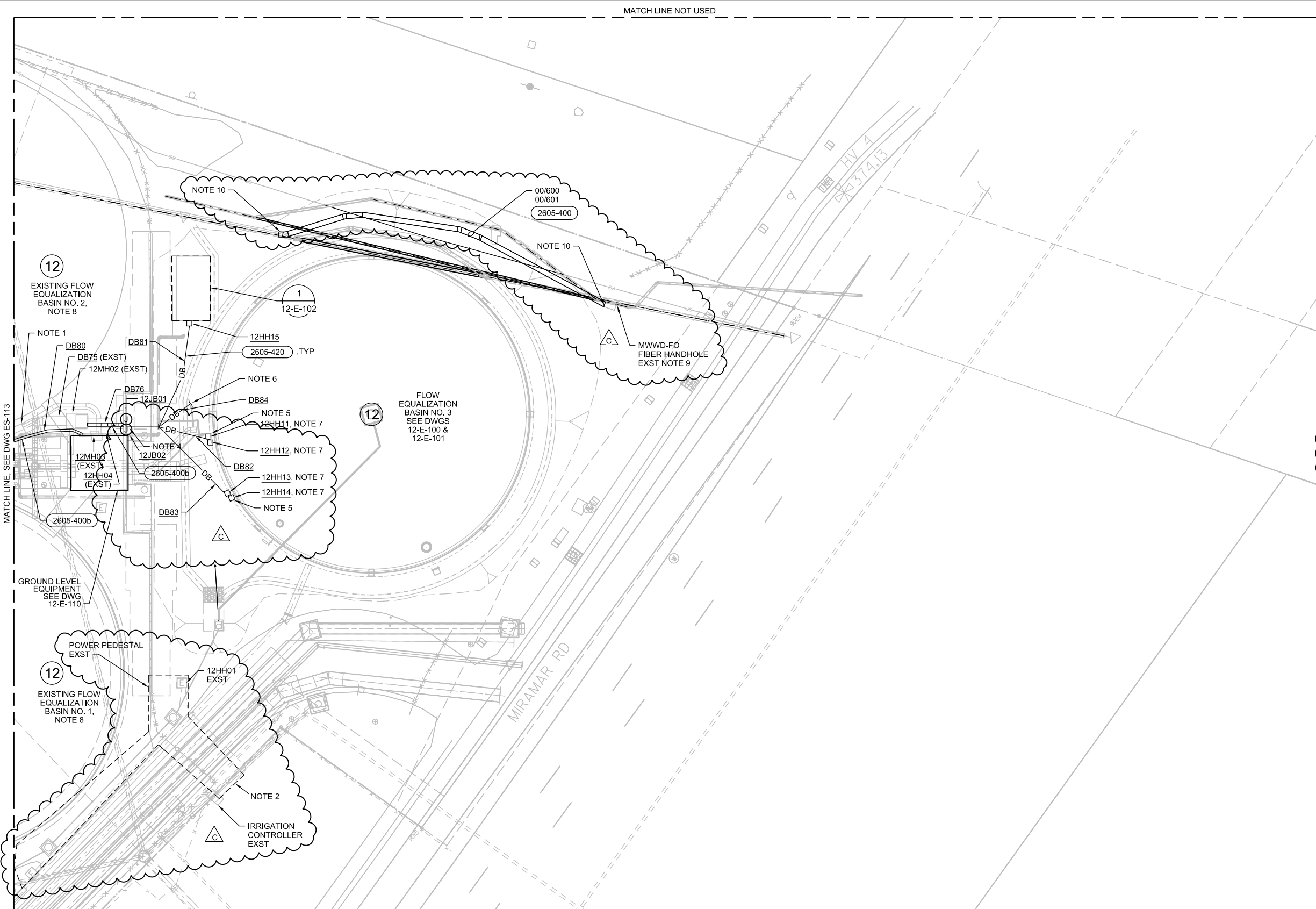
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 52 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Reyhaneh Martin</i> FOR CITY ENGINEER	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOJCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Reyhaneh Martin</i>	PCE#: C89963	PROJECTED BY: THEIN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
ADDENDUM C	CH	<i>Reyhaneh Martin</i>
		DATE
		7/07/21
		FILM
		260-1709
		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
CONTRACTOR	DATE STARTED	40381-1052-D
INSPECTOR	DATE COMPLETED	



DIGITALLY SIGNED 6/24/21

CONSULTANT

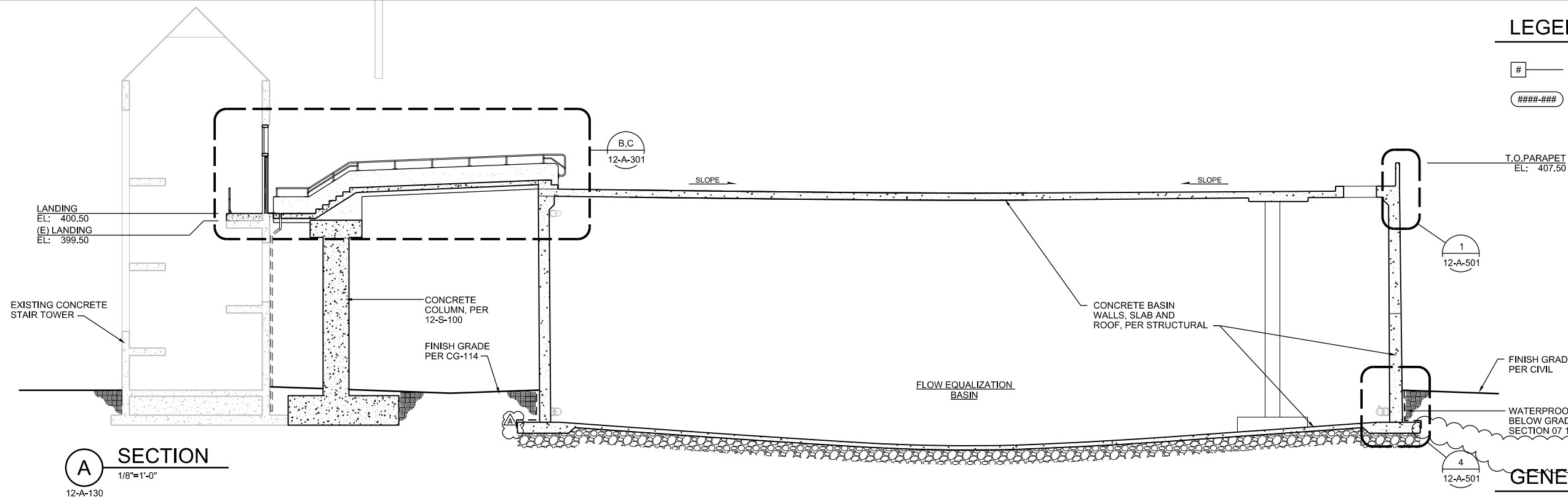
WARNING
0 1
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MATCH LINE NOT USED

LEGEND

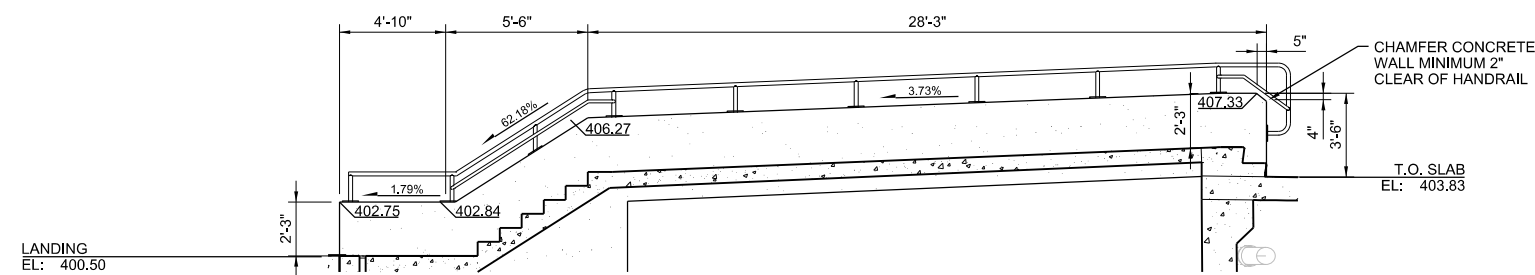
- # — WALL TYPE, REFER TO SHEET PK1-G-016
- ####-### TYPICAL DETAIL, REFER TO 'SD' SHEETS



