

ENGINEER OF WORK

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


1) Registered Engineer

03/15/2022
Date

Seal:




2) For City Engineer

3-15-22
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.	Disclosure of Lobbying Activities	At Time of Bid	ALL BIDDERS
5.	Form 4500-3: DBE Subcontractor Performance Form	At Time of Bid	ALL BIDDERS
6.	Form 4500 -4: DBE Subcontractor Utilization Form	At Time of Bid	ALL BIDDERS
7.	Commitment to Comply with Skilled and Trained Workforce Certification Forms	At Time of Bid	ALL BIDDERS
8.	Debarment and Suspension Certification for Prime Contractors	At Time of Bid	ALL BIDDERS
9.	Debarment and Suspension Certification for Subcontractors, Suppliers & Manufacturers	At Time of Bid	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
12.	Form AA61 – List of Work Made Available	By 5PM, 4 working days After Bid Opening	ALL BIDDERS
13.	Form AA62 – Summary of Bids Received	By 5PM, 4 working days After Bid Opening	ALL BIDDERS
14.	Form AA63 – Good Faith Effort List of Subcontractors Solicited	By 5PM, 4 working days After Bid Opening	ALL BIDDERS
15.	Escrow Bid Document, See Attachment H	By 5PM, 4 working days After Bid Opening	ALL BIDDERS

ITEM	DOCUMENT TO BE SUBMITTED	WHEN DUE	FROM
16.	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
17.	Phased Funding Schedule Agreement	Within 10 working days of Notice of Intent to Award	AWARDED BIDDER
18.	Payment & Performance Bond; Certificates of Insurance and Endorsements	Within 10 working days of receipt by bidder of contract forms and NOI	AWARDED BIDDER
19.	Signed Contract Agreement Page	Within 3 working days of receipt by bidder of Contract Agreement	AWARDED BIDDER
20.	PLA Forms, See Attachment I	Within 10 working days of NOI	AWARDED BIDDER
21.	OCIP Credit Worksheet. See Notice Inviting Bids, Section 17.	Within 10 working days of Notice of Intent to Award.	AWARDED BIDDER
22.	OCIP Enrollment Forms	Within 15 working days of NOI	AWARDED BIDDER
23.	Form UR-334: California State Revolving Funds (CASRF)	Annually. See Attachment D requirements.	AWARDED BIDDER
24.	Form 4500 -2: DBE Subcontractor Participation Form	See Attachment D requirements.	AWARDED BIDDER
25.	Skilled and Trained Workforce Certification Forms	Monthly. See NIB Section 8	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 **MIRAMAR RESERVOIR PUMP STATION (MRPS) IMPROVEMENT PROJECT**. 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 **\$10,400,000**.
4. **BID DUE DATE AND TIME ARE: APRIL 29, 2022 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**
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. SUBCONTRACTING PARTICIPATION PERCENTAGES:

10.1. 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.

10.2. 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.

- 10.3. 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.
- 10.4. 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.
- 10.5. **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:
- 10.6. **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.

- 10.7. 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.

2. Attending the Pre-bid Meeting.

11. MANDATORY ONLINE PRE-BID MEETING VIA GOTOMEETING:

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

The Meeting will be on: **Wed., April 6, 2022 10:00 AM - 12:00 PM (PDT)** at GoToMeeting.

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

<https://meet.goto.com/259173397>

You can also dial in using your phone.

United States: [+1 \(408\) 650-3123](tel:+14086503123)

Access Code: 259-173-397

Get the app now and be ready when your first meeting starts: <https://meet.goto.com/install>

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 the Mandatory Pre-Bid Meeting may result in the Bid being deemed **non-responsive**.

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.

12. AWARD PROCESS:

- 12.1.** 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.

- 12.2. 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.
- 12.3. 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.
- 12.4. The low Bid will be determined by the Base Bid.
- 12.5. Once the low bid has been determined, the City may, at its sole discretion, award the contract for the Base bid alone.

13. SUBMISSION OF QUESTIONS:

- 13.1. The Director (or Designee) of the Purchasing & Contracting 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:

BFriedenreic@sandiego.gov

- 13.2. Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 13.3. 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.
- 13.4. 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.

14. PHASED FUNDING: For Phased Funding Conditions, see Attachment B.

- 15. **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 online. 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 Purchasing & Contracting Department, Public Works Division 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/	2021	ECPI010122-01
City of San Diego Standard Specifications for Public Works Construction (“The WHITEBOOK”)* https://www.sandiego.gov/ecp/edocref/greenbook	2021	ECPI010122-02
City of San Diego Standard Drawings* https://www.sandiego.gov/ecp/edocref/standarddraw	2021	ECPI010122-03
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

Title	Edition	Document Number
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 6 (CA MUTCD Rev 6) https://dot.ca.gov/programs/safety-programs/camutcd/camutcd-files	2014	PWPI060121-10
<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, 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 Purchasing & Contracting Department, Public Works 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:
Purchasing & Contracting Department, Public Works Division
1200 3rd Ave., Suite 200, MS56
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 Project Site, the Plans and Specifications, other materials as described in the Special Provisions, Section 3-9, "TECHNICAL STUDIES AND SUBSURFACE DATA", and the proposal forms (e.g., Bidding Documents). The submission of a Bid shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of work, the quantities of materials to be furnished, and as to the requirements of the Bidding Documents Proposal, Plans, and Specifications.
- 24. CITY STANDARD PROVISIONS:** This contract is subject to the following standard provisions. See The WHITEBOOK for details.
- 24.1.** The City of San Diego Resolution No. R-277952 adopted on May 20, 1991 for a Drug-Free Workplace.
- 24.2.** The City of San Diego Resolution No. R-282153 adopted on June 14, 1993 related to the Americans with Disabilities Act.
- 24.3.** The City of San Diego Municipal Code §22.3004 for Contractor Standards.
- 24.4.** The City of San Diego's Labor Compliance Program and the State of California Labor Code §§1771.5(b) and 1776.
- 24.5.** Sections 1777.5, 1777.6, and 1777.7 of the State of California Labor Code concerning the employment of apprentices by contractors and subcontractors performing public works contracts.
- 24.6.** The City's Equal Benefits Ordinance (EBO), Chapter 2, Article 2, Division 43 of The San Diego Municipal Code (SDMC).

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

25. PRE-AWARD ACTIVITIES:

25.1. The contractor selected by the City to execute a contract for this Work shall submit the required documentation as specified 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:

Shimmick Construction Company, Inc., a corporation, as principal, and Berkshire Hathaway Specialty Insurance Company, a corporation authorized to do business in the State of California, as Surety, hereby obligate themselves, their successors and assigns, jointly and severally, to The City of San Diego a municipal corporation in the sum of **TWELVE MILLION SIX HUNDRED NINETY TWO THOUSAND DOLLARS (\$12,692,000)** for the faithful performance of the annexed contract, and in the sum of **TWELVE MILLION SIX HUNDRED NINETY TWO THOUSAND DOLLARS (\$12,692,000)** 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.

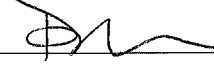
PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND (continued)

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By: 

By: 

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

Print Name: Bonny Hsu
Deputy City Attorney

Date: August 23, 2022

Date: 8/24/22

CONTRACTOR

Shimmick Construction Company, Inc.

SURETY

Berkshire Hathaway Specialty Insurance Company

By: 

By: 
Attorney-in-Fact

Print Name: W. Andrew Sloane, III

Print Name: Nicholas Fredrickson, Attorney-in-Fact

Date: JUNE 7, 2022

CA Lic #6006876
Date: June 3, 2022

655 Montgomery Street, Suite 1100
San Francisco, CA 94111

Local Address of Surety

(415) 659-5589

Local Phone Number of Surety

\$83,006.00

Premium

47-SUR-300183-01-0020

Bond Number

Power Of Attorney

**BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY
NATIONAL INDEMNITY COMPANY / NATIONAL LIABILITY & FIRE INSURANCE COMPANY**

Know all men by these presents, that **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY**, a corporation existing under and by virtue of the laws of the State of Nebraska and having an office at One Lincoln Street, 23rd Floor, Boston, Massachusetts 02111, **NATIONAL INDEMNITY COMPANY**, a corporation existing under and by virtue of the laws of the State of Nebraska and having an office at 3024 Harney Street, Omaha, Nebraska 68131 and **NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, a corporation existing under and by virtue of the laws of the State of Connecticut and having an office at 100 First Stamford Place, Stamford, Connecticut 06902 (hereinafter collectively the "Companies"), pursuant to and by the authority granted as set forth herein, do hereby name, constitute and appoint: **Susan Larson, Charla Boadle, Scott Garcia, Elizabeth Hahn, Roger Kaltenbach, Andrew Larsen, Mindee L. Rankin, Scott Fisher, Jana Roy, Derek Sabo, Scott McGilvray, John Claeys, Nicholas Fredrickson, 2233 112th Avenue N.E. of the city of Bellevue, State of Washington**, their true and lawful attorney(s)-in-fact to make, execute, seal, acknowledge, and deliver, for and on their behalf as surety and as their act and deed, any and all undertakings, bonds, or other such writings obligatory in the nature thereof, in pursuance of these presents, the execution of which shall be as binding upon the Companies as if it has been duly signed and executed by their regularly elected officers in their own proper persons. **This authority for the Attorney-in-Fact shall be limited to the execution of the attached bond(s) or other such writings obligatory in the nature thereof.**

In witness whereof, this Power of Attorney has been subscribed by an authorized officer of the Companies, and the corporate seals of the Companies have been affixed hereto this date of December 20, 2018. This Power of Attorney is made and executed pursuant to and by authority of the Bylaws, Resolutions of the Board of Directors, and other Authorizations of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY, NATIONAL INDEMNITY COMPANY** and **NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, which are in full force and effect, each reading as appears on the back page of this Power of Attorney, respectively. **The following signature by an authorized officer of the Company may be a facsimile, which shall be deemed the equivalent of and constitute the written signature of such officer of the Company for all purposes regarding this Power of Attorney, including satisfaction of any signature requirements on any and all undertakings, bonds, or other such writings obligatory in the nature thereof, to which this Power of Attorney applies.**

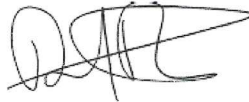
**BERKSHIRE HATHAWAY SPECIALTY
INSURANCE COMPANY,**



By: _____
David Fields, Executive Vice President



**NATIONAL INDEMNITY COMPANY,
NATIONAL LIABILITY & FIRE INSURANCE COMPANY,**



By: _____
David Fields, Vice President

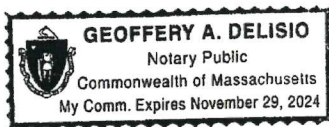


NOTARY

State of Massachusetts, County of Suffolk, ss:

On this 20th day of December, 2018, before me appeared David Fields, Executive Vice President of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY** and Vice President of **NATIONAL INDEMNITY COMPANY** and **NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, who being duly sworn, says that his capacity is as designated above for such Companies; that he knows the corporate seals of the Companies; that the seals affixed to the foregoing instrument are such corporate seals; that they were affixed by order of the board of directors or other governing body of said Companies pursuant to its Bylaws, Resolutions and other Authorizations, and that he signed said instrument in that capacity of said Companies.

[Notary Seal]




Notary Public

I, Ralph Tortorella, the undersigned, Officer of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY, NATIONAL INDEMNITY COMPANY** and **NATIONAL LIABILITY & FIRE 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 is in full force and effect and has not been revoked. **IN TESTIMONY WHEREOF**, see hereunto affixed the seals of said Companies this **June 3, 2022**.




Officer

To verify the authenticity of this Power of Attorney please contact us at: BHSI Surety Department, Berkshire Hathaway Specialty Insurance Company, One Lincoln Street, 23rd Floor Boston, MA 02111 | (770) 625-2516 or by email at Jennifer.Porter@bhspecialty.com. **THIS POWER OF ATTORNEY IS VOID IF ALTERED**
To notify us of a claim please contact us on our 24-hour toll free number at (855) 453-9675, via email at claims.notice@bhspecialty.com, via fax to (617) 507-8259, or via mail.

BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY (BYLAWS)

ARTICLE V.

CORPORATE ACTIONS

....

EXECUTION OF DOCUMENTS:

....

Section 6.(b) The President, any Vice President or the Secretary, shall have the power and authority:

- (1) To appoint Attorneys-in-fact, and to authorize them to execute on behalf of the Company bonds and other undertakings, and
- (2) To remove at any time any such Attorney-in-fact and revoke the authority given him.

NATIONAL INDEMNITY COMPANY (BY-LAWS)

Section 4. Officers, Agents, and Employees:

A. The officers shall be a President, one or more Vice Presidents, a Secretary, one or more Assistant Secretaries, a Treasurer, and one or more Assistant Treasurers none of whom shall be required to be shareholders or Directors and each of whom shall be elected annually by the Board of Directors at each annual meeting to serve a term of office of one year or until a successor has been elected and qualified, may serve successive terms of office, may be removed from office at any time for or without cause by a vote of a majority of the Board of Directors, and shall have such powers and rights and be charged with such duties and obligations as usually are vested in and pertain to such office or as may be directed from time to time by the Board of Directors; and the Board of Directors or the officers may from time to time appoint, discharge, engage, or remove such agents and employees as may be appropriate, convenient, or necessary to the affairs and business of the corporation.

NATIONAL INDEMNITY COMPANY (BOARD RESOLUTION ADOPTED AUGUST 6, 2014)

RESOLVED, That the President, any Vice President or the Secretary, shall have the power and authority to (1) appoint Attorneys-in-fact, and to authorize them to execute on behalf of this Company bonds and other undertakings and (2) remove at any time any such Attorney-in-fact and revoke the authority given.

NATIONAL LIABILITY & FIRE INSURANCE COMPANY (BY-LAWS)

ARTICLE IV

Officers

Section 1. Officers, Agents and Employees:

A. The officers shall be a president, one or more vice presidents, one or more assistant vice presidents, a secretary, one or more assistant secretaries, a treasurer, and one or more assistant treasurers, none of whom shall be required to be shareholders or directors, and each of whom shall be elected annually by the board of directors at each annual meeting to serve a term of office of one year or until a successor has been elected and qualified, may serve successive terms of office, may be removed from office at any time for or without cause by a vote of a majority of the board of directors. The president and secretary shall be different individuals. Election or appointment of an officer or agent shall not create contract rights. The officers of the Corporation shall have such powers and rights and be charged with such duties and obligations as usually are vested in and pertain to such office or as may be directed from time to time by the board of directors; and the board of directors or the officers may from time to time appoint, discharge, engage, or remove such agents and employees as may be appropriate, convenient, or necessary to the affairs and business of the Corporation.

NATIONAL LIABILITY & FIRE INSURANCE COMPANY (BOARD RESOLUTION ADOPTED AUGUST 6, 2014)

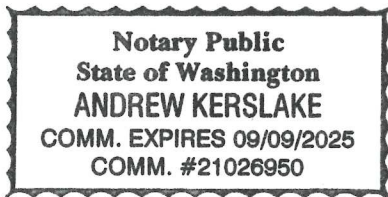
RESOLVED, That the President, any Vice President or the Secretary, shall have the power and authority to (1) appoint Attorneys-in-fact, and to authorize them to execute on behalf of this Company bonds and other undertakings and (2) remove at any time any such Attorney-in-fact and revoke the authority given.

ACKNOWLEDGMENT

State of Washington)
County of King)

On this 3rd day of June, 2022, before me, Andrew Kerslake notary public in and for the State of Washington, with principal office in the County of King, residing therein, duly commissioned and sworn, personally appeared Nicholas Fredrickson, known to me to be the person whose name is subscribed to the within instrument as the attorney-in-fact of Berkshire Hathaway Specialty Insurance Company as surety in said instrument, and acknowledged to me that he subscribed the name of said corporation thereto as surety, and his own name as attorney-in-fact.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in the aforesaid County, the day and year in this certificate first above written.



NOTARY PUBLIC



Commission Expires: 09/09/2025

CALIFORNIA ACKNOWLEDGMENT

CIVIL CODE § 1189

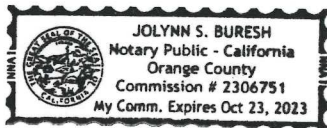
A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California }
County of Orange }
On June 7, 2022 before me, Jolynn S. Buresh, Notary Public,
Date Here Insert Name and Title of the Officer
personally appeared W. Andrew Strane, III
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 [Handwritten Signature]
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: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____ Signer's Name: _____

Corporate Officer – Title(s): _____ Corporate Officer – Title(s): _____

Partner – Limited General Partner – Limited General

Individual Attorney in Fact Individual Attorney in Fact

Trustee Guardian or Conservator Trustee Guardian or Conservator

Other: _____ Other: _____

Signer is Representing: _____ Signer is Representing: _____

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

1. SCOPE OF WORK: The project consists of improvements to the existing 100-million gallon per day (MGD) Miramar Reservoir Pump Station(MRPS) as well as addition of 1 megawatt (MW) of photovoltaic panels on Clearwell 1 at the Miramar Water Treatment Plant. The improvements at the MRPS include rehabilitation of six 200 horsepower (hp) pumps, assessment and rehabilitation of the existing pump cans (if needed), replacement of approximately 200-feet of 66-inch potable water pipeline, rehabilitation of the 48-inch pump discharge pipeline (if needed), replacement of the existing emergency generator, site improvements, electrical improvements, and HVAC improvements. The photovoltaic project includes the phase 2 of a two-phase installation of a commercial roof-mount solar photovoltaic power system on Clearwell 1. This phase 2 installation will increase capacity of the existing system by 1.24MW-AC.