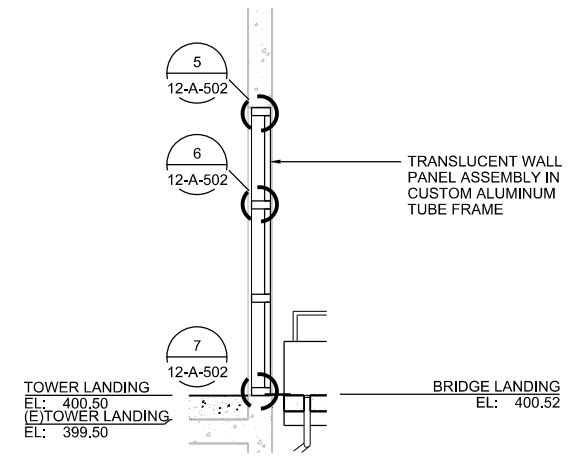
A SECTION
1/8"=1'-0"
12-A-130

GENERAL NOTES

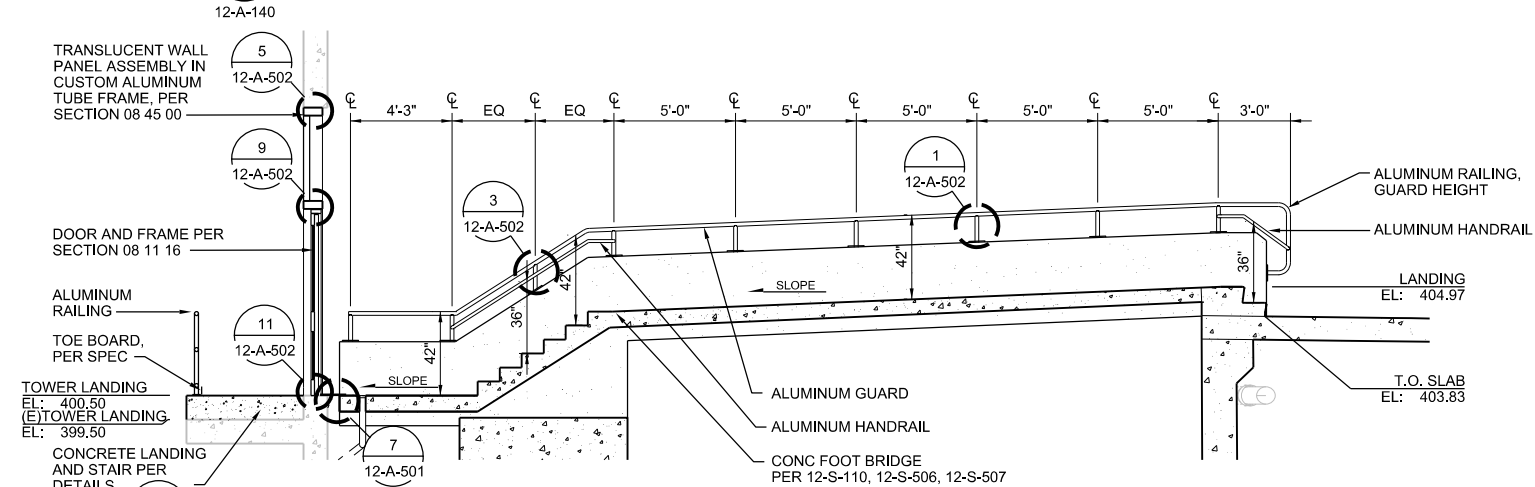
1. ALL NEW EXTERIOR CONCRETE SLAB SURFACES TO RECEIVE TYPE S-5 BROOM FINISH PER SECTION 03 30 00.
 2. PROVIDE EMBEDDED SAFETY NOSINGS PER SECTION 05 50 00 AT ALL EXTERIOR STAIR TREADS AND UPPER APPROACH, CONTRASTING IN COLOR TO TREAD, EXTENDING THE FULL WIDTH OF TREAD OR APPROACH, AND BE AT LEAST AS SLIP RESISTANT AS THE TREAD SURFACE. REFER TO DETAIL: **8** 12-A-501
 3. PROVIDE TRANSITION BETWEEN NEW AND EXISTING RAILING SYSTEMS SUCH THAT THERE IS NO CHANGE IN SURFACE PLANE ON THE HANDRAIL. IF NEW SYSTEM DOES NOT TRANSITION SMOOTHLY TO EXISTING, REMOVE AND REPLACE EXISTING RAILING TO NEAREST CORNER.
 4. PROVIDE CONTINUOUS HANDRAILS ON BOTH SIDES OF ALL NEW STAIRS, WITH EXTENSIONS AT TOP AND BOTTOM OF FLIGHT. HANDRAIL SHALL EXTEND HORIZONTALLY NOT LESS THAN 12 INCHES PAST THE TOP RISER AND CONTINUE TO SLOPE FOR THE DEPTH OF ONE TREAD BEYOND THE BOTTOM RISER.
 5. PROVIDE TOE BOARD ON RAILINGS WHERE LANDING IS OPEN TO BELOW.
 6. RETURN ENDS OF HANDRAIL TO GUARD POST AT BOTH ENDS, OR TO FLOOR SLAB WHERE INDICATED.
 7. PROVIDE RAILING PER STANDARD DETAIL, **0552-001**
- WITH SUPPLEMENTAL DETAILS WHERE INDICATED
- PROVIDE SPLICE FITTINGS AND JOINTS AS NECESSARY FOR INSTALLATION, PER DETAILS: **2** 12-A-502 **4** 12-A-503
- PROVIDE EXPANSION JOINTS AS REQUIRED BY MANUFACTURER BASED ON RAILING LENGTH, PER DETAIL: **4** 12-A-502



B SECTION - BRIDGE WALL ONLY
1/4"=1'-0"
12-A-140



D SECTION
1/4"=1'-0"
12-A-140



C SECTION
1/4"=1'-0"
12-A-140

CONSULTANT

MANUEL ONCINA ARCHITECTS INC.
ARCHITECTURE
PLANNING
INTERIORS
5711 La Jolla Blvd
La Jolla, CA 92037
858/459-1221 PH
858/459-1214 FX
www.oncinarc.com

MOA

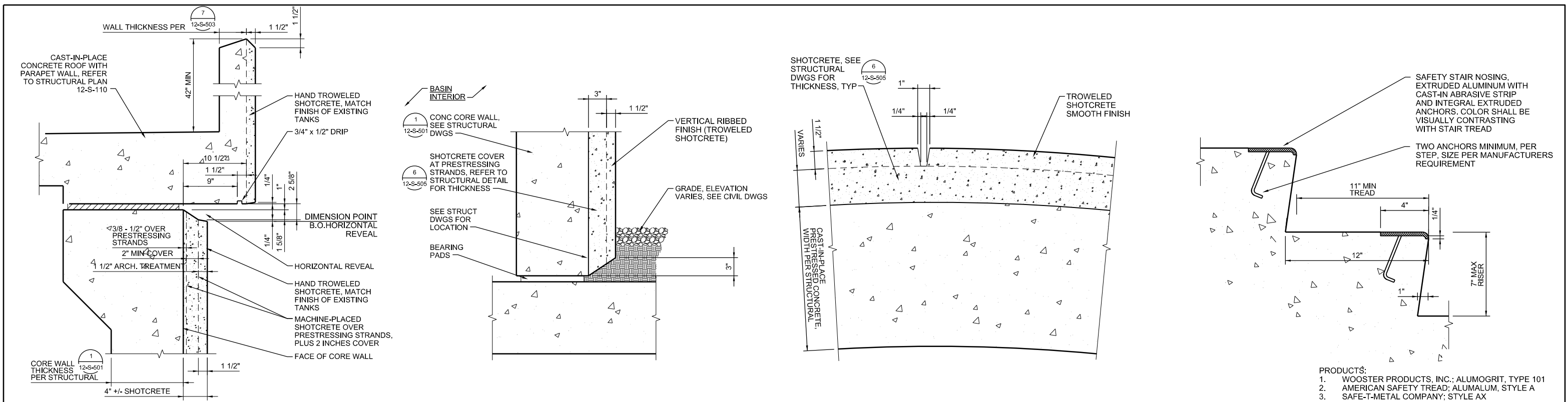
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ARCHITECT