1.1. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and Plans numbered **41085-01-D** through **41085-097-D**, inclusive.

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

See **Appendix E – Location Map**.

3. CONTRACT TIME: The Contract Time for completion of the Work shall be **600 Working Days**.

4. The project has specific milestones, constraints, testing periods, and completion requirements, which include the following:

Activity	Working days from Start of Contract
Notice to Proceed	0 Days
Intermediate Substantial Completion	500 Days
Substantial Completion	520 Days
Final Completion	600 Days

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 7-2.2, "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-22-2058-DBB-3

CONTRACT OR TASK TITLE: Miramar Reservoir Pump Station Improvement Project

CONTRACTOR: Shimmick Construction Company

Funding Phase	Phase Description	Phase Start	Phase Finish	Not-to-Exceed Amount
1	Miramar Reservoir Pump Station Improvements (B-17190) Mobilization, Bond, SWPPP Implementation, Equipment & Material Procurement	NTP	5/31/2023	\$ 3,923,996
	Miramar Reservoir PS New Generator & Upgrades (B-19099) Mobilization, Bond, SWPPP Implementation, Equipment & Material Procurement	NTP	5/31/2023	\$ 441,792
2	Miramar Reservoir Pump Station Improvements (B-17190) Refurbish Pumps & Motors, 48" Pipeline, Pump Barrel Inspection & Rehab, Photo-voltaic System, Field Orders	6/1/2023	NOC	\$ 3,452,688
	Miramar Reservoir PS New Generator & Upgrades (B-19099) Remove & Replace Generator, Electrical Improvements, 66-inch Pipeline Replacement, Fencing, Paving, Field Orders	6/1/2023	NOC	\$ 4,873,524
3				\$
Contract Total				\$12,692,000

Notes:

- 1) WHITEBOOK section 7-3.10, "Phased Funding Compensation" applies.
- 2) The total of all funding phases shall be equal to the TOTAL BID PRICE as shown on BID SCHEDULE 1 - PRICES.
- 3) This PHASED FUNDING SCHEDULE AGREEMENT will be incorporated into the CONTRACT and shall only be revised by written modifications to the CONTRACT.

CITY OF SAN DIEGO

PRINT NAME: Nicole George
Construction Senior Engineer

Signature: 

Date: 7/21/2022

CONTRACTOR

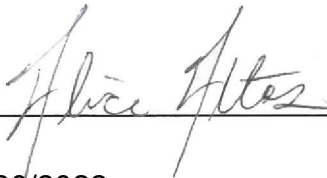
PRINT NAME: W. Andrew Sloane, III

Title: Executive Vice President

Signature: 

Date: 7/19/2022

PRINT NAME: Alice Altes
Design Senior Engineer

Signature: 

Date: 7/20/2022

ATTACHMENT C
EQUAL OPPORTUNITY CONTRACTING PROGRAM

EQUAL OPPORTUNITY CONTRACTING PROGRAM (EOCP)

SECTION A - GENERAL REQUIREMENTS

A. INTRODUCTION.

1. This document sets forth the following specifications:
 - a) The City's general EOCP requirements for all Construction Contracts.
 - b) Special Provisions for Contracts subject to SLBE and ELBE requirements only.
2. Additional requirements may apply for state or federally funded projects.
3. These requirements shall be included as Contract provisions for all Subcontracts.
4. The City specified forms, instructions, and guides are available for download from the EOCP's web site at: <http://www.sandiego.gov/eoc/forms/index.shtml>

B. GENERAL.

1. The City of San Diego promotes equal employment and subcontracting opportunities.
2. The City is committed to ensuring that taxpayer dollars spent on public Contracts are not paid to businesses that practice discrimination in employment or subcontracting.
3. The City encourages all companies seeking to do business with the City to share this commitment.

C. DEFINITIONS.

1. For the purpose of these requirements: Terms "Bid" and "Proposal", "Bidder" and "Proposer", "Subcontractor" and "Subconsultant", "Contractor" and "Consultant", "Contractor" and "Prime Contractor", "Consultant" and "Professional Service Provider", "Suppliers" and "Vendors", "Suppliers" and "Dealers", and "Suppliers" and "Manufacturers" may have been used interchangeably.
2. The following definitions apply:
 - a) **Emerging Business Enterprise (EBE)** - A for-profit business that is independently owned and operated; that is not a subsidiary or franchise of another business and whose gross annual receipts do not exceed the amount set by the City Manager and that meets all other criteria set forth in regulations implementing Municipal Code Chapter 2, Article 2, Division 36. The City Manager shall review the threshold amount for EBEs on an annual basis and adjust as necessary to reflect changes in the marketplace.

- b) **Emerging Local Business Enterprise (ELBE)** - A Local Business Enterprise that is also an Emerging Business Enterprise.
- c) **Minority Business Enterprise (MBE)** - A certified business that is at least fifty-one percent (51%) owned by one or more minority individuals, or, in the case of a publicly owned business at least fifty-one percent (51%) of the stock is owned by one or more minority individuals; and (2) whose daily business operations are managed and directed by one or more minorities owners. Minorities include the groups with the following ethnic origins: African, Asian Pacific, Asian Subcontinent, Hispanic, Native Alaskan, Native American, and Native Hawaiian.
- d) **Women Business Enterprise (WBE)** - A certified business that is at least fifty-one percent (51%) owned by a woman or women, or, in the case of a publicly owned business at least fifty-one percent (51%) of the stock is owned by one or more women; and (2) whose daily business operations are managed and directed by one or more women owners.
- e) **Disadvantaged Business Enterprise (DBE)** - a certified business that is at least fifty-one percent (51%) owned by socially and economically disadvantaged individuals, or, in the case of a publicly owned business at least fifty-one percent (51%) of the stock is owned by one or more socially and economically disadvantaged individuals; and (2) whose daily business operations are managed and directed by one or more socially and economically disadvantaged owners.
- f) **Disabled Veteran Business Enterprise (DVBE)** - A certified business that is at least fifty-one percent (51%) owned by one or more disabled veterans; and (2) business operations must be managed and controlled by one or more disabled veterans. Disabled Veteran is a veteran of the U.S. military, naval, or air service; the veteran must have a service-connected disability of at least 10% or more; and the veteran must reside in California.
- g) **Other Business Enterprise (OBE)** - Any business which does not otherwise qualify as a Minority, Woman, Disadvantaged, or Disabled Veteran Business Enterprise.
- h) **Small Business Enterprise (SBE)** - A for-profit business that is independently owned and operated; that is not a subsidiary or franchise of another business and whose gross annual receipts do not exceed the amount set by the City Manager and that meets all other criteria set forth in regulations implementing Municipal Code Chapter 2, Article 2, Division 36. The City Manager shall review the threshold amount for SBEs on an annual basis and adjust as necessary to reflect changes in the marketplace. A business certified as a Micro Business (MB) or a Disabled Veteran Business Enterprise (DVBE) by the State of

California and that has provided proof of such certification to the City Manager shall be deemed to be an SBE.

- i) **Small Local Business Enterprise (SLBE)** - A Local Business Enterprise that is also a Small Business Enterprise.

D. CITY'S EQUAL OPPORTUNITY COMMITMENT.

1. Nondiscrimination in Contracting Ordinance.

- a) You, your Subcontractors, and Suppliers shall comply with the requirements of the City's Nondiscrimination in Contracting Ordinance, San Diego Municipal Code §§22.3501 through 22.3517.

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

You shall include the foregoing clause in all Contracts between you and your Subcontractors and Suppliers.

- b) **Disclosure of Discrimination Complaints.** As part of its Bid or Proposal, you shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against you in a legal or administrative proceeding alleging that you discriminated against your employees, Subcontractors, vendors, or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.
- c) Upon the City's request, You agree to provide to the City, within 60 Calendar Days, a truthful and complete list of the names of all Subcontractors and Suppliers that you have used in the past 5 years on any of your Contracts that were undertaken within the San Diego County, including the total dollar amount paid by you for each Subcontract or supply Contract.
- d) You further agree to fully cooperate in any investigation conducted by the City pursuant to the City's Nondiscrimination in Contracting Ordinance, Municipal Code §§22.3501 through 22.3517. You understand and agree that violation of this clause shall be considered a material breach of the Contract and may result in remedies being ordered against you up to and including contract termination, debarment, and other sanctions for the violation of the provisions of the Nondiscrimination in Contracting Ordinance. You further understand and agree that the procedures, remedies, and sanctions provided for in the

Nondiscrimination in Contracting Ordinance apply only to violations of the Ordinance.

E. EQUAL EMPLOYMENT OPPORTUNITY OUTREACH PROGRAM.

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

You shall not discriminate against any employee or applicant for employment on any basis prohibited by law. You shall provide equal opportunity in all employment practices. You shall ensure that your Subcontractors comply with this program. Nothing in this section shall be interpreted to hold you liable for any discriminatory practices of your Subcontractors.

You shall include the foregoing clause in all Contracts between you and your Subcontractors and Suppliers.

2. If the Contract is competitively solicited, the selected Bidder shall submit a Work Force Report (Form BB05) within 10 Working Days after receipt by the Bidder to the City for approval as specified in the Notice of Intent to Award letter.
3. The selected Bidder shall submit an Equal Employment Opportunity Plan if a Work Force Report is submitted and if the City determines that there are under-representations when compared to County Labor Force Availability data.
4. If the selected Bidder submits an Equal Employment Opportunity Plan, it shall include the following assurances:
 - a) You shall maintain a working environment free of discrimination, harassment, intimidation, and coercion at all Sites and in all facilities at which your employees are assigned to Work.
 - b) You shall review your EEO Policy annually with all on-Site supervisors involved in employment decisions.
 - c) You shall disseminate and review your EEO Policy with all employees at least once a year, post the policy statement and EEO posters on all company bulletin boards and job sites, and document every dissemination, review, and posting with a written record to identify the time, place, employees present, subject matter, and disposition of meetings.
 - d) You shall review, at least annually, all supervisors' adherence to and performance under the EEO Policy and maintain written documentation of these reviews.

- e) You shall discuss your EEO Policy Statement with Subcontractors with whom you anticipate doing business, including the EEO Policy Statement in your Subcontracts, and provide such documentation to the City upon request.
- f) You shall document and maintain a record of all Bid solicitations and outreach efforts to and from Subcontractors, contractor associations, and other business associations.
- g) You shall disseminate your EEO Policy externally through various media, including the media of people of color and women, in advertisements to recruit. Maintain files documenting these efforts and provide copies of these advertisements to the City upon request.
- h) You shall disseminate your EEO Policy to union and community organizations.
- i) You shall provide immediate written notification to the City when any union referral process has impeded your efforts to maintain your EEO Policy.
- j) You shall maintain a current list of recruitment sources, including those outreaching to people of color and women, and provide written notification of employment opportunities to these recruitment sources with a record of the organizations' responses.
- k) You shall maintain a current file of names, addresses and phone numbers of each walk-in applicant, including people of color and women, and referrals from unions, recruitment sources, or community organizations with a description of the employment action taken.
- l) You shall encourage all present employees, including people of color and women employees, to recruit others.
- m) You shall maintain all employment selection process information with records of all tests and other selection criteria.
- n) You shall develop and maintain documentation for on-the-job training opportunities, participate in training programs, or both for all of your employees, including people of color and women, and establish apprenticeship, trainee, and upgrade programs relevant to your employment needs.
- o) You shall conduct, at least annually, an inventory and evaluation of all employees for promotional opportunities and encourage all employees to seek and prepare appropriately for such opportunities.
- p) You shall ensure that the company's working environment and activities are non-segregated except for providing separate or single-user toilets and necessary changing facilities to assure privacy between the sexes.

F. SUBCONTRACTING.

1. The City encourages all eligible business enterprises to participate in City contracts as a Contractor, Subcontractor, and joint venture partner with you, your Subcontractors, or your Suppliers. You are encouraged to take positive steps to diversify and expand your Subcontractor solicitation base and to offer subcontracting opportunities to all eligible business firms including SLBEs, ELBEs, MBEs, WBEs, DBEs, DVBES, and OBEs.
2. For Subcontractor participation level requirements, see the Contract Documents where applicable.
3. For the purposes of achieving the mandatory Subcontractor participation percentages, City percentage calculations will not account for the following:
 - a) "Field Orders" and "City Contingency" Bid items.
 - b) Alternate Bid items.
 - c) Allowance Bid items designated as "EOC Type II".
4. Allowance Bid items designated as "EOC Type I" will be considered as part of the Base Bid and will be included in the percentage calculation.
5. Each joint venture partner shall be responsible for a clearly defined Scope of Work. In addition, an agreement shall be submitted and signed by all parties identifying the extent to which each joint venture partner shares in ownership, control, management, risk, and profits of the joint venture.

G. LISTS OF SUBCONTRACTORS AND SUPPLIERS.

1. You shall comply with the Subletting and Subcontracting Fair Practices Act, Public Contract Code §§4100 through 4113, inclusive.
2. You shall list all Subcontractors who will receive more than 0.5% of the total Bid amount or \$10,000, whichever is greater on the form provided in the Contract Documents (Subcontractors list).
3. The Subcontractors list shall include the Subcontractor's name, telephone number including area code, physical address, Scope of Work, the dollar amount of the proposed Subcontract, the California contractor license number, the Public Works contractor registration number issued pursuant to Section 1725.5 of the Labor Code, and the Subcontractor's certification status with the name of the certifying agency.
4. The listed Subcontractor shall be appropriately licensed pursuant to Contractor License Laws.
5. For Design-Build Contracts, refer to the RFQ and RFP for each Project or Task Order.

H. SUBCONTRACTOR AND SUPPLIER SUBSTITUTIONS.

1. Listed Subcontractors and Suppliers shall not be substituted without the Express authorization of the City or its duly authorized agent.
2. Request for Subcontractor or Supplier substitution shall be made in writing to Purchasing & Contracting Department, Public Works Division, Attention Contract Specialist, 1200 3rd Ave., Suite 200, MS56, San Diego, CA 92101 with a copy to the Engineer.
3. The request shall include a thorough explanation of the reason(s) for the substitution, including dollar amounts and a letter from each substituted Subcontractor or Supplier stating that they (the Subcontractors or Suppliers) release all interest in working on the Project and written confirmation from the new Subcontractor or Supplier stating that they agree to work on the Project along with the dollar value of the Work to be performed.
4. Written approval of the substitution request shall be received by you or from the City or its authorized officer prior to any unlisted Subcontractor or Supplier performing Work on the Project.
5. Substitution of Subcontractors and Suppliers without authorization shall subject you to those penalties set forth in Public Contract Code §4110.
6. Requests for Supplier substitution shall be made in writing at least 10 Days prior to the provision of materials, supplies, or services by the proposed Supplier and shall include proof of written notice to the originally listed Supplier of the proposed substitution.
7. A Contractor whose Bid is accepted shall not:
 - a) Substitute a person as Subcontractor or Supplier in place of the Subcontractor or Supplier listed in the original bid, except that the City, or it's duly authorized officer, may consent to the substitution of another person as a Subcontractor or Supplier in any of the following situations:
 - i. When the Subcontractor or Supplier listed in the Bid, after having a reasonable opportunity to do so, fails or refuses to execute a written Contract for the scope of work specified in the subcontractor's bid and at the price specified in the subcontractor's bid, when that written contract, based upon the general terms, conditions, plans, and specifications for the project involved or the terms of the subcontractor's written bid, is presented to the subcontractor by the prime contractor.
 - ii. When the listed Subcontractor or Supplier becomes insolvent or the subject of an order for relief in bankruptcy.
 - iii. When the listed Subcontractor or Supplier fails or refuses to perform his or her subcontract.

- iv. When the listed Subcontractor fails or refuses to meet bond requirements as set forth in Public Contract Code §4108.
 - v. When you demonstrate to the City or its duly authorized officer, subject to the provisions set forth in Public Contract Code §4107.5, that the name of the Subcontractor was listed as the result of an inadvertent clerical error.
 - vi. When the listed Subcontractor is not licensed pursuant to Contractor License Law.
 - vii. When the City, or its duly authorized officer, determines that the Work performed by the listed Subcontractor or that the materials or supplies provided by the listed Supplier are substantially unsatisfactory and not in substantial accordance with the Plans and specifications or that the Subcontractor or Supplier is substantially delaying or disrupting the progress of the Work.
 - viii. When the listed Subcontractor is ineligible to work on a public works project pursuant to §§1777.1 or 1777.7 of the Labor Code.
 - ix. When the City or its duly authorized agent determines that the listed Subcontractor is not a responsible contractor.
- b) Permit a Contract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original Subcontractor, Supplier listed in the original Bid without the consent of the City, or its duly authorized officer.
 - c) Other than in the performance of "Change Orders" causing changes or deviations from the Contract, sublet or subcontract any portion of the Work, or contract for materials or supplies in excess of 0.5% of your total bid or \$10,000, whichever is greater, as to which his or her original Bid did not designate a Subcontractor or Supplier.
8. Following receipt of notice from you of the proposed substitution of a Subcontractor or Supplier, the listed Subcontractor or Supplier who has been so notified shall have 5 Working Days within which to submit written objections to the substitution to the Contract Specialist with a copy to the Engineer. Failure to file these written objections shall constitute the listed Subcontractor or Supplier's consent to the substitution. If written objections are filed, the City shall give notice in writing of at least 5 Working Days to the listed Subcontractor or Supplier of a hearing by the City on your request for substitution.