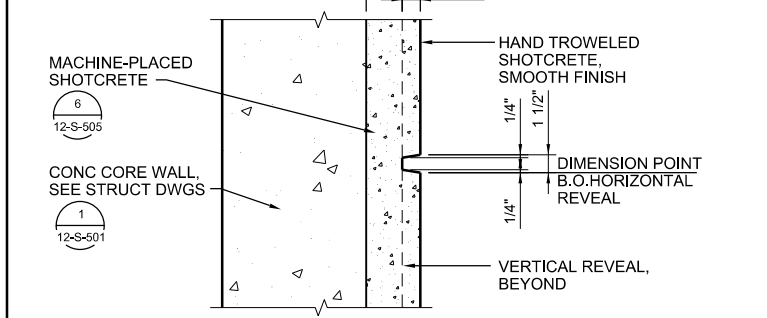
THIEN-LONG TRAN
PROJECT ENGINEER

DATE STARTED _____
DATE COMPLETED _____

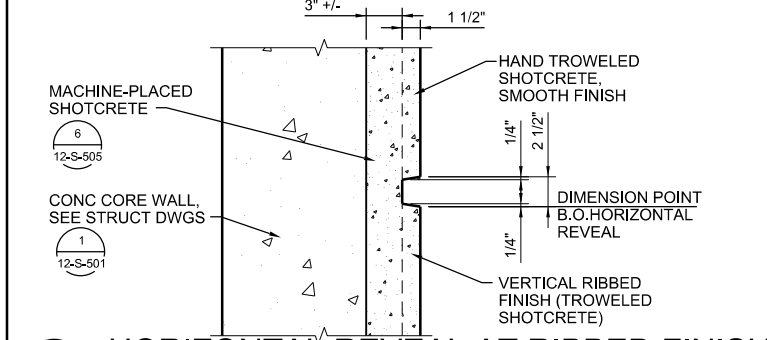
PK1-12-A-301		CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 59 OF 132 SHEETS		WBS B-21059
APPROVED: <i>Raymond Martin</i> FOR CITY ENGINEER		DATE: 7/7/2021		SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Raymond Martin</i>		RCE#: C89963		PROJECT ENGINEER: THIEN-LONG TRAN
DESCRIPTION	BY	APPROVED	DATE	FILM
ADDENDUM C	CH	<i>Raymond Martin</i>	7/07/21	260-1709 CCS27 COORDINATE 1900-6269 CCS83 COORDINATE
				40381-1059-D



1 PARAPET AND HORIZONTAL REVEAL
 1-1/2"=1'-0"
 12-A-130
 12-A-201
 12-A-301

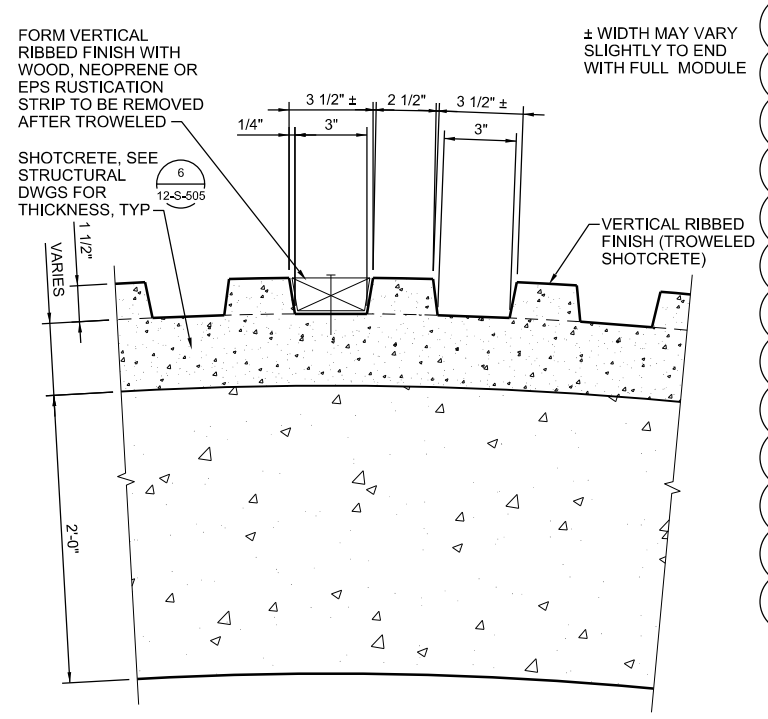


2 HORIZONTAL REVEAL, FIELD
 1-1/2"=1'-0"
 12-A-201



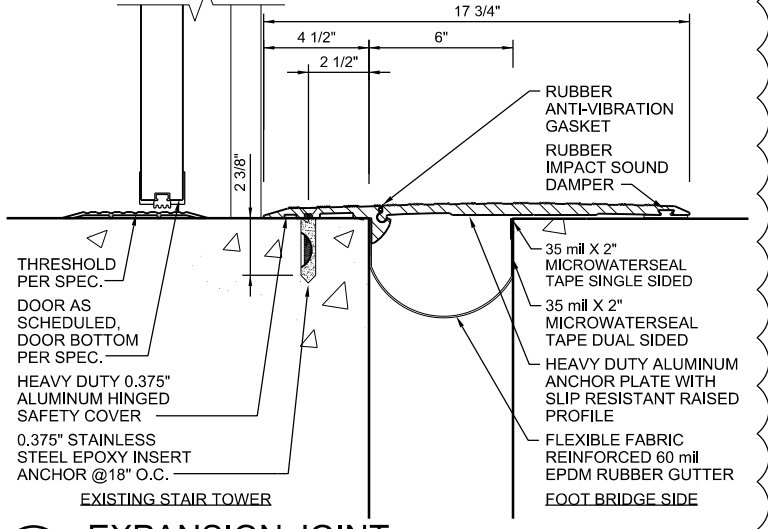
3 HORIZONTAL REVEAL AT RIBBED FINISH
 1-1/2"=1'-0"
 12-A-201

4 HORIZONTAL REVEAL, WALL BASE
 1-1/2"=1'-0"
 12-A-301



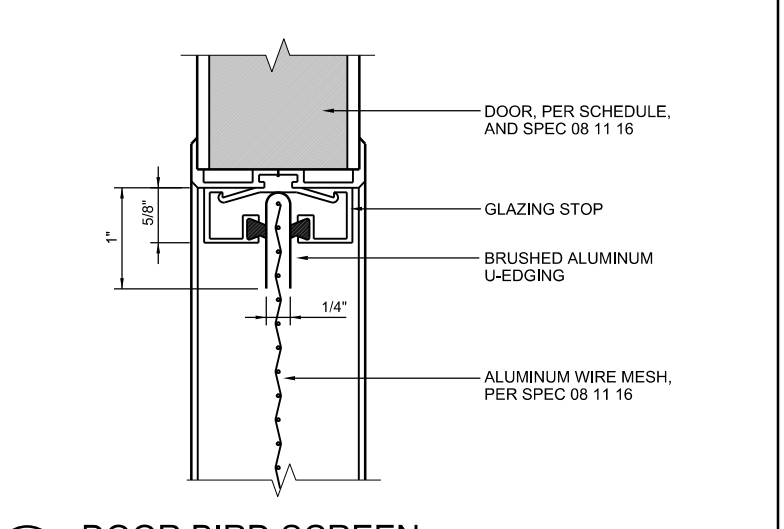
5 VERTICAL RIBBED FINISH
 1-1/2"=1'-0"
 12-A-201

6 VERTICAL REVEAL, FIELD
 1-1/2"=1'-0"
 12-A-201



7 EXPANSION JOINT
 3"=1'-0"
 12-A-301
 12-A-140

8 TYPICAL STAIR RISER
 3"=1'-0"
 12-A-140



9 DOOR BIRD SCREEN
 6"=1'-0"
 12-A-202

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 La Jolla, CA 92037
 858/459-1214 PH
 858/459-1214 FX
 www.oncinarc.com

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LICENSED ARCHITECT
 MONIKA S. BANGS
 C-33175
 7-31-21

DIGITALLY SIGNED 6/25/21

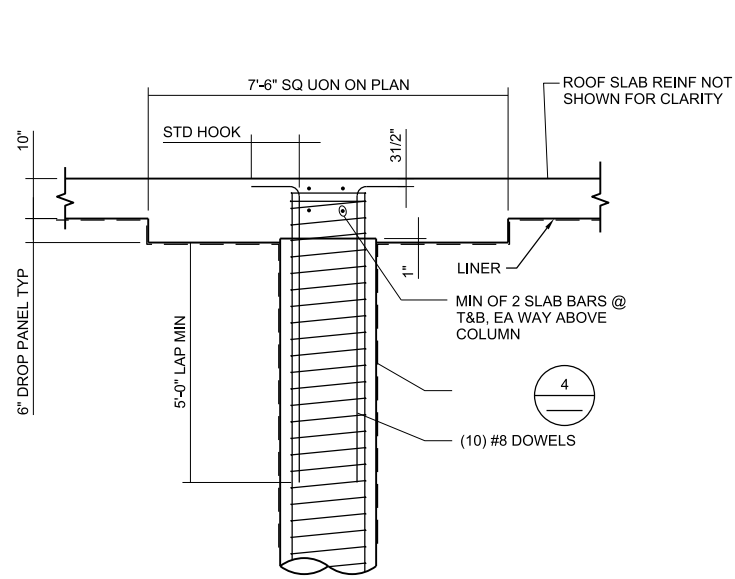
CONTRACTOR INSPECTOR

PK1-12-A-501

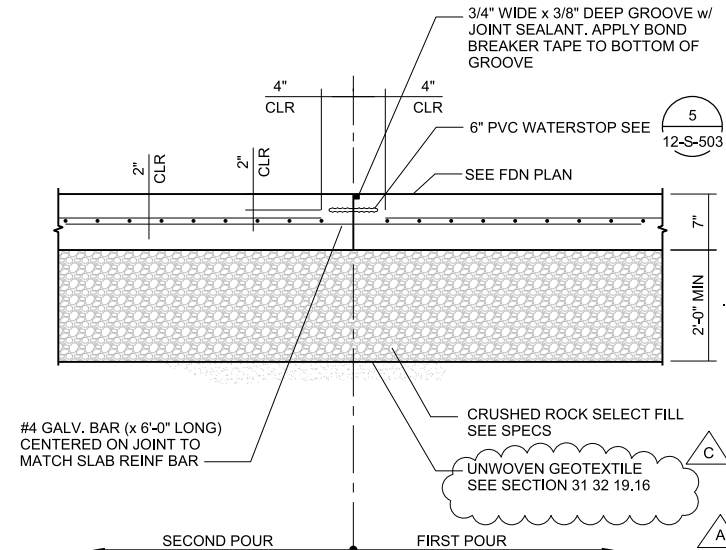
NCWRP EXPANSION AND NCPIWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN ARCHITECTURAL FLOW EQUALIZATION BASINS DETAILS

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 60 OF 132 SHEETS		WBS B-21059
APPROVED FOR CITY ENGINEER Rafsanjani Martin PRINT DCE NAME	DATE 7/7/2021 C89963 RCE#	SUBMITTED BY MONIKA SMOZCZYNSKI PROJECT MANAGER
DESCRIPTION ADDENDUM C	BY CH	APPROVED Rafsanjani Martin
DATE 7/7/21	FILM	PROJECT ENGINEER THIEN-LONG TRAN
		260-1709 CCS27 COORDINATE
		1900-6269 CCS83 COORDINATE
		40381-1060-D

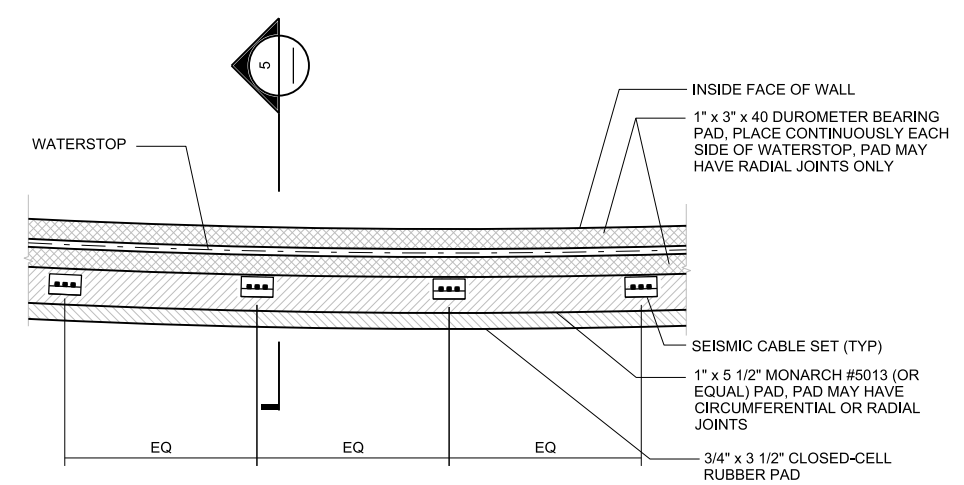
DATE STARTED
DATE COMPLETED



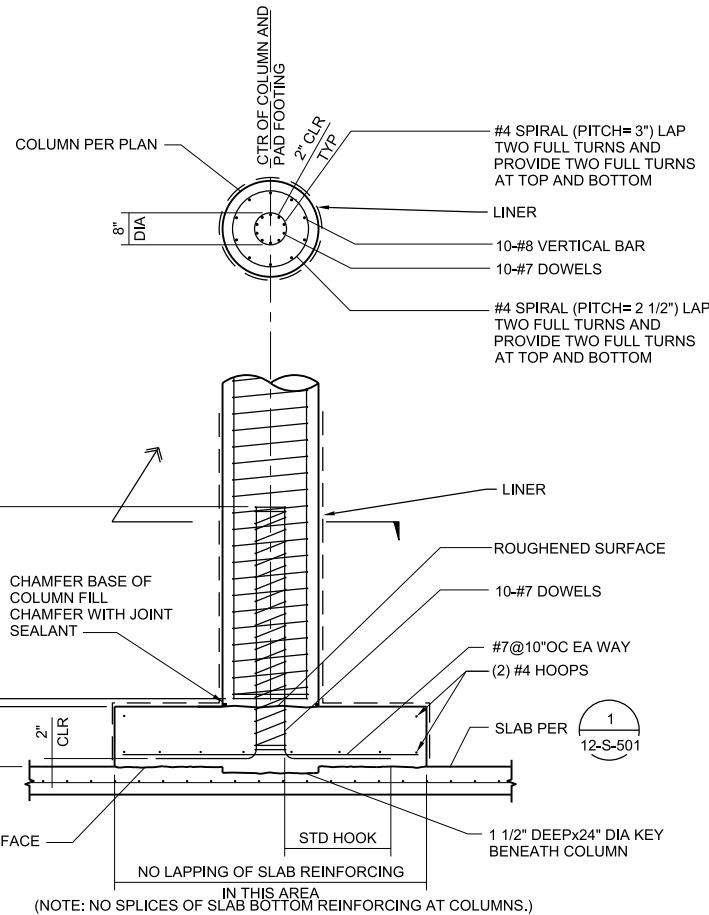
1 DROP PANEL
1/2"=1'-0"
12-S-301



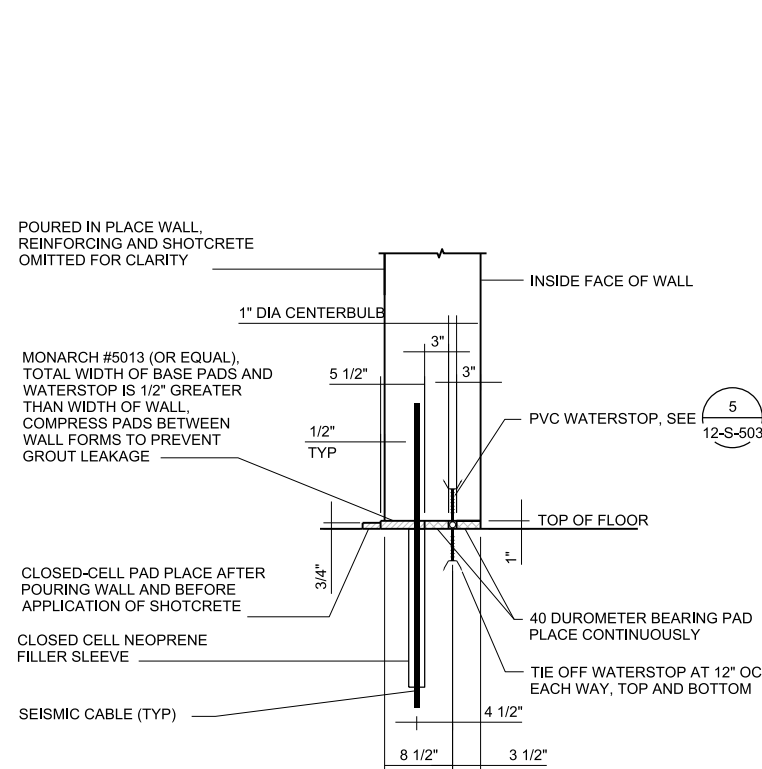
2 FLOOR SLAB JOINT
1"=1'-0"
12-S-100



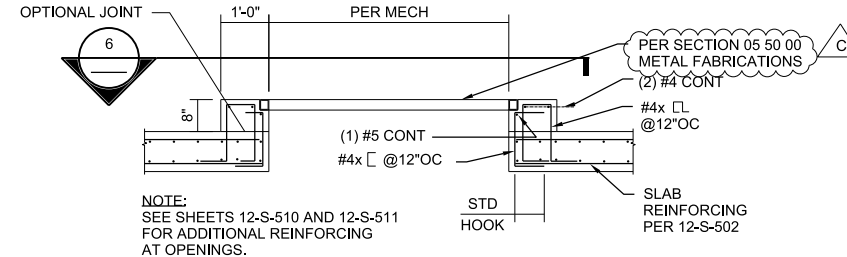
3 PLAN PADS AT WALL BASE JOINT
1"=1'-0"
12-S-501