I. PROMPT PAYMENT.

- 1. You or your Subcontractors shall pay to any subcontractor, not later than 7 Calendar Days of receipt of each progress payment, unless otherwise agreed to in writing, the respective amounts allowed you on account of the Work

performed by the Subcontractors, to the extent of each Subcontractor's interest therein. In cases of Subcontractor performance deficiencies, you shall make written notice of any withholding to the Subcontractor with a copy to the Contracts Specialist. Upon correction of the deficiency, you shall pay the Subcontractor the amount previously withheld within 14 Calendar Days after payment by the City.

2. Any violation of California Business and Professions Code, §7108.5 concerning prompt payment to Subcontractors shall subject the violating Contractor or Subcontractor to the penalties, sanctions, and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to you or your Subcontractor in the event of a dispute involving late payment or nonpayment by the Prime Contractor, deficient subcontract performance, or noncompliance by a Subcontractor.

J. PROMPT PAYMENT OF FUNDS WITHHELD TO SUBCONTRACTORS.

1. The City will hold retention from you and will make prompt and regular incremental acceptances of portions, as determined by the Engineer, of the Work and pay retention to you based on these acceptances.
2. You or your Subcontractors shall return all monies withheld in retention from a Subcontractor within 30 Calendar Days after receiving payment for Work satisfactorily completed and accepted including incremental acceptances of portions of the Work by the City.
3. Federal law (49CFR26.29) requires that any delay or postponement of payment over 30 Calendar Days may take place only for good cause and with the City's prior written approval. Any violation of this provision by you or your Subcontractor shall subject you or your Subcontractor to the penalties, sanctions, and other remedies specified in §7108.5 of the Business and Professions Code.
4. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to you or your Subcontractor in the event of a dispute involving late payment or nonpayment by you, deficient subcontract performance, or noncompliance by a Subcontractor.

K. CERTIFICATION.

1. The City accepts certifications of DBE, DVBE, MBE, SMBE, SWBE, or WBE by any of the following certifying agencies:
 - a) Current certification by the State of California Department of Transportation (CALTRANS) as DBE, SMBE, or SWBE.
 - b) Current MBE, WBE, or DVBE certification from the California Public Utilities Commission.

- c) DVBE certification is received from the State of California's Department of General Services, Office of Small and Minority Business.
- d) Current certification by the City of Los Angeles as DBE, WBE, or MBE.
- e) Subcontractors' valid proof of certification status (copies of MBE, WBE, DBE, or DVBE certifications) shall be submitted as required.

L. CONTRACT RECORDS AND REPORTS.

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 and your Subcontractors and Suppliers shall submit Monthly Payment Reporting by the 5th day of the subsequent month. Incomplete and/or delinquent reporting may cause payment delays, non-payment of invoices, or both.
 - b. You shall submit a signed and executed LCP Tracker Software Contract 3rd Party User Agreement prior to the PLA Pre-job conference as defined in Article 16 of the PLA. See **Appendix L** – LCP Tracker Third Party User Agreement.
 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.
-

ATTACHMENT D

FUNDING AGENCY PROVISIONS

**CALIFORNIA STATE REVOLVING FUND (CASRF), 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)

BUREAU OF RECLAMATION (BOR)

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, AND CALIFORNIA STATE REVOLVING FUND (CASRF) 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**, and the State Water Resources Control Board under the **California Water State Revolving Fund (CASRF)**. 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. The Contractor must maintain separate books, records and other material relative to the Project. The Recipient must also retain such books, records, and other material for itself and for each contractor or subcontractor who performed or performs work on this project for a minimum of thirty-six (36) years after Completion of Construction. The Recipient must 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. The Recipient must allow and must require its contractors to allow interviews during normal business hours of any employees who might reasonably have information related to such records. The Recipient agrees to include a similar duty regarding audit, interviews, and records retention in any contract or subcontract related to the performance of this Agreement. The provisions of this section survive the term of this Agreement. (CWSRF Agmt. § 2.17(b); DWSRF Agmt. Ex. C § C.3.2(d)).

1.2. BONDS. Where contractors are used, the Recipient must not authorize construction to begin until each contractor has furnished a performance bond in favor of the Recipient in the following amounts: faithful performance (100%) of contract value; labor and materials (100%) of contract value. This requirement shall not apply to any contract for less than \$25,000.00. (CWSRF Agmt. § 4.3; DWSRF Agmt. Ex. C § C.3.6).

1.3. COMPLIANCE WITH APPLICABLE LAWS, RULES, AND REQUIREMENTS. The Recipient must, at all times, comply with and require its contractors and subcontractors to comply with all applicable federal and state laws, rules, guidelines, regulations, and requirements. Without limitation of the foregoing, to the extent applicable, the Recipient must:

- (a) Comply with the provisions of the adopted environmental mitigation plan, if any, for the term of this Agreement;
- (b) Comply with the Policy ; and
- (c) Comply with and require compliance with the state and federal requirements set forth elsewhere in this Agreement. (CWSRF Agmt. § 4.5; DWSRF Agmt. Ex. C § C.3.8).

1.4. INDEMNIFICATION.

1.4.1. Contractor shall defend, indemnify and hold harmless the State Water Quality Control Board, 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).

1.5. NO DISCRIMINATION.

- (a) The Contractor must comply with Government Code section 11135 and the implementing regulations (Cal. Code Regs, tit. 2, § 11140 et seq.), including, but not limited to, ensuring that no person is unlawfully denied full and equal access to the benefits of, or unlawfully subjected to discrimination in the operation of, the Project or System on the basis of sex, race, color, religion, ancestry, national origin, ethnic group identification, age, mental disability, physical disability, medical condition, genetic information, marital status, or sexual orientation as such terms are defined under California law, for as long as the Contractor retains ownership or possession of the Project.
- (b) If Project Funds are used to acquire or improve real property, the Contractor must include a covenant of nondiscrimination running with the land in the instrument effecting or recording the transfer of such real property.
- (c) The Contractor must comply with the federal American with Disabilities Act of 1990 and implementing regulations as required by Government Code section 11135(b).

- (d) The Contractor's obligations under this section shall survive the term of this Agreement.
- (e) During the performance of this Agreement, Recipient and its contractors and subcontractors 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.
- (f) The Recipient, its contractors, and subcontractors must ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment.
- (g) The Recipient, its contractors, and subcontractors must comply with the provisions of the Fair Employment and Housing Act and the applicable regulations promulgated thereunder. (Gov. Code, §12990, subs. (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.
- (h) The Recipient, its contractors, and subcontractors must comply with all applicable federal civil rights regulations, including statutory and national policy requirements. (2 CFR § 200.300). This includes, to the greatest extent practicable and to the extent permitted by law, the requirement to respect and protect the freedom of persons and organizations to engage in political and religious speech. (Executive Order 13798).
- (i) The Recipient, its contractors, and subcontractors must give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- (j) The Recipient must comply with and include the following nondiscrimination and compliance provision in all subcontracts under this Agreement:

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

- "(a) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, 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, creed, color, 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 contracting officer setting forth the provisions of this nondiscrimination clause.

- "(b) 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, creed, color, or national origin.
- "(c) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- "(d) The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- "(e) 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.
- "(f) 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 cancelled, 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 No. 11246 of Sept 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- "(g) The contractor will include the provisions of Paragraphs (1) through (7) 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 No. 11246 of Sept. 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 the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, That in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a

result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States."

1.6. INSURANCE. For any policy of insurance concerning or covering the construction of the Project, it will cause, and will require its contractors and subcontractors to cause, a certificate of insurance to be issued showing, the State, the State Water Board, its officers, agents, employees, and servants as additional insured; and must provide the Division with a copy of all such certificates prior to the commencement of construction of the Project. (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:

https://www.waterboards.ca.gov/water_issues/programs/enforcement/fwa/dbp.html
(CWSRF Agmt. § 4.18; DWSRF Agmt. Ex. C § C.3.26).

1.8. PREVAILING WAGES. The Contractor agrees to be bound by all applicable provisions of State Labor Code regarding prevailing wages. The Contractor must monitor all agreements subject to reimbursement from this Agreement to ensure that the prevailing wage provisions of the State Labor Code are being met. In addition, the Contractor agrees to comply with the Davis-Bacon provisions incorporated by reference in Section 3 of this Agreement. (CWSRF Agmt. § 4.19; DWSRF Agmt. Ex. C § C.3.28).

1.9. SIGNAGE. The 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 Division):



b) "Funding for this project has been provided in full or in part by the Clean Water State Revolving Fund through an agreement with the State Water Resources Control Board. California's Clean Water State Revolving Fund is 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).

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 Clean Water State Revolving Fund is 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 must comply with the following federal conditions:
- 1.12. 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))
- 1.13. Wage Rate Requirements (Davis-Bacon).** Contractor must include in its subcontracts the full 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)).
- 1.14. Reserved.**
- 1.15. 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)

- 1.16. 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."

- 1.17. Trafficking in Persons.** The Recipient, its employees, contractors and subcontractors and their employees warrants that it will not engage in severe forms of trafficking in persons, procure a commercial sex act during the term of this Agreement, or use forced labor in the performance of this Agreement. The Recipient must include this provision in its contracts and subcontracts under this Agreement. The Recipient must inform the State Water Board immediately of any information regarding a violation of the foregoing. The Recipient understands that failure to comply with this provision may subject the State Water Board to loss of federal funds. The Recipient agrees to compensate the State Water Board for any such funds lost due to its failure to comply with this condition, or the failure of its contractors or subcontractors to comply with this condition. The State Water Board may unilaterally terminate this Agreement if the Recipient that is a private entity is determined to have violated the foregoing. (CWSRF Agmt. Ex. E § A(5)(h); DWSRF Agmt. Ex. C § C.4.3.xiii).

- 1.18. Influencing.** The Contractor certifies to the best of its knowledge and belief that:

- a. No federal appropriated funds have been paid or will be paid, by or on behalf of the Contractor, to any person 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 the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
- b. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Agreement, the Contractor shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions, and notify the State Water Board.

The Contractor shall require this certification from all parties to any contract or agreement that the Recipient enters into and under which the Recipient incurs costs for which it seeks disbursements under this Agreement.

1.19. 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 of 1975, 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) If the Project relates to construction of a publicly owned treatment works, where the Recipient contracts for program management, construction management, feasibility studies, preliminary engineering, design, engineering, surveying, mapping, or architectural related services, the Recipient shall ensure that any such contract is negotiated in the same manner as a contract for architectural and engineering services is negotiated under chapter 11 of title 40, United States Code, or an equivalent State qualifications-based requirement as determined by the State Water Board.
- g) If the Project relates to construction of a publicly owned treatment works, the Recipient certifies that it has developed and is implementing a fiscal sustainability plan for the Project that includes an inventory of critical assets that are a part of the Project, an evaluation of the condition and performance of inventoried assets or asset groupings, a certification that the Recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan, and a plan for maintaining, repairing, and, as necessary, replacing the Project and a plan for funding such activities.
- h) 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."

i) **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))

1.20. 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/>.

- 1.21. 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).
- 1.22. 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)
- 1.23. TELECOMMUNICATIONS.** The Contractor certifies that no Project Funds will be used on:
 - a. Video surveillance or telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities), telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);
 - b. Telecommunications or video surveillance services produced by such entities;
 - c. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country; or
 - d. Other telecommunications or video surveillance services or equipment in violation of [2 CFR 200.216](#).

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 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%

2.2. 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.

- 2.3.** 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.
- 2.4.** 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.
- 2.5.** 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, washrooms, 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 timetables 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: CA20220001 02/25/2022

Superseded General Decision Number: CA20210001
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: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658.

Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

<p>If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:</p>	<ul style="list-style-type: none"> . Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 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 2022.
<p>If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:</p>	<ul style="list-style-type: none"> . Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	01/14/2022
2	01/21/2022
3	02/11/2022
4	02/25/2022

ASBE0005-002 09/01/2021

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 47.25	24.45
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 32.09	19.66

ASBE0005-004 07/05/2021

	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)....	\$ 22.40	13.07

BOIL0092-003 01/01/2021

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

BRCA0004-008 05/01/2021

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 40.94	18.71

BRCA0018-004 06/01/2021

	Rates	Fringes
MARBLE FINISHER.....	\$ 35.90	14.11
TILE FINISHER.....	\$ 30.47	12.52
TILE LAYER.....	\$ 43.09	18.31

BRCA0018-010 09/01/2020

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

CARP0213-003 07/01/2021

	Rates	Fringes
Drywall		
(1) Work on wood framed construction of single family residences, apartments or condominiums under four stories		
Drywall Installer/Lather...\$	32.14	16.28
Drywall Stocker/Scrapper...\$	22.16	8.62

CARP0619-002 07/01/2021

	Rates	Fringes
Drywall		
(2) All other work		
Drywall Installer/Lather...\$	42.80	16.28
Drywall Stocker/Scrapper...\$	23.07	8.62

CARP0619-003 07/01/2021

	Rates	Fringes
CARPENTER		
(1) Bridge.....\$	51.53	16.28
(2) Commercial Building....\$	46.30	16.28
(3) Heavy & Highway.....\$	51.40	16.28
(4) Residential Carpenter..\$	38.47	16.28
(5) Residential Insulation Installer.....\$	24.16	15.76
PILEDRIVERMAN.....\$	51.53	16.28

CARP0619-004 07/01/2021

	Rates	Fringes
Diver		
(1) Wet.....\$	831.20	16.28
(2) Standby.....\$	444.24	16.28
(3) Tender.....\$	436.24	16.28
(4) Assistant Tender.....\$	412.24	16.28

Amounts in "'Rates' column are per day

CARP0721-001 07/01/2021

	Rates	Fringes
Modular Furniture Installer.....\$	21.85	7.15

CARP1607-004 07/01/2021

	Rates	Fringes
MILLWRIGHT.....\$	51.90	16.48

ELEC0569-001 06/01/2021

	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 08/30/2021

	Rates	Fringes
ELECTRICIAN (Residential, 1-3 Stories).....	\$ 37.28	7.98

 ELEC1245-001 01/01/2022

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 60.19	22.07
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment).....	\$ 48.08	20.86
(3) Groundman.....	\$ 36.76	20.46
(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 01/01/2022

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 61.34	36.885+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
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, PILEDRIVING 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, SBM 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

 IRON0229-001 07/01/2021

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 38.08	24.91
Ornamental, Reinforcing and Structural.....	\$ 43.00	33.55

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 track 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 pulling-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 chute 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 07/01/2021

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 46.50	20.42
GROUP 2.....	\$ 45.55	20.42
GROUP 3.....	\$ 42.01	20.42

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 07/01/2021

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 38.89	17.10
(2) Vehicle Operator/Hauler.	\$ 39.06	17.10

	Rates	Fringes
(3) Horizontal Directional Drill Operator.....	\$ 40.91	17.10
(4) Electronic Tracking Locator.....	\$ 42.91	17.10
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 40.10	20.12
GROUP 2.....	\$ 41.40	20.12
GROUP 3.....	\$ 43.41	20.12
GROUP 4.....	\$ 45.15	20.12

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 10/01/2021

	Rates	Fringes
DRYWALL FINISHER/TAPER		
(1) Building & Heavy Construction.....	\$ 37.14	20.90
(2) Residential Construction (Wood frame apartments, single family homes and multi-duplexes up to and including four stories).....	\$ 32.27	14.70

 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 08/04/2021

	Rates	Fringes
PLASTERER.....	\$ 45.77	18.39

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	19.77
GROUP 2.....	\$ 27.99	19.77
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 09/01/2021		
	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Camp Pendleton; Vandenberg Air Force Base.....	\$ 58.33	25.36
Work ONLY on new additions and remodeling of commercial buildings, bars, restaurants, and stores not to exceed 5,000 sq. ft. of floor space.....	\$ 52.20	24.38
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 39.91	22.71
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.....	\$ 53.83	25.36

PLUM0016-011 09/01/2021		
	Rates	Fringes
PLUMBER/PIPEFITTER Residential.....	\$ 42.74	21.28

PLUM0345-001 09/01/2021		
	Rates	Fringes
PLUMBER Landscape/Irrigation Fitter..	\$ 36.85	24.75
Sewer & Storm Drain Work....	\$ 40.94	22.13

ROOF0045-001 07/01/2021		
	Rates	Fringes
ROOFER.....	\$ 37.75	10.24

SFCA0669-001 01/01/2022		
	Rates	Fringes
SPRINKLER FITTER.....	\$ 43.01	25.16

	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 <https://www.dol.gov/agencies/whd/government-contracts>.

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 National Office because National Office has 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"

10.2. 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:

(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 asset 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/whd/forms/index.htm> 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

10.3. 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.