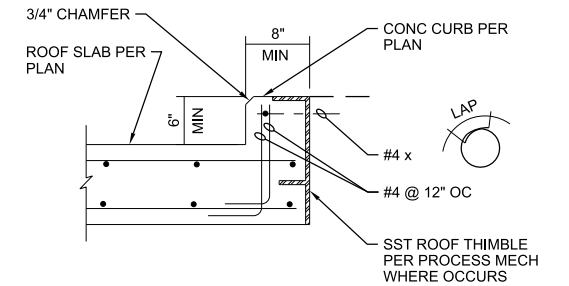
4 COL FTG
1/2"=1'-0"
12-S-301



5 WALL WATERSTOP/SEALANT
1"=1'-0"
12-S-501



7 HATCH CURB
1/2"=1'-0"
12-S-110



8 CIRCULAR CONCRETE CURB
1"=1'-0"
12-S-110

- POURED IN PLACE WALL, REINFORCING AND SHOTCRETE OMITTED FOR CLARITY
- MONARCH #5013 (OR EQUAL), TOTAL WIDTH OF BASE PADS AND WATERSTOP IS 1/2" GREATER THAN WIDTH OF WALL, COMPRESS PADS BETWEEN WALL FORMS TO PREVENT GROUT LEAKAGE
- CLOSED-CELL PAD PLACE AFTER POURING WALL AND BEFORE APPLICATION OF SHOTCRETE
- CLOSED CELL NEOPRENE FILLER SLEEVE
- SEISMIC CABLE (TYP)
- INSIDE FACE OF WALL
- 1" DIA CENTERBULE
- 5 1/2"
- 3"
- 3"
- 1/2" TYP
- PVC WATERSTOP, SEE 5 12-S-503
- TOP OF FLOOR
- 1"
- 40 DUROMETER BEARING PAD PLACE CONTINUOUSLY
- TIE OFF WATERSTOP AT 12" OC, EACH WAY, TOP AND BOTTOM
- 8 1/2"
- 3 1/2"

- WALL BASE JOINT NOTES:
- GLUE ALL PADS TO TOP OF WALL FOOTING WITH CONTACT CEMENT.
 - FILL ALL VOIDS BETWEEN BASE PADS, SEISMIC CABLE SLEEVE AND WATERSTOP WITH A SOFT MASTIC.

6 PLAN VIEW CURB
1/2"=1'-0"

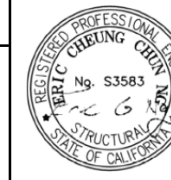
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Tel. (619) 831-4600 Kleinfelder.com



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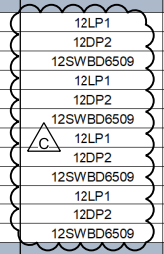
CONTRACTOR INSPECTOR

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 69 OF 132 SHEETS		WBS B-21059
APPROVED FOR CITY ENGINEER: <i>Rayhanah Martin</i>	DATE: 4/8/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER
PRINT DCE NAME: <i>Rayhanah Martin</i>	RCE#: C89963	CREATED BY: THIEN-LONG TRAN PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
ADDENDUM A	CH	<i>Rayhanah Martin</i>
ADDENDUM C	CH	<i>Rayhanah Martin</i>
DATE	FILE	
6/07/21		260-1709
7/07/21		CCS27 COORDINATE
		1900-6269
		CCS83 COORDINATE
DATE STARTED	DATE COMPLETED	40381-1069-D

PK1-12-S-504

GENERAL NOTE:
 1. CONDUITS TYPES ARE IDENTIFIED ON THE AREA CLASSIFICATION AND MATERIALS SELECTION TABLE.

CIRCUIT AND RACEWAY SCHEDULE									
CIRCUIT ID	CIRCUIT DESCRIPTION	CIRCUIT FROM	CIRCUIT TO	WIRING	OPERATING VOLTAGE	RACEWAY QUANTITY	RACEWAY SIZE (INCHES)	ROUTING INFORMATION	NOTES
12/001	SWITCHBOARD FEEDER	12A7S6509	12SWBD6509	3#350KCMIL, #1G	480V	2	3	EXISTING	REMOVE 12SWBD6509 AND INSTALL NEW SWITCHBOARD 12SWBD6509. DISCONNECT AND RETERMINATE EXISTING CONDUCTORS.
12/002	NEW PANEL 12DP2 (SECT 1) FEEDER	12SWBD6509	12DP2 (SECT 1)	3#1/0, 1#6 G	480V	1	2	NEW FEEDER OVERHEAD	
12/003	RECONNECT EXISTING PANEL	12SWBD6509	12DP1	3#4/0, 1#4 G	480V	1	2 1/2	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/004	TRANSFORMER FEEDER	12SWBD6509	12XLP1	3#6, 1#10 G	480V	1	1	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/005	PANEL FEEDER	12XLP1	12LP1	3#2, 1#2N, 1#8G	208/120V	1	1 1/2	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/006	TRANSFORMER FEEDER	12SWBD6509	12X1P1	3#12, 1#12G	480V	1	3/4	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/007	PANEL FEEDER	12X1P1	12P1	3#6, 1#6N, 1#10G	208/120V	1	1 1/2	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/008	REFEED EXISTING EQUIPMENT	12SWBD6509	12MS111	3#12, 1#12G	480V	1	3/4	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/009	REFEED EXISTING EQUIPMENT	12MS111	12F111	3#12, 1#12G	480V	1	3/4	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/010	REFEED EXISTING EQUIPMENT	12SWBD6509	12MS112	3#12, 1#12G	480V	1	3/4	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/011	REFEED EXISTING EQUIPMENT	12MS112	12F112	3#12, 1#12G	480V	1	3/4	EXISTING	RECONNECT EXISTING EEQUIPMENT
12/012	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 1 100A RCPT-W	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/013	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 2 100A RCPT-W	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/014	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 3 100A RCPT-W	3#2, 1#8G	480V	1	11/4	NEW FEEDER	
12/015	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 1 100A RCPT-N	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/016	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 2 100A RCPT-N	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/017	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 3 100A RCPT-N	3#2, 1#8G	480V	1	11/4	NEW FEEDER	
12/018	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 1 100A RCPT-S	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/019	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 2 100A RCPT-S	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/020	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 3 100A RCPT-S	3#2, 1#8G	480V	1	11/4	NEW FEEDER	
12/021	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 1 100A RCPT-E	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/022	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 2 100A RCPT-E	3#2, 1#8G	480V	1	11/4	EXISTING	RECONNECT TO EXISTING RECEPTACLE
12/023	30 HP BLOWER RECEPTACLE	12SWBD6509	BASIN 3 100A RCPT-E	3#2, 1#8G	480V	1	11/4	NEW FEEDER	
12/024	DUPLEX RECEPTACLE-CIRCUIT 12LP1-31 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-26,28,30 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-4	12LP1 12DP2 12SWBD6509	20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE	2#10, 1#10G 3#10, 1#10G 3#2, 1#8G	120V 480V 480V	1 1 1	1 1 11/4		
12/025	DUPLEX RECEPTACLE-CIRCUIT 12LP1-31 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-26,28,30 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-4 DUPLEX RECEPTACLE-CIRCUIT 12LP1-25 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-19,21,23 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-5	12LP1 12DP2 12SWBD6509 12LP1 12DP2 12SWBD6509	20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE	2#10, 1#10G 3#10, 1#10G 3#2, 1#8G 2#10, 1#10G 3#10, 1#10G 3#2, 1#8G	120V 480V 480V 120V 480V 480V	1 1 1 1 1 1	1 1 11/4 1 1 11/4		
12/026	DUPLEX RECEPTACLE-CIRCUIT 12LP1-29 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-20,22,24 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-6	12LP1 12DP2 12SWBD6509	20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE	2#10, 1#10G 3#10, 1#10G 3#2, 1#8G	120V 480V 480V	1 1 1	1 1 11/4		
12/027	DUPLEX RECEPTACLE-CIRCUIT 12LP1-31 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-26,28,30 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-4 DUPLEX RECEPTACLE-CIRCUIT 12LP1-25 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-19,21,23 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-5 DUPLEX RECEPTACLE-CIRCUIT 12LP1-29 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-20,22,24 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-6 DUPLEX RECEPTACLE-CIRCUIT 12LP1-27 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-25,27,29 100A, 480V, 3P RECEPTACLE-CIRCUIT 12SWBD6509-3	12LP1 12DP2 12SWBD6509 12LP1 12DP2 12SWBD6509 12LP1 12DP2 12SWBD6509 12LP1 12DP2 12SWBD6509	20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE 100A, 480V RECEPTACLE	2#10, 1#10G 3#10, 1#10G 3#2, 1#8G 2#10, 1#10G 3#10, 1#10G 3#2, 1#8G 2#10, 1#10G 3#10, 1#10G 3#2, 1#8G 2#10, 1#10G 3#10, 1#10G 3#2, 1#8G	120V 480V 480V 120V 480V 480V 120V 480V 480V 120V 480V 480V	1 1 1 1 1 1 1 1 1 1 1 1	1 1 11/4 1 1 11/4 1 1 11/4 1 1 11/4		
12/028	CONDUIT WITH PULL WIRE DUPLEX RECEPTACLE-CIRCUIT 12LP1-26 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-49,51,53	JUNCTION BOX 20A, 120V RECPT 12DP2	JUNCTION BOX 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE	PULL WIRE 2#10, 1#10G 3#10, 1#10G	- 120V 480V	1 1 1	1 1 1		
12/029	CONDUIT WITH PULL WIRE DUPLEX RECEPTACLE-CIRCUIT 12LP1-26 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-49,51,53	12PNL03 20A, 120V RECPT 12DP2	JUNCTION BOX 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE	PULL WIRE 2#10, 1#10G 3#10, 1#10G	- 120V 480V	1 1 1	1 1 1		
12/030	CONDUIT WITH PULL WIRE DUPLEX RECEPTACLE-CIRCUIT 12LP1-26 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-49,51,53 30A, 480V, 3P RECEPTACLE-CIRCUIT 12DP2-43,45,47	12PNL03 12LP1 12DP2	JUNCTION BOX 20A, 120V RECEPTACLE 30A, 480V RECEPTACLE	PULL WIRE 2#10, 1#10G 3#10, 1#10G 3#10, 1#10G	- 120V 480V 480V	1 1 1	1 1 1		