10.4. 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
U.S. Department of Commerce	213-989-3153 or 213-353-9400
Minority Business Development Agency	RE: Business Development Centers
1055 Wilshire Blvd Suite 900 Los Angeles, CA 91107	https://www.mbda.gov/business-center/los-angeles-mbda-business-center 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> https://sch.thesupplierclearinghouse.com/FrontEnd/SearchCertifiedDirectory.asp
San Francisco, CA 94102-3298	

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 **within 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 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 following forms 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

14.1.2. The following forms shall be completed and submitted within **4 Working Days after the Bid opening by 5 PM**. 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

14.1.3. 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)

14.1.4. 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		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 Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

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
Title	Date

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.

FORM 4500-3 (DBE Subcontractor Performance Form)



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

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?

--Continue on back if needed--

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
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.

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

SUMMARY OF BIDS RECEIVED

Company Name	NAICS CODES	Scope of Work	Selected (Y/N)	Bid Amount	DBE	Non-DBE	Explanation for not Selecting

USE ADDITIONAL FORMS AS NECESSARY

DISADVANTAGE BUSINESS ENTERPRISE (DBE)

GOOD FAITH EFFORT LIST OF SUBCONTRACTORS SOLICITED

Contractor Name	Contractor Address	How Located	Date of Contact	Contact Method	Scope of Work	Bidding (Yes/No)

USE ADDITIONAL FORMS AS NECESSARY



**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. <u>Recipient's Name and Address:</u>			6. <u>Recipient's Contact Person and Phone Number:</u>		
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

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

INSTRUCTIONS FOR COMPLETING FORM UR-334

- Box 1** Grant or Financing Agreement Number.
- Box 2** Annual reporting period.
- Box 3** Enter the dates between which you made procurements under this financing agreement or grant.
- Box 4** Enter the total amount of payments paid to the contractor or sub-contractors during this reporting period.
- Box 5** Enter Recipient's Name and Address.
- Box 6** Enter Recipient's Contact Name and Phone Number.
- Box 7** Enter details for the **DBE purchases only** and be sure to limit them to the current period.
1) Use either an "R" or a "C" to represent "Recipient" or "Contractor." 2) Enter a dollar total for DBE and total the two columns at the bottom of the section. 3) Provide the payment date. 4) Enter a product type choice from those at the bottom of the page. 5) List the vendor name and address in the right-hand column
- Box 8** Initial here if no DBE contractors or sub-contractors were paid during this reporting period.
- Box 9** Initial this box only if all purchases under this financing agreement or grant have been completed during this reporting period or a previous period. If you initial this box, we will no longer send you a survey.
- Box 10** This box is for explanatory information or questions.
- Box 11** Provide an authorized representative signature.
- Box 12** Enter the date form completed.



**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

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.

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 **2021 Edition** of the Standard Specifications for Public Works Construction (The "GREENBOOK").
2. The **2021 Edition** of the City of San Diego Standard Specifications for Public Works Construction (The "WHITEBOOK"), including the following:
 - a) General Provisions (A) for all Construction Contracts.

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

1-2 TERMS AND DEFINITIONS. To the "WHITEBOOK", to item 55, "Normal Working Hours", ADD the following:

The **Normal Working Hours** are **7:00 AM to 3:30 PM**. Construction activities outside of normal working hours may occur with prior approval by the Resident Engineer, at no cost to the City.

To the "WHITEBOOK", ADD the following:

111. **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 sufficiently complete, in accordance with the Contract Documents, so that the specific area or unit process can be utilized for the purposes for which it is intended.
112. **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.
113. **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 Owner shall provide acceptance of the facilities and take over operation of the facilities.

114. **Intermediate Substantial Completion** – The time at which the Project’s operating facilities or systems are sufficiently complete to provide the Owner with uninterrupted operations and maintenance of the overall facility as required to perform full flow ramp up and tests of all pumps.

115. **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.

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) Air Pollution Control District 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:

1. 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>

2. 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.
3. 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
- 4. 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.
- 5. 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.
- 6. The 1st candidate from a party that receives no objection becomes that party's DRB member.
- 7. You and the City each provide written notification to your selected DRB member.
- 8. 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.
- 9. 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.
- 10. 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.
 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.
- 11. 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.
2. 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.
3. 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.
4. 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 50% of the base Bid.

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” Subsection 3.01 “Maintenance of Record Documents”.

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

5. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests at the Work Site:
 - a) Geotechnical Report for Miramar Reservoir Pump Station Improvements, dated March 13, 2020, by Kleinfelder
6. The report listed above are available for review at the following link:

<https://drive.google.com/file/d/1fPVFugfOJSBLvcPb0rhakUu5s6NCBdm/view?usp=sharing>

3-11.2 Project Identification Signs. 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.

3-13.1 Completion. To the “WHITEBOOK”, ADD the following:

2. For additional requirements related to Closeout items, refer to Technical Specifications, Section 01 77 00 “Closeout Procedures”

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

2. The list of Separate Contractors includes:
North City Pure Water Pipeline K-21-1744-DBB-3-A W.A. Rasic Construction Company.

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 the Project. See **Appendix F – Adjacent Projects Map**

for the approximate location. Coordinate the Work with the adjacent projects as listed below:

- a) North City Pure Water Pipeline

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 K**, 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.

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

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

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 issuance of the Notice of Intent to Award** 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", DELETE in its entirety and SUBSTITUTE with the following:

1. Your attention is directed to the City of San Diego Labor Compliance Program, Section IV, pages 4-7, and the State of California Labor Code §§1771.5(b) and 1776 (Stats. 1978, Ch. 1249). These require, in part, that you and your Subcontractors maintain and furnish to the City, at a designated time, a certified copy of each weekly payroll containing a statement of compliance signed under penalty of perjury.
2. You and your Subcontractors shall submit weekly certified payrolls reflecting the wages of all yours and Subcontractors' employees engaged in the Work online via LCP Tracker, the City's web-based labor compliance program.
3. You and your Subcontractors shall submit the following PLA and Labor Compliance required documents online via LCP Tracker, to the City's web-based labor compliance program:
 - a) Letter of Assent (PLA Attachment A);
 - b) Contractor Core Workforce Form (PLA Attachment B-2) [if required];

- c) Monthly Proof of Fringe Benefit Payments to Union Trust;
- d) City of San Diego Labor Compliance Authorized Signatory Form;
- e) City of San Diego List of Trades Craft;
- f) Labor Compliance Checklist;
- g) Fringe Benefit Statement;
- h) DAS 140 Form & Transmittal Confirmation;
- i) DAS 142 or Workforce Dispatch Request Form (PLA Attachment B-1) & Transmittal Confirmation;
- j) Certified Payroll Report (Performance Report with Statement of Compliance, Non-Performance Reports, Confirmation Report that CPR was uploaded to the DIR website);
- k) State & Federal Apprentice Certifications;
- l) Payroll Confirmations (as requested per CCR 16432);
- m) Other Deduction Forms (letter or documentation relating to non-standard deductions); and
 Monthly Skilled & Trained Workforce Certification Form and Report
 (See Section 6: Certifications and Forms)

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

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. The Bidder selected to perform the work shall submit to the City, as well as OCIP credit worksheets obtained from all their subcontractors, the OCIP credit worksheets after receiving The Notice of Intent to Award and prior to the issuance of the Limited Notice to Proceed. **Failure to comply with OCIP requirements shall render the bid non-responsive and ineligible for award.**
6. Contractor shall still maintain minimum insurance outside of OCIP as defined in Section 5-4.17
7. OCIP related manuals mentioned in Section 5-4 and 5-10 can be downloaded from the following link:

https://drive.google.com/drive/folders/1rYQ7K_e95mTw0TWiRBVvFAILVc5Sjyfn?usp=sharing

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 greater than thirty days 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: 7/21/2019 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
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 for the contract value per 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 \$25,000 (twenty-five 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. 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 Contractors 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 2021 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 -- \$3,000,000 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 -- \$3,000,000 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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 additional 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 - \$5,000,000 annual aggregate
 - c) Automobile Liability -- \$3,000,000
 - 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: **MIRAMAR RESERVOIR PUMP STATION (MRPS) IMPROVEMENT PROJECT**

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*	\$154M	\$15K	General Liability	\$3M	Needs Approval			
Automobile Liability**	N/A	N/A	Automobile Liability	\$3M	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 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 North City Pure Subaqueous Pipeline and Pump Station		
			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	\$3M							
Workers Compensation	CA Statutory - \$1M employers Liability							
Pollution Liability	\$5M							
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.

5.4.25 OTHER REQUIRED INSURANCE.

1. The insurance provisions herein shall not be construed to limit your indemnity obligations contained in the Contract.
2. The provisions identified in the following Sections shall apply only to the preparation and development of Storm Water Pollution Prevention Plan (SWPPP), engineered traffic control plans, other structural and Engineering work and remediation, handling and disposal of hazardous materials.
3. All other work will fall under the provisions of the Owner Controlled Insurance Program (OCIP) as describe in Section 5-4.

5-4.25.1 Policies and Procedures.

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

5-4.26 Types of Insurance.

5-4.34 Architects and Engineers Professional Insurance (Errors and Omissions Insurance).

1. For Contracts with required engineering services (e.g., Design-Build, preparation of engineered Traffic Control Plans (TCP), and etc.) by you, you

shall keep or require all of your employees or Subcontractors, who provide professional engineering services under this contract, Professional Liability coverage with a limit of **\$1,000,000** per claim and **\$2,000,000** annual aggregate in full force and effect.

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

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.

5-10 COMMUNITY OUTREACH. To the "WHITEBOOK", DELETE in its entirety and SUBSITITUTE 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 the 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, and supporting responses to community questions and complaints related to your activities.
5. Members of your team shall participate in outreach meetings, including an initial orientation meeting (superintendent and foremen), led by the City and Owner's Outreach team to discuss expectations for and participation in outreach tasks throughout the Contract Time. The superintendent shall participate in the subsequent outreach meetings on a quarterly basis following the initial orientation.
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:
 - i. Your contact information is made available on any outreach materials.
 - ii. You will be the primary point of contact to resolve project related inquiries and complaints.
8. Electronic Communication.
 - i. 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.
 - ii. 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.
 - iii. Copies of email communications shall be saved individually on to the City's internal public contact tracking system in an Outlook Message Format (*.msg).

- iv. 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 the Contractor. 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.

5-10.2.1 Communication with the Public

1. 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.

2. 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.
3. 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.
4. 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.

5-10.2.2 Communication 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. You have a right to speak to members of the media about your company and its role on the project. All other questions shall be referred to the City.

5-10.2.3 Payment

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

5-11 **NEWSLETTER.** To the "WHITEBOOK", DELETE in its entirety.

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

1. PMWeb shall be used on this Contract.
2. You shall post all communications addressed to the Engineer concerning construction including RFIs, submittals, daily logs, and transmittal through PM Web. Review and act on all communications addressed to the Contractor in PM Web will be provided at the Pre-Construction meeting and demonstration will be provided.
3. Contractor shall comply with Section 5-3.3 for items related to "Payroll Records".

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1.1 **Construction Schedule.** To the "WHITEBOOK", ADD the following:

3. Refer to the Sample City Invoice materials in **Appendix D – Sample City Invoice with Cash Flow Forecast** and use the format shown.

To the "WHITEBOOK", ADD the following:

ADD:

6-2.2 **Work Restrictions**

1. Contractor is required to have no more than two (2) pumps offline at anyone time.
2. Contractor to provide advance notice, minimum of 60 calendar days for any shutdown at the pump station for review and approval by the Engineer. Contractor may be instructed to stop work during San Diego County Water Authority shut down periods in order to provide adequate inflow into the Miramar water treatment plant. Tentative shutdown dates for San Diego County Water Authority are October 16-25, 2022 and -April 16 to May 2, 2023.
3. The emergency generator needs to be 100% available at all times. If there is a power outage, the emergency power should be made immediately available.

6-2.3 **Schedule Milestones**

1. Milestone 1 – Intermediate Substantial Completion- Completion of all requirements defined herein for Intermediate Substantial Completion.
2. Milestone 2 – Substantial Completion– Completion of all requirements defined herein for Substantial Completion.
3. Milestone 3 – Final Completion – Completion of all requirements defined herein for Final Completion.

ADD:

6-6.1.1

Environmental Document.

1. The City of San Diego has prepared an Environmental Impact Report/ Environmental Impact Statement (EIR/ EIS), Project No. **SCH #2016081016 / PTS #499621**. This document can be obtained at the following web link under the Pure Water San Diego North City Project Final Environmental Impact Report section:

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

2. A Site Development Permit for Pure Water Phase 1, which includes the Miramar Reservoir Pump Station Improvements project has been granted to the City of San Diego Utilities Department. This Permit may be obtained at the following web link.

https://drive.google.com/file/d/17W_AUS3tSeeqF-Y4CS34gc_m5Prf2n_T/view

3. Compliance with the City's environmental documents 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 amount for the first Milestone not completed.

Milestone No.	Milestone Description	Required Completion Date	Amount of Liquidated Damages
Milestone 1	Intermediate Substantial Completion	500 Working Days after Notice to Proceed	\$1,000/working day
Milestone 2	Substantial Completion	520 Working Days after Notice to Proceed	\$1,000/working day
Milestone 3	Final Acceptance and Completion	600 Working Days after Notice to Proceed	\$1,000/working day

SECTION 7 - MEASUREMENT AND PAYMENT

7-3.1 General. To the “WHITEBOOK”, ADD the following:

- 4. The bid items and their scope are specified in the plans, contract documents and technical specification Section 01 29 00.

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

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

SECTION 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.
 - a) Refer to AWWA C900-16 for all references to AWWA C905.

SECTION 1001 – CONSTRUCTION BEST MANAGEMENT PRACTICES (BMPs)

1001-1.1 GENERAL. To the “WHITEBOOK”, ADD the following:

8. Based on a preliminary assessment by the City, this Contract is subject to **SWPPP**.

1001-1.8 Permit Registration Documents (PRDs). To the “WHITEBOOK” ADD the following:

10. A Preamble and exhibit will be provided to the CONTRACTOR by the Legally Responsible Party (LRP) providing context of the Project within the larger Pure Water Program. CONTRACTOR to request preamble and exhibit prior to Pre-con Meeting. The Contractor shall utilize the start date of the Pure Water Program, May 27, 2019, when determining the Risk Level of the Project.

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 H - SWPPP Construction BMP Maintenance Log**.
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TECHNICALS



MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SPECIFICATIONS

**PUBLIC UTILITIES DEPARTMENT
CITY OF SAN DIEGO, CALIFORNIA**

KLEINFELDER PROJECT NO. 20203382.015B

FEBRUARY 2022

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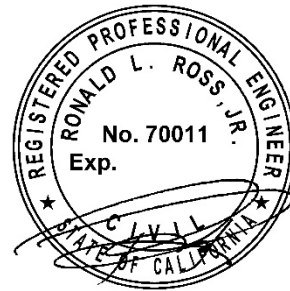
**Technical Specifications
for the
CITY OF SAN DIEGO
MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS**

FEBRUARY 2022

DIVISION 1, DIVISION 2, 030132, 050523, 079200,
099000, 101400, 312316, 312323, 33051613,
DIVISION 40 (EXCEPT 409000, 409100, 409200),



030133, 030100, 036200, 036300, DIVISION 4,
DIVISION 6, 312313, 321123,



DIVISION 23



**DIVISION 26 (EXCEPT 264200), 409000, 409100,
409200**



FEBRUARY 2022

**Technical Specifications
for the
CITY OF SAN DIEGO
MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS**

FEBRUARY 2022



<p>264200</p>  <p>A circular professional engineer seal for Richard F. Yeager, No. 70686, Civil, State of California. The seal includes the text "REGISTERED PROFESSIONAL ENGINEER", "RICHARD F. YEAGER", "No. 70686", "Exp. _____", "CIVIL", and "STATE OF CALIFORNIA". A signature is written over the seal.</p>	<p>031000, 031500, 032100, 033000, 033900</p>  <p>A circular professional engineer seal for Christina Mariko Nishimura, S 6084, Structural, State of California. The seal includes the text "REGISTERED PROFESSIONAL ENGINEER", "CHRISTINA MARIKO NISHIMURA", "S 6084", "STRUCTURAL", and "STATE OF CALIFORNIA". A signature is written over the seal.</p>
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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work of this contract entails the upgrade and modification to the Miramar Reservoir Pump Station including but not limited to:
1. Rehabilitation of the six (6) two hundred horsepower (200 hp) pumps/motors each and inspection and repair to the pump columns, replacement of the pump discharge check valves and miscellaneous appurtenances,
 2. Replacement of the station emergency engine-generator, electrical transfer switch and main breakers and installation of one new variable speed drive,
 3. Removal of an approximately 200-foot section of the existing 66-inch diameter prestressed concrete steel cylinder pipe section of the Miramar Potable Water Transmission Pipeline and replacing it with new cement mortar lined and tape wrapped mortar coated steel pipe. The Miramar pipeline will be dewatered and dechlorinated by the contractor at the Scripps Ranch Pump Station per the statewide community drinking water discharge NPDES requirements, Per State Water Resources Control Board Order WQ 2014-0194-DWQ General Order No. CAG 140001 and all subsequent permit revisions. Activity must also comply with the Phase I Regional Municipal Separate Storm Sewer System Permit and Construction General permits. Pipeline will be disinfected and placed back in service by the contractor.
 4. Upgrades to the electrical building ventilation system, upgrades to the station instrument and control equipment,
 5. Station site improvements, rehabilitated pump station start-up, and recommissioning, and
 6. Other appurtenant work in accordance with the special provisions, plans and technical specifications.
- B. Work of this contract also includes installation and commissioning of a ballasted, rack-mounted, commercial solar 1.78 MW-DC / 1.24 MW-AC Photovoltaic (PV) system on Clearwell 1 at the Miramar Water Treatment Plant as shown in the SO drawings and further described in Section 26 31 00. PV system on Clearwell 2 (Phase 1) will be constructed by others.

1.2 WORK NOT COVERED BY CONTRACT DOCUMENTS (NOT USED)

1.3 PROVISIONS FOR FUTURE WORK

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SUMMARY OF WORK

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- A. This project is part of the San Diego Pure Water Program. The North City Pure Water Pipeline will be constructed to the east of the pump station and will discharge into the Miramar Reservoir.

1.4 OWNER-FURNISHED PRODUCTS

- A. Intentionally left blank.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Informational Submittals:
 - 1. Schedule of Values: Submit on Owner's form.
 - 2. Schedule of Estimated Progress Payments:
 - a. Submit with initially acceptable Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
 - 3. Application for Payment.
 - 4. Final Application for Payment.

1.2 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- B. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- D. Lump Sum Work:
 - 1. Reflect specified cash and contingency allowances and alternates, as applicable.
 - 2. List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
 - a. Mobilization includes, at minimum, items identified in Section 01 50 00, Temporary Facilities and Controls.
 - b. Include item(s) for monthly progress schedule update.
- E. An unbalanced or front-end loaded schedule will not be acceptable.
- F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- G. Submit Schedule of Values in a spreadsheet format compatible with latest version of MS Excel.

1.3 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.

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- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.4 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 Engineer.
- 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 Engineer.

1.5 MEASUREMENT AND PAYMENT

- 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 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. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.

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- C. Whenever pay quantities of material are determined by weight, weigh material on scales furnished by Contractor and certified accurate by state agency responsible. Obtain weight or load slip from weigher and deliver to Owner’s representative at point of delivery of material.
- D. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- E. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- F. Haul materials that are specified for measurement by the cubic yard measured in the vehicle in transport vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Load vehicles to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- G. Quantities will be based on ground profiles shown. Field surveys will not be made to confirm accuracy of elevations shown.
- H. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.
- I. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
AL	Allowance
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer

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Item	Method of Measurement
LS	Lump Sum
MFBM	Thousand Foot Board Measure—Field Measure by Engineer
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

- J. Payment for all Lump Sum (LS) 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.
- K. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specification sections as follows:
 - 1. Limits of Work are as shown on the Drawings.
 - 2. All Work shown on Drawings and in Specification section(s).
- L. Payment for lump sum price items covers all the labor, materials, and services necessary to furnish and install the following items.

1.6 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.

1.7 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to

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Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.8 BID ITEMS (LIST A)

- A. Bid items under List A include but are not limited to, rehabilitation and improvements to the 100 MGD Miramar Reservoir Pump Station (MRSP) including civil, mechanical, HVAC, electrical, and instrumentation, replacement of approximately 200 linear feet of 66-inch PCCP.
1. Miramar Reservoir Pump Station Rehabilitation (1-A)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. The work under this bid item includes: refurbishing six 200 HP pumps and motors, including pump removal, shipping to and from the service center, installation, and testing; demolition of existing supports, piping, valves, fittings, and appurtenances; installation of discharge piping check valves and restrained flex couplings; replacement air release valves, and small diameter mill piping, valves, gauges, pressure switches and appurtenances; replacement of motor starter with VFD for one pump; upgrades to the pump station PLC, installation of harmonic filter, and other electrical improvements; installation of air conditioner unit for the existing electrical building; removal and replacement of the existing standby generator with new skid-mounted generator (existing generator to be salvaged by the Owner per Section 02 41 00), and construction of concrete pad and containment area for the new generator; and all other work as shown on the Drawings and described in the Specifications and not included in other bid items.
 2. 48-inch Discharge Pipeline Inspection and Rehabilitation (2-A)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. The work under this bid item includes all labor, equipment, and materials necessary to inspect and rehabilitate the 48-inch discharge pipeline per specification Section 43 01 50, Inspection Assistance and Repair of 48-inch Discharge Pipeline and per the contract documents.
 3. 66-inch Pipeline Replacement (3-A)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.

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- c. Work under this bid item shall include all labor, equipment, and materials necessary to remove and dispose of the existing 66-inch prestressed concrete steel cylinder pipeline and install new 66-inch cement mortar lined and tape wrapped mortar coated steel pipe line as indicated on the plans and specifications. Work includes, but is not limited to: all labor, equipment, and materials necessary for excavations, shoring, dewatering, dechlorination, protection or relocation of existing utilities; required demolition and removal of existing pipe and appurtenances; furnish and installment of new steel pipeline, pipe access manway and access manhole, connections to existing pipeline, corrosion protection; furnish and installment of fill, slurry, compaction for restoration of site to existing or proposed conditions, disinfection of new and existing pipeline segment taken out of service; all necessary City coordination required to shutdown and bypass the existing pipeline between the Miramar WTP clearwells and the existing 2A vault, and all other work as shown on the Drawings and described in the Specifications.
- 4. Pump Barrel Inspection Assistance (4-A)
 - a. Measurement shall be per each
 - b. Payment for this item shall be per each pump barrel inspected
 - c. The work of this unit cost item includes all labor, equipment, and materials necessary to provide access and confined space entry assistance and standby emergency rescue for inspection of each of the six pump barrels by the Engineer as specified in Section 43 01 40, Vertical Turbine Pump Rehabilitation, and for closing the pump barrel with a blind flange if repair work is not necessary.
- 5. Pump Barrel Rehabilitation (5-A)
 - a. Measurement shall be per each.
 - b. Payment for this item shall be per each pump barrel rehabilitated for up to 15 SF of replacement
 - c. Work of this unit cost item includes all labor, equipment and materials necessary to rehabilitate each pump barrel up to a maximum of 15 SF of replacement as directed by the Engineer. The nature of rehabilitation includes but not limited to additional cleaning and dewatering, removal and replacement of defective mortar liner, repairing corrosion damaged steel barrel by welding or welding patches to the barrel, cleaning debris from the barrel and providing confined space entry and standby emergency rescue assistance for the Engineer for inspection of the work, and closing the pump barrel with a blind flange

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following repair, all as specified in Section 43 01 40, Inspection Assistance and Repair of Pump Barrels. Some pump barrels may not require rehabilitation.

6. Additional Pump Barrel Rehabilitation (6-A)
 - a. Measurement shall be per square foot
 - b. Payment for this item shall be per square foot of rehabilitation in a single pump barrel for area greater than the 15 SF covered in Bid Item No. 5-A
 - c. Work under this unit cost item includes all labor, equipment and materials necessary for additional pump barrel pump rehabilitation for the cement mortar linear removal and replacement and miscellaneous welding repairs when the replacement area exceeds 15 SF in any pump barrel.
7. Mobilization and Demobilization (7-A)
 - a. No measurement shall be made for this item.
 - b. Payment is made for this item to include, but not limited to, office trailers, temporary sheds, temporary utilities, all temporary facilities, and all preparatory work prior to the commencement of productive work at the site required under this contract. Payment for this item also includes demobilization, removal of said temporary facilities and return of the Miramar Reservoir Pump Station and Miramar Water Treatment Plant to the conditions and requirements of the Contract Documents. Payment under this bid item shall be made as the lump sum price. The total amount listed under this Bid Item shall not exceed three (3%) percent of the total amount proposed for the project.
8. Bonds - Payment and Performance not to Exceed 2.5% (8-A)
 - a. No measurement shall be made for this Item.
 - b. 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 Section 1-7.2.1 for requirements.
9. Building Permits (9-A)
 - 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 perfect permits associated with the Work. Payment for this item shall be made for actual fees paid from the allowance amount named in the Bid Schedule.

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10. SWPPP Development (10-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item for the preparation and development of the SWPPP measures required under this contract and shall be made as the lump sum price named in the Bid Schedule under Item No. 10-A. Payment for this item shall include the preparation of the final SWPPP as required for compliance with the permitting agency. Payment shall include preparation costs for the final SWPPP.
11. SWPPP Implementation (11-A)
 - a. No measurement shall be made for this Item.
 - b. 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 under Item No. 11-A. Payment for this item shall include the implementation of the final SWPPP and shall include all necessary additional BMPs as required for compliance with the permitting agency. Payment shall include implementation, monitoring, upkeep and removal of all necessary BMPs as required in the approved SWPPP.
12. SWPPP Permit Fee (12-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards the SWPPP Permit Fee to the required permitting agency. Payment for this item shall be made as the allowance amount named in the Bid Schedule under Item No. 12-A.
13. Field Orders – Allowance (13-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards field orders for 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 under Item No. 13-A. Field Order limits shall conform to Whitebook 7-3.9.

1.9 BID ITEMS (LIST B)

- A. Bid items under List B include but are not limited to installation of 1 commercial roof-mount solar photovoltaic power system (SPVPS) located at the Miramar Water Treatment Plant, work included in this contract includes installation of panels, racking, DC combiners, and inverters at CW1, and mechanical pull boxes.
 1. Miramar Clearwell Photovoltaic System Phase 2 (1-B)

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- a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. Work under this bid item shall include all labor, equipment, and materials necessary to install a ballasted, rack-mounted, commercial solar Photovoltaic (PV) system at the Miramar Water Treatment Plant Clearwell 1 (Phase 2 herein). The PV System shall be complete and operable in accordance with the Contract Documents.
2. Mobilization and Demobilization (2-B)
- a. No measurement shall be made for this item.
 - b. Payment is made for this item to include, but not limited to, office trailers, temporary sheds, temporary utilities, all temporary facilities, and all preparatory work prior to the commencement of productive work at the site required under this contract. Payment for this item also includes demobilization, removal of said temporary facilities and return of the Miramar Reservoir Pump Station and Miramar Water Treatment Plant to the conditions and requirements of the Contract Documents. Payment under this bid item shall be made as the lump sum price. The total amount listed under this Bid Item shall not exceed three (3%) percent of the total amount proposed for the project.
3. Bonds - Payment and Performance not to Exceed 2.5% (3-B)
- a. No measurement shall be made for this Item.
 - b. 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 Section 1-7.2.1 for requirements.
4. Building Permits (4-B)
- 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 perfect permits associated with the Work. Payment for this item shall be made for actual fees paid from the allowance amount named in the Bid Schedule.
5. SWPPP Development (5-B)
- a. No measurement shall be made for this Item.
 - b. Payment is made for this item for the preparation and development of the SWPPP measures required under this

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contract and shall be made as the lump sum price named in the Bid Schedule under Item No. 5-B. Payment for this item shall include the preparation of the final SWPPP as required for compliance with the permitting agency. Payment shall include preparation costs for the final SWPPP.

6. SWPPP Permit Fee (6-B)

- a. No measurement shall be made for this Item.
- b. Payment is made for this item as an allowance towards the SWPPP Permit Fee to the required permitting agency. Payment for this item shall be made as the allowance amount named in the Bid Schedule under Item No. 6-B.

SWPPP Implementation (7-B)

- a. No measurement shall be made for this Item.
- b. 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 under Item No. 7-B. Payment for this item shall include the implementation of the final SWPPP and shall include all necessary additional BMPs as required for compliance with the permitting agency. Payment shall include implementation, monitoring, upkeep and removal of all necessary BMPs as required in the approved SWPPP.

7. Field Orders – Allowance (8-B)

- a. No measurement shall be made for this Item.
- b. Payment is made for this item as an allowance towards field orders for 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 under Item No. 8-B. Field Order limits shall conform to Whitebook 7-3.9.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 31 13
PROJECT COORDINATION

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Informational:
 - 1. Photographs:
 - a. Digital Images: Submit one copy of images on flash drive 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.

1.2 RELATED WORK AT SITE

- A. General:
 - 1. Other work that is either directly or indirectly related to but not part of scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
 - 2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.
 - 3. Include sequencing constraints specified herein as a part of Progress Schedule.
- B. Power:
 - 1. Agency and Contact Person: San Diego Gas & Electric, telephone number: 1- 800-411-7343
 - 2. Work to be performed by San Diego Gas & Electric:
 - a. Incoming underground power cables, materials, installation, termination, and connection.
 - b. Metering at SDG&E transformers and metering hardware, except as indicated.
 - c. SDG&E will replace the existing pump station 1000 kva transformer with a new 1500 kva transformer
 - d. Work to be performed by San Diego Gas & Electric should be complete prior to construction.
 - 3. Work to be performed by Contractor:
 - a. Coordinate Contractor's Work with San Diego Gas & Electric.
 - b. Incoming power trench, and backfill, and duct system.
 - c. As indicated.

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- d. Contractor is responsible for electricity until project is accepted by PUD.
- e. Perform Work in accordance with San Diego Gas & Electric.
- 4. Owner will be responsible for payment of direct charges of San Diego Gas & Electric.
- C. Applications Software Development:
 - 1. Refer to Section 40 90 00, Instrumentation and Control for general requirements, for detailed information pertaining to programming.
 - e. Coordinate and deliver to Owner at Project site hardware and standard software components, as specified for Instrumentation and Control.
 - f. Sequencing: Include sequencing constraints specified herein as part of Progress Schedule.
 - g. Owner will confirm delivery date with Contractor 10 days prior to scheduled delivery, and within 24 hours of expected delivery time.
 - 2. Deliver hardware specified in 40 91 00, Instrumentation and Control Components to Owner within constraints detailed in Section 40 90 00, Instrumentation and Control for components but no later than 120 days after Effective Date of the Agreement.
 - 3. Return delivery of hardware to Project Site within constraints detailed in Section 40 90 00, Instrumentation and Control for general requirements.
 - 4. Allowance for interruptions to the Work because of testing by Engineer of Engineer-developed applications software:
 - a. During Functional Testing and Performance Testing, Contractor shall plan for interruption of testing of the Work to allow Engineer to investigate software problems, make software configuration changes, and conduct additional testing.
 - b. Allowance for Interruptions: 20 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.

1.3 OWNER-FURNISHED PRODUCTS

- A. Intentionally left blank.

1.4 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

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- a. Telephone: 1- 800-411-7343
2. Telephone Company: AT&T
 - a. Telephone: 1-800-331-0500
3. Public Utilities Department: City of San Diego
 - a. Contact Person: Fabiola Amarillas
Telephone: 858-533-5437
4. Gas Department: San Diego Gas & Electric
 - a. Telephone: 1- 800-411-7343
5. Building Department: City of San Diego
 - a. Contact Person: Robert Andrews
Telephone: 619-446-5192

1.5 PROJECT MILESTONES

- A. General: Include the Milestones specified herein as a part of the Progress Schedule required under Section 01 32 00, Construction Progress Documentation.
- B. Project Milestones-Pump Station Rehabilitation as described in the contract documents:
 1. Existing Miramar Potable Water Transmission Pipeline Shutdown
 2. Miramar Potable Water Transmission Pipeline reactivated
 3. First and second pumps rehabilitated, reinstalled and back in service
 4. Third and fourth pumps rehabilitated, reinstalled and back in service
 5. Fifth and sixth pumps rehabilitated, reinstalled and back in service
 6. Existing Engine Generator taken offline
 7. New Engine Generator placed into service
 8. Pump Station rehabilitation completed.
- C. Project Milestones-PV System installation as described in the contract documents.
 1. Panel Installation, Site Electrical Installation
 2. Data Acquisition System / Instrumentation Installation
 3. String Testing (Voc, Operating Current, Polarity)
 4. Data Acquisition System / Instrumentation Installation Validation
 5. Startup and Commissioning
 6. Interconnection and Capacity Demonstration

1.6 WORK SEQUENCING/CONSTRAINTS

- A. The following describes the general sequence of construction and constraints that shall be followed by the contractor in the progression of work. Items that are not mentioned can be performed at any time, provided that they do not interfere with the proscribed sequence or constraints.
- B. Work Sequencing/Constraints Pump Station Rehabilitation
 - 1. Contractor is required to obtain written approval of lock-out/tag-out procedures and coordination with City operations at least 10 days prior to beginning work at the pump station.
 - 2. Contractor is required to obtain written acceptance of Demolition Plan as described in Section 02 41 00.
 - 3. Contractor is required to notify the City at least 2 weeks prior to any work near the San Diego County Water Authority’s 30-inch raw water pipeline. Complete replacement of the approximately 200-foot section of the existing 66-inch diameter Miramar Potable Water Transmission Pipeline, including but not limited to: leak testing, curing of the cement slurry pipe bedding and backfill, and performing disinfections and acceptance by the City. See sequencing note 4 on Drawing G-2.
 - 4. Refurbishment of the pump/motor sets shall not begin until the 66-inch diameter Miramar Potable Water Transmission Pipeline replacement is complete. Refurbishment of the pump/motor sets shall be performed in three steps. Each step shall be the complete refurbishment of two of the six pump and motor units as specified in Section 43 01 20, Vertical Turbine Pump Rehabilitation including the reinstallation, startup and acceptance. The second step can begin after acceptance of the first set of pumps. During each step the in-place pumping units shall be available for normal operation. The third step can begin after acceptance of the second set of pumps. Only one of the two existing VFD-driven pumps shall be rehabilitated at a time while the others remain in service.
 - 5. Following pump removal, and before pump reinstallation, the associated pump barrels shall be inspected and repaired, if necessary, in accordance with Section 43 01 40, Inspection Assistance and Repair of Pump Barrels.
 - 6. Modification and upgrades to pump electrical controls shall be performed concurrently with the refurbishment of each pump.
 - 7. Only one of the two existing VFD-driven pumps shall be rehabilitated at a time.
 - 8. With the exception of several pre-scheduled and City approved temporary full pump station shutdowns of up to 8 hours each for electrical switchover, the in-place pumping units shall be available for normal operation.
 - 9. City of San Diego Staff and Contractor shall jointly determine the order in which the pumps are rehabilitated.