NOTES:
 1. THIS SCHEDULE LISTS THE CONDUCTORS AND THE CONDUIT CONNECTIONS FROM EACH INSTRUMENT, DEVICE OR PIECE OF EQUIPMENT TO THE ENPOINT OF NEAREST JUNCTION BOX. REFER TO ROUTING INFORMATION FOR FURTHER DETAIL AND ALSO THE DUCTBANK AND CONDUIT ROUTING SCHEDULE.

WHERE ROUTING INFORMATION LISTS A JUNCTION BOX, THE CONDUIT AND CONDUCTORS SHALL BE ROUTED TO THE JUNCTION BOX AND THEN THE CONDUCTORS SHALL BE COMBINED WITH OTHER CIRCUITS AS DESCRIBED ON THE DUCTBANK AND CONDUIT ROUTING SCHEDULE. WHERE ROUTING DOES NOT LIST A JUNCTION BOX, CONDUCTORS SHALL BE ROUTED TO THE NEAREST HANDHOLE AND COMBINED AS SCHEDULED.

CONSULTANT

WARNING

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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

ch2m

REGISTERED PROFESSIONAL ENGINEER
 RYAN STEPHEN HARGETT
 No. E21673
 ELECTRICAL
 STATE OF CALIFORNIA

DIGITALLY SIGNED 6/24/21

CONTRACTOR _____

INSPECTOR _____

PK1-12-E-610

NCWRP EXPANSION AND NCPIWF INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN ELECTRICAL

FLOW EQUALIZATION BASINS CIRCUIT AND RACEWAY SCHEDULE

CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 100 OF 132 SHEETS		WBS <u>B-21059</u>
APPROVED FOR CITY ENGINEER <i>Rayhanah Martin</i> PRINT DCE NAME	DATE 7/7/2021 C89963	SUBMITTED BY MONIKA SMOYCZYNSKI PROJECT MANAGER
DESCRIPTION ADDENDUM C	BY CH	APPROVED <i>Rayhanah Martin</i>
		DATE 7/7/21
		FILM
		PROJECT ENGINEER THIEN-LONG TRAN
		260-1709 CCS27 COORDINATE
		1900-6269 CCS83 COORDINATE
		DATE STARTED _____
		DATE COMPLETED _____

40381-1100-D

CIRCUIT AND RACEWAY SCHEDULE

CIRCUIT ID	CIRCUIT DESCRIPTION	CIRCUIT FROM	CIRCUIT TO	WIRING	OPERATING VOLTAGE	RACEWAY QUANTITY	RACEWAY SIZE (INCHES)	ROUTING INFORMATION	NOTES
12/060	INSTRUMENTATION WIRING	12PIT555	55PCM01	1-TYPE 3	4-20ma	1	3/4	ROUTE VIA JUNCTION BOXES AS NECESSARY	
12/061	INSTRUMENTATION WIRING	LB FITTING	12FV547	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV547	LB FITTING	4#14	24VDC	1	3/4		
12/062	NEW PANEL 12DP2 (SECT 2) FEEDER	12DP2 (SECT 1)	12DP2 (SECT 2)	3#2, 1#8 G	480V	1	2	NEW FEEDER OVERHEAD	
12/063	INSTRUMENTATION WIRING	LB FITTING	12FV543	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV543	LB FITTING	4#14	24VDC	1	3/4		
12/064	INSTRUMENTATION WIRING	LB FITTING	12FV550	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV550	LB FITTING	4#14	24VDC	1	3/4		
12/065	INSTRUMENTATION WIRING	LB FITTING	12FV546	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV546	LB FITTING	4#14	24VDC	1	3/4		
12/066	INSTRUMENTATION WIRING	LB FITTING	12FV549	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV549	LB FITTING	4#14	24VDC	1	3/4		
12/067	INSTRUMENTATION WIRING	LB FITTING	12FV545	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV545	LB FITTING	4#14	24VDC	1	3/4		
12/068	INSTRUMENTATION WIRING	LB FITTING	12FV548	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV548	LB FITTING	4#14	24VDC	1	3/4		
12/069	INSTRUMENTATION WIRING	LB FITTING	12FV544	4#14, 1#14G	120V	1	3/4		
	INSTRUMENTATION WIRING	12FV544	LB FITTING	4#14	24VDC	1	3/4		
12/071	INSTRUMENTATION WIRING	12LET501	12LI501A	1-TYPE 3	4-20ma	1	3/4	LOCATED ON ROOF OF BASIN 1 (NOT SHOWN ON PLANS)	SEE DETAIL 3 ON 12-E-501
12/073	INSTRUMENTATION WIRING	12LET521	12LI521A	1-TYPE 3	4-20ma	1	3/4	LOCATED ON ROOF OF BASIN 2 (NOT SHOWN ON PLANS)	SEE DETAIL 3 ON 12-E-501
12/074	INSTRUMENTATION WIRING	12PNL03	55PCM01	4#14, 1#14G	120V	1	2	SEE SITE PLANS AND DUCTBANK SCHEDULE	
12/075	INSTRUMENTATION WIRING	55PCM01	12PNL03	20#14	24VDC	1	1		
12/076	INSTRUMENTATION WIRING	12L5H541	55PNL02	1-TYPE 3	4-20ma	1	3/4	SEE SITE PLANS AND DUCTBANK SCHEDULE	
12/077	INSTRUMENTATION WIRING	12LET541	12LI541A	1-TYPE 3	4-20ma	1	3/4	SEE SITE PLANS AND DUCTBANK SCHEDULE	SEE DETAIL 3 ON 12-E-501
12/078	INSTRUMENTATION WIRING	12H13	12PB02	8#14, 1#14G	120V	1	1		
12/079	INSTRUMENTATION WIRING	12H12	12PB01	PULL WIRE	120V	1	1		
12/080	POWER CIRCUITS FOR VALVES 12FV43 & 12FV47	LB FITTING	12FV543	3#10, 1#10G	480V	1	3/4		
12/081	POWER CIRCUITS FOR VALVES 12FV46 & 12FV50	LB FITTING	12FV546	3#10, 1#10G	480V	1	3/4		
12/082	POWER CIRCUITS FOR VALVES 12FV45 & 12FV49	LB FITTING	12FV545	3#10, 1#10G	480V	1	3/4		
12/083	POWER CIRCUITS FOR VALVES 12FV44 & 12FV48	LB FITTING	12FV544	3#10, 1#10G	480V	1	3/4		
12/084	INSTRUMENTATION WIRING	12LI501A	55PNL02 VIA 12JB10	1-TYPE 3	4-20ma	1	3/4	SEE SITE PLANS AND DUCTBANK SCHEDULE	SEE DETAIL 3 ON 12-E-501
12/085	INSTRUMENTATION WIRING	12LI521A	55PNL02 VIA 12JB10	1-TYPE 3	4-20ma	1	3/4	SEE SITE PLANS AND DUCTBANK SCHEDULE	SEE DETAIL 3 ON 12-E-501
12/086	INSTRUMENTATION WIRING	12LI541A	55PNL02 VIA 12JB10	1-TYPE 3	4-20ma	1	3/4	SEE SITE PLANS AND DUCTBANK SCHEDULE	SEE DETAIL 3 ON 12-E-501
12/088	CONTROL POWER FOR 12PNL03	12LP1	12PNL03	2#12, 1#12G	120V	1	3/4	NEW FEEDER OVERHEAD	
12/100	12ATS6509 FEEDER	05SWBD1	12ATS6509	3#350KCMIL, #1G	480V	2	3	EXISTING	REMOVE 12ATS6509 AND INSTALL NEW ATS 12ATS6509. DISCONNECT AND RETERMINATE EXISTING CONDUCTORS.
12/101	12ATS6509 FEEDER	05SWBD2	12ATS6509	3#350KCMIL, #1G	480V	2	3	EXISTING	REMOVE 12ATS6509 AND INSTALL NEW ATS 12ATS6509. DISCONNECT AND RETERMINATE EXISTING CONDUCTORS.
55/0100	EQUALIZATION BASIN LEVEL SIGNALS	55PNL02	55PCM01	2-TYPE 3	4-20ma	1	1 1/2		
00/600	FIBER OPTIC	MWWD-FO HANDHOLE/ PPS	20PCM03D	24-STRAND FO	-	1	4	SEE SITE PLANS, MAJORITY OF ROUTING IS EXISTING	SEE SITE PLANS, EXISTING CONDUIT TO BE USED TO EXTENT POSSIBLE. NEW DUCT BANK TO MATCH EXISTING FOR TIE-IN
00/601	FIBER OPTIC	MWWD-FO HANDHOLE/ MBC	20PCM03D	24-STRAND FO	-	1	4	SEE SITE PLANS, MAJORITY OF ROUTING IS EXISTING	SEE SITE PLANS, EXISTING CONDUIT TO BE USED TO EXTENT POSSIBLE. NEW DUCT BANK TO MATCH EXISTING FOR TIE-IN

GENERAL NOTE:
1. CONDUITS TYPES ARE IDENTIFIED ON THE AREA CLASSIFICATION AND MATERIALS SELECTION TABLE.

- NOTES:
1. THIS SCHEDULE LISTS THE CONDUCTORS AND THE CONDUIT CONNECTIONS FROM EACH INSTRUMENT, DEVICE OR PIECE OF EQUIPMENT TO THE ENPOINT OF NEAREST JUNCTION BOX. REFER TO ROUTING INFORMATION FOR FURTHER DETAIL AND ALSO THE DUCTBANK AND CONDUIT ROUTING SCHEDULE.
WHERE ROUTING INFORMATION LISTS A JUNCTION BOX, THE CONDUIT AND CONDUCTORS SHALL BE ROUTED TO THE JUNCTION BOX AND THEN THE CONDUCTORS SHALL BE COMBINED WITH OTHER CIRCUITS AS DESCRIBED ON THE DUCTBANK AND CONDUIT ROUTING SCHEDULE. WHERE ROUTING DOES NOT LIST A JUNCTION BOX, CONDUCTORS SHALL BE ROUTED TO THE NEAREST HANDHOLE AND COMBINED AS SCHEDULED.

PK1-12-E-612

NCWRP EXPANSION AND NCWPW INFLUENT PS & PIPELINE PACKAGE 1 - PWP NCWRP FLOW EQUALIZATION BASIN ELECTRICAL FLOW EQUALIZATION BASINS CIRCUIT AND RACEWAY SCHEDULE			
CITY OF SAN DIEGO, CALIFORNIA PUBLIC UTILITIES DEPARTMENT SHEET 102 OF 132 SHEETS			WBS <u>B-21059</u>
APPROVED: <i>Rayhanah Martin</i> FOR CITY ENGINEER	DATE: 7/7/2021	SUBMITTED BY: MONIKA SMOCZYNSKI PROJECT MANAGER	PROJECT ENGINEER: THIEN-LONG TRAN
PRINT DCE NAME: <i>Rayhanah Martin</i>	RCE#: C89963	DESCRIPTION: ADDENDUM C	DATE: 7/07/21
BY: <i>Rayhanah Martin</i>	APPROVED: <i>Rayhanah Martin</i>	CH:	DATE:
DATE STARTED:	DATE COMPLETED:	260-1709 CCS27 COORDINATE:	1900-6269 CCS83 COORDINATE:
CONTRACTOR:	INSPECTOR:	40381-1102-D	PK1 - ADDENDUM C

CONSULTANT

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DIGITALLY SIGNED 6/24/21

City of San Diego

CITY CONTACT: Juan E. Espindola, Senior Contract Specialist, Email: JEspindola@sandiego.gov
Phone No. (619) 533-4491

ADDENDUM D



FOR

PURE WATER PROGRAM: NORTH CITY WATER RECLAMATION PLANT FLOW EQUALIZATION BASIN

BID NO.:	<u>K-21-1791-DBB-3-A</u>
SAP NO. (WBS/IO/CC):	<u>B-21059</u>
CLIENT DEPARTMENT:	<u>2000</u>
COUNCIL DISTRICT:	<u>1</u>
PROJECT TYPE:	<u>BO</u>

BID DUE DATE:

**2:00 PM
JULY 28, 2021**

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 Engineers:

Mark Elliott
1) Registered Engineer

7/21/2021
Date



DIGITALLY SIGNED: 7/21/2021


2) For City Engineer

7/21/2021
Date

Seal:



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER'S QUESTIONS

Q1. Drawing PK1-ES-114 Detail 10 calls for new fiber to be spliced from existing manhole MWWD-FO to 20PCM03D. The location of 20PCM03D and the existing conduit runs to 20PCM03D are not shown on site plan drawings. Please specify location of 20PCM03D and provide detail of existing conduit run from manhole 00MH09 to 20PCM03D.

A1. Installation is intended to be a field installation to match routing of existing fiber once utility locates and potholes are conducted on site.

Q2. The new Specification 40 95 34 added in Addendum C refers to single mode fiber, but relates 850nm and 1300nm wavelengths for testing in 3.10 Test Requirements. Those wavelengths are for multimode fiber. Single mode wavelengths are 1310nm and 1550nm. Please clarify testing requirements in this Specification section.

A2. Requirement should be 1310nm and 1550 nm. See changes per this Addendum D.

Q3. I apologize for sending this in with less than 14 days to go, but we noticed with Addendum C that there is an item due at bid time for which there is no planetbids Attachment section. Can you advise which Attachment this experience should go with, or if there will be a new attachment section added for this?