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10. Any work that may impact the Miramar WTP must be coordinated with the Owner in writing at least 10 days prior to beginning work at the pump station.
- C. Work Sequencing/Constraints PV System
1. Contractor is required to obtain written approval of lock-out/tag-out procedures and coordination with City operations prior to beginning work at the pump station.
 2. Contractor shall obtain written direction from the City prior to beginning any work on the Miramar Water Treatment plant site.
 3. The Phase 2 Solar Photovoltaic System (this contract) will be interconnected with the Phase 1 Solar Photovoltaic System (to be completed by others) so both phases operate as one. All equipment and construction shall be procured and installed with this intent.
- D. Include the following work sequences in the Progress Schedule-Pump Station Rehabilitation:
1. Electrical Installation and Testing
 2. Instrumentation Installation and Testing
 3. Pump barrel inspections for each set of pumps
 4. Pump factory testing for each set of pumps
 5. Miramar Transmission Water Pipeline disinfection
 6. Miramar Potable Water Pipeline Pressure Test

1.7 FACILITY OPERATIONS

- A. Only City forces shall operate valves and/or equipment on City-owned facilities. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems.
- B. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
- 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. Process or Facility Shutdown:
1. Provide 10 working days advance written request for approval of need to shut down a process or facility to Owner and Engineer.
 2. Power outages will be considered upon 10 working days written request to Owner and Engineer. Describe the reason, anticipated length of time, and

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.

- F. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of such Work.
- G. Relocation of Existing Facilities:
 - 1. During construction, it is expected that minor relocations of Work may 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 Engineer.
- H. Construction request for plant access/operation of plant equipment shall be made using the attached Notice of Plant Access form attached as a supplement at the end of this section.

1.8 ADJACENT FACILITIES AND PROPERTIES

- A. General:
 - 1. Work area is adjacent to a DSOD jurisdictional saddle dam. Any work on the saddle dam, including staging/use of equipment requires written approval by DSOD.
- B. Examination:
 - 1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, 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.
- C. Documentation:
 - 1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs.
 - 2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
 - 3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's

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operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.9 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Owner shall have right to select subject matter and vantage point from which photographs are to be taken.
3. Digital Images: No post-session electronic editing of images is allowed. Stored image shall be actual image as captured without cropping or other edits.

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 30 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 1680 by 2240 pixels and 24-bit, millions of color.

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 20 photographs using digital, minimum resolution of 1680 by 2240 pixels and 24-bit, millions of color.

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 each flash drive with Project and Owner's name, and month and year images were produced.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CUTTING, FITTING, AND PATCHING

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PROJECT COORDINATION

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- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Owner before commencing Work to cut or otherwise alter:
 - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather-resistant or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.
- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown on Drawings.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by Engineer.

3.2 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is part of this specification.
 - 1. Notice of Plant Access form.

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS NOPA # 0XX

CONSTRUCTION REQUEST FOR PLANT ACCESS/OPERATION OF PLANT EQUIPMENT

Bldg/Area:			
Specific Location of Work			
Equip/Panels, etc Accessed/Affected			
Date(s):		Estimated Time for Access	
Contractor:		In >>>>	
Subcontractor:		Out >>>>	
Planned Activities: Detailed Description			
Dwg References As-Builts			
Please see attached Drawings			
Superintendent/Foreman at location			
Planned crew size at location			
Task Hazard Analysis Attached			
PLANT OPERATIONS RESPONSE TO NOTICE / REQUEST			
Plant staff required to provide access to locked area or box?			Y/N
Plant staff required to be present at all times during work?			Y/N
Special safety training / PPE required to work in this area?			Y/N
Conflict with Plant operations or scheduled activities?			Y/N
Comments:			
Operations Acknowledgement by:			
Date :		Time:	
NOPA Work Completed on:		R.E. Signature	

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 GENERAL

- A. Contractor 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.

1.2 PRECONSTRUCTION CONFERENCE

- B. 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.

- C. Attendees will include:

1. Owner's representatives.
2. Contractor's office representative.
3. Contractor's resident superintendent.
4. Contractor's quality control representative.
5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
6. Engineer's representatives.
7. Others as appropriate.

1.3 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.4 PROGRESS MEETINGS

- A. Engineer 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. Contractor, Subcontractors, and Suppliers, as appropriate.
 - 3. Engineer's representative(s).
 - 4. Others as appropriate.

1.5 QUALITY CONTROL MEETINGS

- A. In accordance with Section 01 45 16.13, Contractor Quality Control.
- B. Scheduled by Engineer 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.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and Suppliers, as necessary.
 - 4. Engineer's representatives.
 - 5. Owner's representative as appropriate.

1.6 PROCESS INSTRUMENTATION AND CONTROL SYSTEMS (PICS) COORDINATION MEETINGS

- A. Engineer will schedule meetings at Site, conducted monthly to review specific requirements of PICS work.
- B. Attendees will include:
 - 1. Contractor.
 - 2. Owner.
 - 3. PICS Subcontractor/Installer.
 - 4. Engineer's representatives.
 - 5. Owners representative as appropriate.

1.7 PREINSTALLATION MEETINGS

- A. When required in individual Specification sections, convene at Site prior to commencing the Work of that section.

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- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Engineer 4 days in advance of meeting date.
- D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.8 FACILITY STARTUP MEETINGS

- A. Schedule and attend a minimum of two 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. Engineer's representatives.
 - 5. Owner's operations personnel.
 - 6. Others as required by Contract Documents or as deemed necessary by Contractor.

1.9 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUBMITTALS

A. Informational Submittals:

1. Preliminary Progress Schedule: Per section 6-1.1 of 2021 Whitebook, a cost loaded construction schedule shall be submitted at preconstruction meeting.
2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 60 days after Effective Date of the Agreement.
 - b. Submit an Updated Progress Schedule at each update, in accordance with Article Detailed Progress Schedule.
3. Submit with Each Progress Schedule Submission:
 - a. Contractor's certification that Progress Schedule submission is actual schedule being used for execution of the Work.
 - b. Electronic file compatible with latest version of Project Planner (P6) by Primavera Systems, Inc.]
 - c. Progress Schedule: 4 legible copies.
 - d. Narrative Progress Report: Same number of copies as specified for Progress Schedule.
 - e. Progress Quantity Chart(s).
4. Prior to final payment, submit a final Updated Progress Schedule.

1.2 SCHEDULE COORDINATION – NOT USED

1.3 PRELIMINARY PROGRESS SCHEDULE

- A. In addition to basic requirements outlined in General Conditions, show a detailed schedule, beginning with Notice to Proceed, for minimum duration of 120 days, and a summary of balance of Project through Final Completion.
- B. Show activities including, but not limited to the following:
 1. Notice to Proceed.
 2. Permits.
 3. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01 33 00, Submittal Procedures.
 4. Early procurement activities for long lead equipment and materials.
 5. Initial Site work.

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6. Earthwork.
 7. Specified Work sequences and construction constraints.
 8. Contract Milestone and Completion Dates.
 9. Owner-furnished products delivery dates or ranges of dates.
 10. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 11. System startup summary.
 12. Project close-out summary.
 13. Demobilization summary.
- C. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the Owner withholding all or part of the monthly progress payment until the Preliminary Progress Schedule is updated in a manner acceptable to Engineer.
- D. Format: In accordance with Article Progress Schedule : Critical Path Network.

1.4 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of General Conditions, submit Detailed Progress Schedule beginning with Notice to Proceed and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by Engineer, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Format: In accordance with Article Progress Schedule— Critical Path Network.
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.5 PROGRESS SCHEDULE—BAR CHART- NOT USED

1.6 PROGRESS SCHEDULE—CRITICAL PATH NETWORK

- A. General: Comprehensive computer-generated schedule using CPM, generally as outlined in Associated General Contractors of America (AGC) 580, “Construction Project Planning and Scheduling Guidelines.” If a conflict occurs between the AGC publication and this specification, this specification shall govern.
- B. Contents:
 1. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
 2. Identify Work calendar basis using days as a unit of measure.

CONSTRUCTION PROGRESS DOCUMENTATION

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3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones set forth in the Agreement and Section 01 31 13, Project Coordination.
6. Include as applicable, at a minimum:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial Site work.
 - d. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s) Subcontract Work.
 - e. Major equipment design, fabrication, factory testing, and delivery dates.
 - f. Delivery dates for Owner-furnished products, as specified in Section 01 11 00, Summary of Work.
 - g. Sitework.
 - h. Concrete Work.
 - i. Structural steel Work.
 - j. Architectural features Work.
 - k. Conveying systems Work.
 - l. Equipment Work.
 - m. Mechanical Work.
 - n. Electrical Work.
 - o. Instrumentation and control Work.
 - p. Interfaces with Owner-furnished equipment.
 - q. Other important Work for each major facility.
 - r. Equipment and system startup and test activities.
 - s. Project closeout and cleanup.
 - t. Demobilization.
7. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day nor more than 30 days, unless otherwise approved.

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8. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from Engineer.
- C. Network Graphical Display:
1. Plot or print on paper not greater than 30 inches by 42 inches or smaller than 22 inches by 34 inches, unless otherwise approved.
 2. Title Block: Show name of Project, Owner, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date.
 3. Identify horizontally across top of schedule the time frame by year, month, and day.
 4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
 5. Indicate the critical path.
 6. Show, at a minimum, the controlling relationships between activities.
 7. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration.
 8. Plot activities on an early start basis unless otherwise requested by Engineer.
 9. Provide a legend to describe standard and special symbols used.
- D. Schedule Report:
1. On 8-1/2-inch by 11-inch white paper, unless otherwise approved.
 2. List information for each activity in tabular format, including at a minimum:
 - a. Activity Identification Number.
 - b. Activity Description.
 - c. Original Duration.
 - d. Remaining Duration.
 - e. Early Start Date (Actual start on Updated Progress Schedules).
 - f. Early Finish Date (Actual finish on Updated Progress Schedules).
 - g. Late Start Date.
 - h. Late Finish Date.
 - i. Total Float.
 3. Sort reports, in ascending order, as listed below:
 - a. Activity number sequence with predecessor and successor activity.
 - b. Activity number sequence.
 - c. Early-start.

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- d. Total float.
- E. Cost-Loading:
 - 1. Note the estimated cost to perform each Work activity, with the exception of Submittals or Submittal reviews, in the network in a tabular listing.
 - 2. The sum of all activity costs shall equal the Contract Price. An unbalanced or front-end-loaded schedule will not be acceptable.

1.7 PROGRESS QUANTITY CHARTS – NOT USED

1.8 PROGRESS OF THE WORK

- A. Updated Progress Schedule shall reflect:
 - 1. Progress of Work to within 5 working days prior to submission.
 - 2. Approved changes in Work scope and activities modified since submission.
 - 3. Delays in Submittals or resubmittals, deliveries, or Work.
 - 4. Adjusted or modified sequences of Work.
 - 5. Other identifiable changes.
 - 6. Revised projections of progress and completion.
 - 7. Report of changed logic.
- B. Produce detailed subschedules during Project, upon request of Owner or Engineer, to further define critical portions of the Work such as facility shutdowns.
- C. If an activity is not completed by its latest scheduled completion date and this failure is anticipated to extend Contract Times (or Milestones), submit, within 7 days of such failure, a written statement as to how nonperformance will be corrected to return Project to acceptable current Progress Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- D. Owner may order Contractor to increase plant, equipment, labor force, or working hours if Contractor fails to:
 - 1. Complete a Milestone activity by its completion date.
 - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner.

1.9 NARRATIVE PROGRESS REPORT

- A. Format:
 - 1. Organize same as Progress Schedule.
 - 2. Identify, on a cover letter, reporting period, date submitted, and name of author of report.

CONSTRUCTION PROGRESS DOCUMENTATION

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B. Contents:

1. Number of days worked over the period, work force on hand, construction equipment on hand (including utility vehicles such as pickup trucks, maintenance vehicles, stake trucks).
2. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved.
3. Contractor's plan for management of Site (for example, lay down and staging areas, construction traffic), use of construction equipment, buildup of trade labor, and identification of potential Contract changes.
4. Identification of new activities and sequences as a result of executed Contract changes.
5. Documentation of weather conditions over the reporting period, and any resulting impacts to the work.
6. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact.
7. Changes to activity logic.
8. Changes to the critical path.
9. Identification of, and accompanying reason for, any activities added or deleted since the last report.
10. Steps taken to recover the schedule from Contractor-caused delays.

1.10 SCHEDULE ACCEPTANCE

A. Engineer's acceptance will demonstrate agreement that:

1. Proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones, are within the specified times.
 - b. Specified Work sequences and constraints are shown as specified.
 - c. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included.
 - d. Access restrictions are accurately reflected.
 - e. Startup and testing times are as specified.
 - f. Submittal review times are as specified.
 - g. Startup testing duration is as specified and timing is acceptable.
2. In all other respects, Engineer's acceptance of Contractor's schedule indicates that, in Engineer's judgment, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. Engineer's review will not make any change in Contract requirements. Lack

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to Engineer's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.

- B. Unacceptable Preliminary Progress Schedule:
 - 1. Make requested corrections; resubmit within 10 days.
 - 2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, including updating schedule on a monthly basis to reflect actual progress and occurrences to date.
- C. Unacceptable Detailed Progress Schedule:
 - 1. Make requested corrections; resubmit within 10 days.
 - 2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process.
- D. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to Engineer's acceptance of Baseline Progress Schedule, shall be delineated in Narrative Report current with proposed Updated Progress Schedule.

1.11 ADJUSTMENT OF CONTRACT TIMES

- A. Reference General Conditions.
- B. Evaluation and reconciliation of Adjustments of Contract Times shall be based on the Updated Progress Schedule at the time of proposed adjustment or claimed delay.
- C. Schedule Contingency:
 - 1. Contingency, when used in the context of the Progress Schedule, is time between Contractor's proposed Completion Time and Contract Completion Time.
 - 2. Contingency included in Progress Schedule is a Project resource available to both Contractor and Owner to meet Contract Milestones and Contract Times. Use of Schedule contingency shall be shared to the proportionate benefit of both parties.
 - 3. Use of schedule contingency suppression techniques such as preferential sequencing and extended activity times is prohibited.
 - 4. Pursuant to Contingency sharing provisions of this specification, no time extensions will be granted, nor will delay damages be paid until a delay occurs which (i) consumes all available contingency time, and (ii) extends Work beyond the Contract Completion date.

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D. Float:

1. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times.
2. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of Owner and Contractor.
3. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.

E. Claims Based on Contract Times:

1. Where Engineer has not yet rendered formal decision on Contractor's Claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in Progress Schedule, reflect an interim adjustment in the Progress Schedule as acceptable to Engineer.
2. It is understood and agreed that such interim acceptance will not be binding on either Contractor or Owner, and will be made only for the purpose of continuing to schedule Work until such time as formal decision has been rendered as to an adjustment, if any, of the Contract Times.
3. Revise Progress Schedule prepared thereafter in accordance with Engineer's formal decision.

PART 2 - PRODUCTS (NOT USED)

PART 3 - PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 GENERAL

- A. See section 3-8 of the 2021 WHITEBOOK and 2021 GREENBOOK for submittal requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 - GENERAL

1.1 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. Additional abbreviations and acronyms can be found in Section 1-3. of the 2021 WHITEBOOK and 2021 GREENBOOK.
- 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. 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, and Engineer.