Q54. Reference Specification 03 31 40, paragraph 1.04.A. Paragraph 1 states

..." All tanks listed for the Subcontractor's experience requirements must have been built in the Subcontractor's own name. Experience of personnel associated with the Subcontractor or hired by the Subcontractor are not acceptable. Subcontractor shall submit the name and location of the City and the completion dates of three tanks meeting the requirements listed above and on which the proposed qualifying "stressing

machine” and automated shotcrete equipment has been used.” In order ensure a bidder is responsive to the intent of the specifications, please confirm that the above-mentioned experience submittal is required to be submitted with the bid.

A54. Confirmed.

- A3. Bidders will not be required to submit qualification information at time of bid or after bid opening. However, it is the responsibility of the prime contractor to fully vet and ensure the subcontractor performing the work has the experience to meet the requirements of the contract, and that the required qualifications of the tank subcontractor and/or parties supplying and constructing the tank as set forth in the Contract Documents are met. In addition, the Contractor shall ensure that at minimum, the subcontractor performing the work has prior experience of three (3) relevant tank installations with the same technical requirements as this project.
- Q4. After looking at the Solicitation Document on page 170 (which I attached) it mentions 530 working days for project final acceptance and completion. And just wanted to confirm if that is the correct number of working days (530) or is it the sum of all 3 milestones which will equal 1420 working days.
- A4. Each required Milestone completion date is in number of Working Days after Notice to Proceed as specified in Supplementary Special Provisions 6-9 Liquidated Damages.

C. ADDENDUM

1. To Addendum C, Technicals 40 95 34, Fiber Optics and Installation, Part 3 Execution, Item 3.10, Test Requirements, Sub-Item B, numeral 1, Page 44, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 1. Operating Wavelengths: All single-mode links shall be certified with test tools using laser light sources at 1,310nm and 1,550nm.
2. To Addendum C, Technicals 40 95 34, Fiber Optics and Installation, Part 3, Execution, Item 3.10, Test Requirements, Sub-Item B, numeral 2, Page 44, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 2. Attenuation Range (one way): Minimum 5 db at 1,550nm.

3. To Addendum C, Technicals 40 95 34, Fiber Optics and Installation, Part 3, Execution, Item 3.10, Test Requirements, Sub-Item C, numeral 1, Page 45, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 1. Operating Wavelengths: Single mode at 1,310nm and 1,550nm plus or minus 10 nanometers.
4. To Addendum C, Technicals 40 95 34 Fiber Optics and Installation, Part 3 Execution, Item 3.10 Test Requirements, Sub-Item C, numeral 2, Page 45, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 2. Attenuation Range (one way): Minimum 30 db at 1,550nm.
5. To Addendum C, Technicals 40 95 34 Fiber Optics and Installation, Part 3 Execution, Item 3.10 Test Requirements, Sub-Item D, numeral 1, letter a, Page 45, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 - a. Operating Wavelengths: Single mode at 1,310nm and 1,550nm plus or minus 10 nanometers.

James Nagelvoort, Director
Engineering & Capital Projects Department

Dated: *July 22, 2021*
San Diego, California

JN/RWB/lir

Bid Results

Bidder Details

Vendor Name Kiewit Infrastructure West Co.
Address 3555 Farnam Street
Omaha, Nebraska 68131
United States
Respondee Terrence L. Robinson
Respondee Title Senior Vice President
Phone 562-946-1816
Email terry.robinson@kiewit.com
Vendor Type PQUAL, CADIR
License # 433176
CADIR 1000001147

Bid Detail

Bid Format Electronic
Submitted 07/28/2021 1:56 PM (PDT)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 261906

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Commitment to Comply with Skilled Workforce.pdf	Commitment to Comply with Skilled Workforce.pdf	COMMITMENT TO COMPLY WITH SKILLED AND TRAINED WORKFORCECERTIFICATION FORMS
Disclosure of Lobbying Activities.pdf	Disclosure of Lobbying Activities.pdf	DISCLOSURE OF LOBBYING ACTIVITIES
Debarment and Suspension Certification_Prime.pdf	Debarment and Suspension Certification_Prime.pdf	PRIME - DEBARMENT AND SUSPENSION CERTIFICATION
Mandatory Disclosure of Business Interests.pdf	Mandatory Disclosure of Business Interests.pdf	MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM
Form 4500-3 DBE Subcontractor.pdf	Form 4500-3 DBE Subcontractor.pdf	FORM 4500-3: DBE SUBCONTRACTOR PERFORMANCE FORM
Form 4500-4 DBE Subcontractor Utilization.pdf	Form 4500-4 DBE Subcontractor Utilization.pdf	FORM 4500-4: DBE SUBCONTRACTOR UTILIZATION FORM
Bid_Bond_FINAL.pdf	Bid_Bond_FINAL.pdf	Bid Bond
Debarment Suspension Certification Subs.pdf	Debarment Suspension Certification Subs.pdf	SUBS, SUPPLIERS, MANUF. - DEBARMENT AND SUSPENSION CERTIFICATION
Contractors Certification of Pending Actions.pdf	Contractors Certification of Pending Actions.pdf	CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS

Subcontractors

Showing 8 Subcontractors

Name & Address	Desc	License Num	CADIR	Amount	Type
Atlas Integrated Systems, Inc. 6789 Quail Hill Pkwy, Suite 405 Irvine, California 92603	Fiber Optic - Constructor	777306	1000007772	\$53,275.00	CADIR, SDB, MALE, CAU
CMC Steel Fabricators, Inc. 3880 Murphy Canyon Rd #100 San Diego, California 92123	Rebar - Constructor	778010	1000000298	\$482,578.00	
DN Tanks Inc. 351 Cypress Lane El Cajon, California 92020	Tank Prestressing - Constructor	979914	1000005732	\$1,147,000.00	
F.D. Thomas, Inc. 200 Harris Avenue Sacramento, California 95838	Painting & Coating - Constructor	610403	1000000093	\$89,125.00	
Mass Electric Construction Co 1925 Wright Ave Suite C La Verne, California 91750	Electrical and Instrumentation - Constructor	819912	1000001289	\$551,200.00	CADIR
PGC Construction, Inc 42309 Winchester Rd Suite C Temecula, California 92591	Translucent Wall Panels - Constructor	829086	829086	\$85,000.00	
SONCO CONSTRUCTION 4927 Toronto Avenue Fontana, California 92336	Liner - Constructor	911666	1000024656	\$486,860.00	
Whitson Contracting & Management 11021 Via Frontera, Suite E San Diego, California 92127	Biofiltration Basin - Contracor	823289	1000430875	\$11,218.60	ELBE, SDB

Line Items

Discount Terms No Discount

Item #	Item Code	Type	Item Description	UOM	QTY	Unit Price	Line Total	Response	Comment
							\$11,886,000.00		
Main Bid									
1	237110		Bonds (Payment and Performance Not to Exceed 2.5%)	LS	1	\$40,000.00	\$40,000.00	Yes	
2	237110		Mobilization and Demobilization	LS	1	\$215,000.00	\$215,000.00	Yes	
3	237110		Dispute Resolution Board (EOC Type I)	AL	1	\$54,000.00	\$54,000.00	Yes	
4	237110		Sheeting, Shoring, and Bracing	LS	1	\$85,000.00	\$85,000.00	Yes	
5	238910		Site Civil Grading, Excavation and Stormwater Piping	LS	1	\$1,000,000.00	\$1,000,000.00	Yes	
6	237110		Yard Piping	LS	1	\$850,000.00	\$850,000.00	Yes	
7	541330		Storm Water Pollution Prevention Plan (SWPPP) - Permit Fee (EOC Type I)	AL	1	\$5,000.00	\$5,000.00	Yes	
8	237110		Storm Water Pollution Prevention Plan (SWPPP) - Implementation	LS	1	\$10,000.00	\$10,000.00	Yes	
9	237110		Site Electrical	LS	1	\$850,000.00	\$850,000.00	Yes	
10	237310		Traffic Control and Engineered Traffic Control Plans	LS	1	\$1,000.00	\$1,000.00	Yes	
11	561730		Bioretention Basins and Appurteneances	LS	1	\$10,000.00	\$10,000.00	Yes	
12	237110		Construction of the NCWRP Flow Equalization Basin	LS	1	\$8,205,000.00	\$8,205,000.00	Yes	
13	237110		NCWRP Flow Equalization Basin Field Orders (EOC Type II)	AL	1	\$496,000.00	\$496,000.00	Yes	
14	238210		Security Guard (EOC Type I)	AL	1	\$65,000.00	\$65,000.00	Yes	

Line Item Subtotals

Section Title	Line Total
Main Bid	\$11,886,000.00
Grand Total	\$11,886,000.00