1.2 ABBREVIATIONS

- A. 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. ABMA American Bearing Manufacturers' Association

 - 5. AEIC Association of Edison Illuminating Companies
 - 6. AGA American Gas Association
 - 7. AGMA American Gear Manufacturers' Association

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8.	AI	Asphalt Institute
9.	AISI	American Iron and Steel Institute
10.	AITC	American Institute of Timber Construction
11.	ALS	American Lumber Standards
12.	AMCA	Air Movement and Control Association
13.	APA	APA – The Engineered Wood Association
14.	API	American Petroleum Institute
15.	APWA	American Public Works Association
16.	AHRI	Air-Conditioning, Heating, and Refrigeration Institute
17.	ASA	Acoustical Society of America
18.	ASABE	American Society of Agricultural and Biological Engineers
19.	ASCE	American Society of Civil Engineers
20.	ASHRAE	American Society of Heating, Refrigerating and Air-
21.	ASNT	American Society for Nondestructive Testing
22.	ASSE	American Society of Sanitary Engineering
23.	AWI	Architectural Woodwork Institute
24.	AWPI	American Wood Preservers' Institute
25.	BHMA	Builders Hardware Manufacturers' Association
26.	CBM	Certified Ballast Manufacturer
27.	CDA	Copper Development Association
28.	CGA	Compressed Gas Association
29.	CISPI	Cast Iron Soil Pipe Institute
30.	CMAA	Crane Manufacturers' Association of America
31.	CRSI	Concrete Reinforcing Steel Institute
32.	CS	Commercial Standard
33.	CSA	Canadian Standards Association
34.	CSI	Construction Specifications Institute
35.	DIN	Deutsches Institut für Normung e.V.
36.	DIPRA	Ductile Iron Pipe Research Association
37.	EIA	Electronic Industries Alliance
38.	EJCDC	Engineers Joint Contract Documents' Committee
39.	FAA	Federal Aviation Administration

ABBREVIATIONS AND ACRONYMS

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40.	FDA	Food and Drug Administration
41.	FEMA	Federal Emergency Management Agency
42.	FIPS	Federal Information Processing Standards
43.	FM	FM Global
44.	Fed. Spec.	Federal Specifications (FAA Specifications)
45.	FS	Federal Specifications and Standards (Technical
46.	GA	Gypsum Association
47.	GANA	Glass Association of North America
48.	HI	Hydraulic Institute
49.	HMI	Hoist Manufacturers' Institute
50.	IBC	International Building Code
51.	ICBO	International Conference of Building Officials
52.	ICC	International Code Council
53.	ICEA	Insulated Cable Engineers' Association
54.	IFC	International Fire Code
55.	IESNA	Illuminating Engineering Society of North America
56.	IFI	Industrial Fasteners Institute
57.	IGMA	Insulating Glass Manufacturer's Alliance
58.	IMC	International Mechanical Code
59.	INDA	Association of the Nonwoven Fabrics Industry
60.	IPC	International Plumbing Code
61.	ISA	International Society of Automation
62.	ISO	International Organization for Standardization
63.	ITL	Independent Testing Laboratory
64.	JIC	Joint Industry Conferences of Hydraulic Manufacturers
65.	MIA	Marble Institute of America
66.	MIL	Military Specifications
67.	MMA	Monorail Manufacturers' Association
68.	MSS	Manufacturer's Standardization Society
69.	NAAMM	National Association of Architectural Metal Manufacturers
70.	NACE	NACE International
71.	NBGQA	National Building Granite Quarries Association

ABBREVIATIONS AND ACRONYMS

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72.	NEBB	National Environmental Balancing Bureau
73.	NEC	National Electrical Code
74.	NECA	National Electrical Contractor's Association
75.	NESC	National Electrical Safety Code
76.	NETA	InterNational Electrical Testing Association
77.	NFPA	National Fire Protection Association
78.	NHLA	National Hardwood Lumber Association
79.	NICET	National Institute for Certification in Engineering Technologies
80.	NIST	National Institute of Standards and Technology
81.	NRCA	National Roofing Contractors Association
82.	NRTL	Nationally Recognized Testing Laboratories
83.	NSPE	National Society of Professional Engineers
84.	NTMA	National Terrazzo and Mosaic Association
85.	NWWDA	National Wood Window and Door Association
86.	PCI	Precast/Prestressed Concrete Institute
87.	PEI	Porcelain Enamel Institute
88.	PS	Product Standards Section-U.S. Department of Commerce
89.	RMA	Rubber Manufacturers' Association
90.	SDI	Steel Deck Institute
91.	SJI	Steel Joist Institute
92.	SMACNA	Sheet Metal and Air Conditioning Contractors National
93.	SPI	Society of the Plastics Industry
94.	STI/SPFA	Steel Tank Institute/Steel Plate Fabricators Association
95.	SWI	Steel Window Institute
96.	TEMA	Tubular Exchanger Manufacturers' Association
97.	TCA	Tile Council of North America
98.	TIA	Telecommunications Industry Association
99.	UBC	Uniform Building Code
100.	UFC	Uniform Fire Code
101.	UMC	Uniform Mechanical Code
102.	USBR	U.S. Bureau of Reclamation
103.	WCLIB	West Coast Lumber Inspection Bureau

ABBREVIATIONS AND ACRONYMS

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- 104. WI Wood Institute
- 105. WWPA Western Wood Products Association

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 01 43 33

MANUFACTURERS' FIELD SERVICES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. Person-Day: One person for 8 hours at Owner's site within regular Contractor working hours.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 calendar 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 calendar days prior to scheduled training and revise as necessary for acceptance.

1.3 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. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 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.

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- E. Only those days of service approved by Engineer 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 Owner.
 - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.
 - 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.

3.2 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, 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.

3.3 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.

MANUFACTURERS' FIELD SERVICES

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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
 5. Section 01 91 14, Equipment Testing and Facility Startup.
- C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
1. Title and objectives.
 2. Recommended attendees (such as, managers, engineers, operators, maintenance).
 3. Course description, outline of course content, and estimated class duration.
 4. Format (such as, lecture, self-study, demonstration, hands-on).
 5. Instruction materials and equipment requirements.
 6. Resumes of instructors providing training.
- D. Pre-startup 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. Refresher Training: The Contractor shall provide a minimum of 8 hours of refresher training 8 months after Pre-startup training. Training content shall be determined by the City and communicated to the Contractor a minimum of one month prior to the refresher training date.

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G. Recording of Training Sessions:

1. Video training materials shall be produced by a qualified, professional video production company.

3.4 SUPPLEMENTS

A. The supplement listed below, following “End of Section,” is part of this specification.

1. Manufacturer’s Certificate of Proper Installation.

END OF SECTION

MANUFACTURERS’ FIELD SERVICES

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

MANUFACTURER’S CERTIFICATE OF PROPERINSTALLATION

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 is installed by one manufacturer)

Note: Attach any equipment check 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)

MANUFACTURERS’ FIELD SERVICES

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MANUFACTURERS' FIELD SERVICES

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SECTION 01 45 16.13
CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.1 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.

1.2 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.

1.3 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.

1.4 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; or
 - 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.

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- D. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Engineer.
- 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

3.1 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 Engineer.
- 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.

3.2 COORDINATION MEETING

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Engineer 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.

3.3 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 may perform other duties on the Project.

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3. CQC System Manager shall be an experienced construction person, with experience on similar type Work.
 4. 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.
 5. CQC System Manager shall be onsite during construction; periods of absence may not exceed 2 weeks at any one time.
 6. 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 Engineer.
 2. CQC staff shall take direction from CQC System Manager in matters pertaining to QC.
 3. CQC staff must be of 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 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. Add additional staff when necessary for a proper CQC organization.
- C. Organizational Changes: Obtain Engineer's acceptance before replacing any member of the CQC staff. Requests for changes shall include name, qualifications, duties, and responsibilities of the proposed replacement.

3.4 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.

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- 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 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 Engineer.
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.

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- 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 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.

3.5 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 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.

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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 Paragraph 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 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 Engineer, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Engineer.

CONTRACTOR QUALITY CONTROL

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3.6 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. Contractor/subcontractor and their areas of responsibility.
 - 2. Operating plant/equipment with hours worked, idle, or down for repair.
 - 3. 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.
 - 4. 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.
 - 5. Material received with statement as to its acceptability and storage.
 - 6. Identify submittals reviewed, with Contract reference, by whom, and action taken.
 - 7. Offsite surveillance activities, including actions taken.
 - 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 - 9. List instructions given/received and conflicts in Drawings and/or Specifications.
 - 10. Contractor's verification statement.
 - 11. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
 - 12. 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.

3.7 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 follow the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

3.8 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. Procure services of a licensed testing laboratory. 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 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 Engineer, with a reference to the test number and date taken.
 - 4) Provide directly to Engineer 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).

3.9 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.

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B. Punchlist:

1. CQC System Manager shall develop a punch list of items which do not conform to the Contract requirements.
2. Include punch list 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 increment thereof if the Project is divided into increments by separate completion dates.

END OF SECTION

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SECTION 01 45 33

SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 - GENERAL

1.1 GENERAL

- A. See section 4 of the 2021 WHITEBOOK and 2021 GREENBOOK for Special Inspection, Observation, and Testing requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 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.
- B. Federal Emergency Management Agency (FEMA).
- C. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
- D. Telecommunications Industry Association (TIA); Electronic Industries Alliance (EIA): 568B, Commercial Building Telecommunications Cabling Standard.
- E. U.S. Department of Agriculture (USDA): Urban Hydrology for Small Watersheds.
- F. 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.

1.2 SUBMITTALS

- A. Informational Submittals:
 - 1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 - 2. Temporary Utility Submittals:
 - a. Electric power supply and distribution plans.
 - b. Water supply and distribution plans.
 - c. Sanitary.
 - 3. Temporary Construction Submittals:
 - a. Access Roads: Routes, cross-sections, and drainage facilities.
 - b. Parking area plans.
 - c. Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - d. Fencing and protective barrier locations and details.
 - e. Staging area location plan.
 - 4. Temporary Control Submittals:
 - a. Dust control plan.

TEMPORARY FACILITIES AND CONTROLS

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- b. Plan for disposal of waste materials and intended haul routes.

1.3 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.
 - 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.
- B. Having Contractor's superintendent at Site full time.

1.4 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.

1.5 VEHICULAR TRAFFIC

- A. 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 (NOT USED)

PART 3 - EXECUTION

3.1 ENGINEER'S FIELD OFFICE – NOT USED

3.2 TEMPORARY UTILITIES

- A. Power:
 - 1. Electric power is limited at Site. Make arrangements to obtain and pay for electrical power used until final payment and acceptance by Owner, unless otherwise recommended by Engineer at Substantial Completion.
 - 2. Cost of electric power will be borne by Contractor.

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- 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.
 - 2. 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.
 - 3. Pay costs of installation, maintenance, operation, removal, and fuel consumed.
 - 4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
 - 5. 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. No construction or potable water is available at Site. Make arrangements for and bear costs of providing water required for construction purposes and for drinking by construction personnel during construction.
- 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.
- F. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

3.3 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 residence or business shall be cut off from vehicular traffic, unless special arrangements have been made.

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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 for protection of existing facilities. Maintain fence throughout construction period. Obtain Engineer'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. Signs and Equipment:
1. Conform to requirements of manual published by the California State Department of Transportation.
 2. Portable TOW-AWAY-NO STOPPING Signs: Place where approved by police department and Owner.

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

3. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
 4. Provide at obstructions, such as material piles and equipment.
- D. Waterways:
1. Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.
- E. Archaeological Finds:
1. General: Should finds of an archaeological or paleontological nature be made within Site limits, immediately notify Owner and Engineer and proceed in accordance with General Conditions. Continue the Work in other areas without interruption.
 2. Archaeological Finds: Evidence of human occupation or use of an area within contract limits prior to the Year 1840. Evidence may consist of skeletons, stone, or other utensils, or evidence of habitations or structures.
 3. Paleontological Finds: Evidence of prehistoric plant or animal life, such as skeletons, bones, fossils, or casts and other indications such as pictographs.
 4. Owner may order the Work stopped in other areas if, in Owner's opinion, find is more extensive than may appear from uncovered material.
 5. Protection of Finds:
 - a. Cover, fence, or otherwise protect finds until notice to resume the Work is given.
 - b. Cover finds with plastic film held in place by earth, rocks, or other weights placed outside the find. Should additional backfilling be necessary for safety or to prevent caving, place backfill material loosely over plastic film.
 - c. Sheet or shore as necessary to protect excavations underway. Place temporary fence to prevent unauthorized access.
 - d. Dewater finds made below water table as necessary to protect construction Work underway. Divert groundwater or surface runoff away from find by ditching or other acceptable means.
 6. Removal of Finds:
 - a. Finds are property of Owner. Do not remove or disturb finds without Owner's written authorization.
 - b. Should Owner elect to have a find removed, provide equipment, labor, and material to permit safe removal of find without damage. Provide transportation for delivery to individuals,

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institutions, or other places as Owner may find desirable, expedient, or required by law.

- F. Endangered and Threatened Species:
1. Take precautions necessary and prudent to protect native endangered and threatened flora and fauna.
 2. Notify Engineer of construction activities that might threaten endangered and threatened species or their habitats.
 3. Engineer will mark areas known as habitats of endangered and threatened species prior to commencement of onsite activities.
 4. Additional areas will be marked by Engineer as other habitats of endangered and threatened species become known during construction.

3.4 TEMPORARY CONTROLS

- A. Air Pollution Control:
1. Minimize air pollution from construction operations.
 2. Burning:
 - a. Of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
 3. Conduct operations of dumping rock, sand and soil and of carrying rock, sand and soil 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. Water Pollution Control:
1. Divert sanitary sewage and non-storm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.
 2. Prior to commencing excavation and construction, obtain Owner's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and dewatering pump discharges.

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3. Comply with construction BMP requirements as specified in the 2021 Storm Water Manual and 2021 Whitebook for stormwater flow and surface runoff
 4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.
- C. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities as specified in the 2021 Storm Water Manual and 2021 Whitebook to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.

3.5 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.

3.6 ACCESS ROADS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits.
- 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 Engineer detours and other operations affecting traffic and access.

Provide at least 72 hours' notice to Engineer of operations that will alter access to Site.

- F. Upon completion of construction, leave access roads in condition suitable for future use by Owner.

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3.7 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. Provide parking facilities for personnel working on Project. No employee or equipment parking will be permitted on Owner's existing paved areas except as specifically designated for Contractor's use.

3.8 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- D. Road Closures: Not permitted without approval of the Owner.
- E. Maintenance of traffic is not required if Contractor obtains written permission from Owner and tenant of private property, or from authority having jurisdiction over public property involved, to obstruct traffic at designated point.
- F. In making street crossings, do not block more than one-half the street at a time.

Whenever possible, widen shoulder on opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.

- G. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.
- H. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.
- I. Notify fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, without written permission from fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish Contractor's night emergency telephone numbers to police department.

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- J. Coordinate traffic routing with that of others working in same or adjacent areas.

3.9 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in other Specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up and dispose of debris.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least weekly, dispose of such waste materials, debris, and rubbish offsite.
- D. At least weekly, brush sweep entry drive, roadways, and other streets and walkways affected by the Work and where adjacent to the Work.

END OF SECTION

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SECTION 01 61 00

COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 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 also includes the existing refurbished vertical turbine pumps and 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.

1.2 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 2019 edition of the California Building Code (CBC).
1. Wind: Basic wind speed, V: 115 mph, with exposure category C.
 2. Seismic: Risk Category IV, importance factor, I, of 1.5, Site Class D, mapped maximum considered earthquake, 5 percent damped, spectral response at short periods, S_s , 0.904g, mapped maximum considered earthquake, 5 percent damped, spectral response at a period of 1 second, S_1 , 0.353, unless specified otherwise.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 700 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 30 degrees F to 110 degrees F.

1.4 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.

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- 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.
 - c. Deliver materials to Site.
 - 4. 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 Engineer of anticipated date and place of arrival.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.5 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.

COMMON PRODUCT REQUIREMENTS

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- 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.

1.6 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 above ground 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

2.1 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.

COMMON PRODUCT REQUIREMENTS

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- 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 Underwriters Laboratories, Inc. 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 Owner.
- 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

COMMON PRODUCT REQUIREMENTS

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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.

2.2 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 and all applicable standards.
 - 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.
- B. Lubrication Systems:
 - 1. Require no more than weekly attention during continuous operation.
 - 2. Convenient and accessible; oil drains with bronze or Type 316 stainless steel valves and fill-plugs easily accessible from the normal operating area or platform.
 - 3. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
 - 4. Provide constant-level oilers or oil level indicators for oil lubrication systems.
 - 5. For grease type bearings, which are not easily accessible, provide and install Type 316 stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.3 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Construction Manager not less than 14 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

3.1 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.

3.2 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. Engineer 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 Engineer.

3.3 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. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.

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- F. 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.
- G. 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.

3.4 FIELD FINISHING

- A. In accordance with Section 09 90 00, Painting and Coating, and individual Specification sections.

3.5 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.6 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.7 SUPPLEMENTS

- A. The supplement listed below, following "End of Section", is part of this specification.
 - 1. Form: Manufacturer's Certificate of Compliance.

END OF SECTION

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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: *(signature)* _____

(printed name) _____

(title) _____

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
 - a. Record Documents: As required in General Conditions.
 - b. Approved Shop Drawings and Samples: As required in the General Conditions.
 - c. Special bonds, Special Guarantees, and Service Agreements.
 - d. Consent of Surety to Final Payment: As required in General Conditions.
 - e. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - f. Releases from Agreements.
 - g. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01 29 00, Payment Procedures.
 - h. Extra Materials: As required by individual Specification sections.

1.2 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
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 Engineer'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 Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.3 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

3.1 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Promptly following commencement of Contract Times, secure from Engineer 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 Engineer.

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- C. Making Entries on Drawings:
1. Using an erasable colored pencil (not ink or indelible pencil), 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 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.

3.2 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.
 - 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.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 -GENERAL

1.1 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

1.2 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: 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.

1.3 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 Engineer.
 - b. Submit prior to shipment date.
 - 2. Final Data: Submit Instructional Manual Formatted data not less than 30 days prior to installation of equipment or system equipment or system field functional testing. Submit 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.

1.4 DATA FORMAT

- A. Prepare preliminary data in the form of an instructional manual. Prepare final data 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.

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3. Cover: Identify manual with typed or printed title “OPERATION AND MAINTENANCE DATA” and list:
 - a. Project title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of separate structure as applicable.
 - d. Identify volume number if more than one volume.
 - e. Identity of general subject matter covered in manual.
 - f. Identity of equipment number and Specification section.
 4. Spine:
 - a. Project title.
 - b. Identify volume number if more than one volume.
 - c. Designate applicable system, equipment, material, or finish.
 5. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor’s name, address, and telephone number, as appropriate.
 - c. Identify area of responsibility of each.
 - d. Provide name and telephone number of local source of supply for parts and replacement.
- C. Table of Contents:
1. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 2. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 3. Paper: 20-pound minimum, white for typed pages.
 4. Text: Manufacturer’s printed data, or neatly typewritten.
 5. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
 6. Material shall be suitable for reproduction, with quality equal to original.
 7. Faxes and photocopying of material will be acceptable, except for material containing photographs.
- D. Final Compilation Electronic Media Format:
1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on flash drive.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data.

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Arrange by specification number and name.

- c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.
 - d. Files shall not have any security settings.
 - e. Files shall be processed for optical character recognition.
- E. All content shall be legible to satisfaction of the City.

1.5 SUBMITTALS

A. Informational:

- 1. Data Outline: Electronically submit a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
- 2. Preliminary Data:
 - a. Submit electronically for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) Response will be returned to Contractor.
 - 2) Response will be forwarded to Resident Project Representative.
 - 3) Response will be retained in Engineer's file.
 - c. If data does not meet conditions of the Contract:
 - 1) Response will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in Engineer's file.
 - 3) Resubmit revised data in accordance with Engineer's comments.
- 3. Final Data: Submit in format specified herein.

1.6 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.

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- 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) Electronic (PDF)
 - 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) Identify Specification section and product on Drawings.
 - b. Relations of component parts of equipment and systems.
 - c. 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) Electronic (PDF)
 - 2) Organize in consistent format under separate heading for each different procedure.
 - 3) Provide logical sequence of instructions for each procedure.
 - 4) 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.

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- 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.

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- 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. Electronic (PDF)
 - b. Use Maintenance Summary Form bound with this section
 - c. Each Maintenance Summary may take as many pages as required.
 - d. Use only 8-1/2-inch by 11-inch size paper
 - e. Complete using electronic printing.
 3. Include 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.

1.7 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.

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- 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.

1.8 COMPILED SUMMARY OF O&M INFORMATION

- A. The Contractor shall provide a comprehensive document that contains the following items for each unit (or common units) that requires an O&M manual submittal:
 - 1. Copy of the manufacturer's warranty
 - 2. Maintenance checklists and schedules
 - 3. Copy of videos and training materials
 - 4. A spreadsheet with:
 - a. Warranty start and end dates,
 - b. Reference specification sections,
 - c. Brief O&M schedule description,
 - d. Name of manufacturer and contact information.

1.9 SUPPLEMENTS

- A. The supplements listed below, following "End of Section", are part of this Specification.
 - 1. Forms: Maintenance Summary Form.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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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.

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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.				

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SECTION 01 88 15
ANCHORAGE AND BRACING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the California Building Code (CBC), for seismic, wind, gravity, soil, and operational loads.

1.2 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 Code (CBC).

1.3 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.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
1. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of California.
 2. 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.
 3. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
 4. 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.

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5. 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.
 6. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
 7. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
 8. Design anchorage and bracing for:
 - a. Equipment and components that weigh more than 400 pounds and has a center of mass located 4 feet or more above adjacent finished floor.
 - b. Equipment weighing more than 20 pounds that is mounted to the wall or roof/ceiling suspended.
 - 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 are wall mounted or ceiling/roof suspended.
 9. Design seismic anchorage and bracing for Designated Seismic Systems regardless of weight or mounting height.
 - a. Component Importance Factor:
 - 1) Per Section 01 61 00 – Common Product Requirements.
 10. 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 exposed 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.

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- c. Locate braces to minimize vibration to or movement of structure.
- d. For vibrating loads, use anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
- 4. Seismic:
 - a. Design anchorage and bracing for criteria listed in Section 01 61 00 – Common Product Requirements and the General Structural Notes on the Drawings.
- 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 $I_p = 1.5$.
 - 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. Provide support drawings and calculations for electrical distribution components if any of the following conditions apply:
 - a. I_p is equal to 1.5 and conduit diameter is greater than 2.5-inch trade size.
 - b. I_p is equal to 1.5 and the total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
 - c. Supports are cantilevered up from floor.
 - d. Supports include bracing to limit deflection and are constructed as rigid welded frames.
 - e. Attachments utilize spot welds, plug welds, or minimum size welds as defined by AISC.
 - 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.

1.5 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:

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- 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. 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 CBC 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.

1.6 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

2.1 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 of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.

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- 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 non-vibration isolated mechanical equipment rated over 10 horsepower.

PART 3 - EXECUTION

3.1 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.
- 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.

3.2 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.

3.3 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with 2019 CBC 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.

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- B. Provide any 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.

END OF SECTION

SECTION 01 91 14
TESTING, INTEGRATION, AND STARTUP

PART 1 - GENERAL

1.1 GENERAL

- A. The goal of testing, integration, and startup is to verify proper performance and operation of the Miramar Reservoir Pump Station (MRPS) after the improvements of this project.

1.2 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. Controls Integrator: Entity who is responsible for the programming of the MRPS controls systems.
- C. Commissioning:
 - 1. The disciplined and systematic process of assuring that all components, subsystems and systems of a constructed unit are constructed, 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: Construction Contract, Specifications and Drawings.
- F. Factory Acceptance Testing (FAT): All testing required to be conducted at the fabricator's/manufacturer's/vendor's off-site locations, witnessed or unwitnessed. Includes all such testing, regardless of the specific descriptive title used for said testing in the Contract Documents.
- G. Final Completion: Refer to the Contract Requirements and Supplementary Provisions

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- 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, often completed after a predetermined time of full-scale operation.
- 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 sub-systems.
- K. Mechanical/Electrical Functional Testing: Testing performed to confirm general performance of mechanical and electrical systems. Hydrostatic leak testing of pipes and pump capacity test are examples. 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 specified period of time 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. Startup: The act of starting or operating a component, subsystem or system and testing its functionality and performance against defined metrics.
- N. Systems: A group of related components, equipment or subsystems that perform a defined function or set of functions within a facility.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Startup Personnel Qualifications: The qualifications submittal for the Startup Manager and Project Integrator shall be provided at the Preconstruction Conference.
 - 2. Startup and Test Plans: Submitted within 60 days after Notice to Proceed.
 - 3. Factory Acceptance Test Plans.
 - 4. Startup and Testing Schedule:
 - a. Schedule shall be a snapshot of the overall Project Schedule.
 - b. Schedule may not be a separate schedule from overall Project Schedule.
 - c. Schedule shall be submitted in hard copy and electronic version.
 - 5. Startup Results Submittal:
 - a. Include the following:
 - 1) Results documentation from all Factory Acceptance Testing.

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- 2) Completed test plans (endorsed by Construction Manager and Contractor).

1.4 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		
Factory Acceptance Testing	As required to meet testing schedule	Approved submittals required prior to testing.	
Mechanical/Electrical Functional Testing and Equipment Performance 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	Includes hydrostatic testing or pipes.

1.5 WORK RELATED TO THE FACILITY

- A. During construction the Owner will conduct integration procedures associated with the MRPS and its coordinated operation with the Miramar Water Treatment Plant.
- B. Any work that may impact the Miramar WTP must be coordinated with the Owner, per Section 01 31 13.

1.6 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.
- B. Controls Integrator: Assigned duties are those specifically required to plan and execute the installation, interconnection, integration, and startup of the various control devices, panels, components, systems, and subsystems.

1.7 STARTUP AND TEST PLANS

- A. The Contractor shall 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. Factory acceptance testing.

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2. Manufacturer's installation inspection.
 3. Mechanical/electrical functional testing.
 4. Pump Functional testing.
 5. Pump Performance testing.
- C. Test plans will be developed as described below:
1. The Overall Startup Plan shall include four main sections arranged as follows:
 - a. Overall Startup Plan Summary.
 - b. Factory Acceptance Testing.
 - c. Functional and Performance Testing.
 - d. Startup Schedule.
 2. The contents and requirements pertaining to each section are described below.
 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.
 4. Factory Acceptance Test Plan:
 - a. The Factory Test Plan shall be a comprehensive description of the complete test setup, procedures, analyses, and reporting program for each factory test required for the Work. Detailed step by step procedures describing all activities in the test process shall be included for all factory tests, witnessed or unwitnessed. All shop or factory tests, witnessed, or unwitnessed, that require testing to demonstrate compliance with the Contract Documents and require submittal of test results, must have a Factory Acceptance Test Plan accepted by the Engineer at least 4 weeks prior to the test.
 - b. At a minimum, the following shall be included for each Factory Acceptance Test Plan:
 - 1) Identification information for the component, subsystem, or system being tested. All applicable tag numbers shall be included.
 - 2) A narrative description of the purpose and goals of the test.
 - 3) Pass/Fail criteria.
 - 4) A listing and copy of all pertinent reference documents (Contract Documents and industry standards or specifications applicable to the testing).

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- 5) Complete description, including drawings, for all test stands and/or test apparatuses.
 - 6) Credentials of test personnel.
 - 7) Descriptions of all test equipment.
 - 8) Descriptions and product information, including calibration certificates, for all test instruments.
 - 9) Step-by-step detailed procedures of how the test will be conducted.
The level of detail shall be sufficient for any witness with a rudimentary technical aptitude to be able to follow the steps and develop confidence that the tests were being performed as planned. All steps are significant and all steps shall be included in the procedures.
 - 10) Copies of the actual data logs and/or data recording forms that will be used for the test.
 - 11) A complete disclosure of all calculation methodologies.
 - 12) Sample computations or analyses with results in the same format as the final report. This item is intended to demonstrate how data collected will be used to generate final results. A sample shall be included for each type of computation required for the test and analysis of results.
 - 13) A detailed outline of the final factory testing report.
- c. Each factory test shall be described separately. Factory Acceptance Test Plans are the only portion of the Startup and Test Plans that will be accepted prior to acceptance of the Overall Startup Plan Summary.
- Also, Factory Acceptance Test Plans will be allowed to be submitted and reviewed individually. However, the Overall Startup Plan Summary is required to summarize the factory testing program and all submittal numbers for individually submitted Factory Acceptance Test Plans shall be accurately accounted for in that document.
- 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. Miramar Reservoir Pump Station:
 - 1) Pumps and Motors.
 - b. Control:
 - 1) Instruments.
 - 2) Interconnection and control cables/wiring.
 - 3) Appurtenant communication and interconnection devices and equipment.

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- 2. Auxiliary Systems:
 - a. Main Piping:
 - 1) Suction and discharge pipe valves
 - 2) Appurtenant instruments, devices, valves, and piping.
 - b. Building Systems (all structures, as applicable):
 - 1) HVAC.
 - c. Corrosion Control: Test Stations, Anodes, 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

3.1 GENERAL STARTUP AND TESTING REQUIREMENTS

- A. Contractor is responsible for the complete testing, check out, startup, and commissioning of all elements of the MRPS. 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. The 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, 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, and other items as required for startup, unless otherwise indicated.
 - 2. Operate process units and facility with support of Contractor.

3.2 FACTORY ACCEPTANCE TESTING

- A. Contractor shall coordinate the timing and location of all Factory Acceptance Testing (FAT) including, but not limited to the following items:
 - 1. Pumps and Motors.
- B. The Contractor will prepare the test plans for each FAT or review manufacturer standard test plans in accordance with these Contract Documents. The Contractor's Startup Manager shall be the lead representative for the development of these test plans.

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3.3 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.

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- f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
- g. Equipment and electrical tagging complete.
- h. Delivery of all spare parts and special tools.

3.4 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. Pumps, Motors, and Drives
 - 2. Piping (buried and exposed).
 - 3. HVAC systems.
 - 4. Standby Power Generator
- 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.

3.5 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

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SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
 - 1. Air-Conditioning, Heating, and Refrigeration Institute (AHRI): Guideline K, Containers for Recovered Non-flammable Fluorocarbon Refrigerants.
 - 2. American National Standards Institute (ANSI): A10.6, Safety Requirements for Demolition Operations.
 - 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.
 - 4. 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.

1.2 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 pumps, pipes and pipe fittings, valves, manholes tanks, conduit, and other 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 the 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.

1.3 SUBMITTALS

- A. Informational Submittals:

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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.

1.4 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. In addition to the requirements of the General Conditions, Contractor's safety requirements shall conform to ANSI A10.6.

1.5 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.

1.6 SEQUENCING AND SCHEDULING

- A. The Work of this Specification shall not commence until Contractor's Demolition/Renovation Plan has been approved by Engineer.
- B. Include the Work of this Specification in the progress schedule, as specified in Section 01 32 00, Construction Progress Documentation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXISTING FACILITIES TO BE DEMOLISHED OR RENOVATED

- A. Structures:
 1. Sidewalks, curbs, gutters, fence, and gates shall be removed as indicated.
 2. Irrigation shed and appurtenances.
- B. Utilities and Related Equipment:
 1. The 66-inch PCCP at the extents indicated on the drawings as to accommodate the new installation of 66-inch CML&C pipe.
 2. Pump station valves, piping and pipe fittings, gauges, air vac assemblies, pipe supports and other pump appurtenances as indicated.

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3. Notify Owner or appropriate utilities to turn off affected services at least 72 hours before starting demolition activities.
 4. Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by Engineer.
 5. When utility lines are encountered that are not indicated on the Drawings, notify Owner prior to further work in that area.
- C. Paving and Slabs:
1. Remove concrete and asphaltic concrete paving, pads and slabs as indicated.
 2. Provide neat saw-cuts at limits of pavement removal as indicated.
- 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:
 - a. Fill holes and depressions left as a result of removals in existing concrete.

3.2 PROTECTION

- A. Dust and Debris Control:
1. Prevent the spread of dust and debris to occupied portions of the site and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to flooding, or pollution.
 2. Vacuum and dust the Work area daily.
 3. 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 the 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 Engineer.

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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 and existing access roads 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 Engineer approval.
- 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. 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, pipe supports, walls 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 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.
 5. Where fencing is removed, temporary fencing must be placed. Must coordinate with PUD Security Section prior to removing fencing.
- F. 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.

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3.3 BURNING

- A. The use of burning at the Site for the disposal of refuse and debris will not be permitted.

3.4 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 Engineer. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by Engineer.

3.5 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.

3.6 TITLE TO MATERIALS

- A. All salvaged materials will remain the property of Owner.
- B. All items designated to be removed shall become the property of Contractor.
- C. Title to equipment and materials resulting from demolition is vested in the Contractor upon approval by Engineer of Contractor's Demolition/Renovation Plan, and the resulting authorization by Engineer to begin demolition.

3.7 DISPOSITION OF MATERIAL

- A. Do not remove equipment and materials without approval of Contractor's Demolition/Renovation Plan by Engineer.
- B. Salvage material to the maximum extent possible.
- C. Repair or replace, at the discretion of Engineer, items damaged during removal or storage.
- D. Remove salvaged items designated as the property of Owner in a manner to prevent damage.
- E. Repair or replace, at the discretion of Engineer, items damaged during removal or storage.
- F. Deliver salvaged items that are designated as the property of Owner to a storage site as directed on the Site.
- G. Owner will not be responsible for the condition or loss of, or damage to, property scheduled to become Contractor's property after Engineer's authorization to begin demolition. Materials shall not be viewed by prospective purchasers or sold on the site.
- H. Owner will not be responsible for the condition or loss of, or damage to, such property after Engineer's authorization to begin demolition.

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- I. Store salvaged items as approved by Engineer and remove them from Owner's property before completion of the Contract. Materials and equipment shall not be either viewed by prospective purchasers or sold on the site.

3.8 REUSE OF MATERIALS AND EQUIPMENT – NOT USED

3.9 SPECIALIZED SALVAGE

- A. Relocate and Salvage existing trailer mounted engine generator.
 1. Disconnect all power lines and provided all equipment, tools, and/or repairs to existing trailer mount to relocate the existing standby engine generator.
 2. Final relocation of the generator shall be coordinated with the owner, up to a maximum of 20 miles from the project site.

3.10 UNSALVAGEABLE MATERIAL

- A. Concrete, masonry, and other noncombustible material, except concrete permitted to remain in place, shall be disposed of in the following manner and location.
 1. Sanitary Landfill

3.11 CLEANUP

- A. 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

1.1 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. 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.

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- 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.

1.2 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: Surface defect such as honeycomb, rock pockets, indentations and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch diameter, cracks in liquid containment structures and belowgrade habitable spaces 0.005-inch wide and wider, cracks in other structures 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 which include but are not limited to fins, form pop-outs, and other projections, and at exposed concrete which includes texture irregularities, stains, and other color variations that cannot be removed by cleaning.
- 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: Concrete less than 60 days old forming structures constructed as part of the Work.
- 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.

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1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product data sheets for each material supplied.
 - 2. Samples: Mesh reinforcement and mesh anchor.
 - 3. Drawings supplemented by photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location in existing concrete.
- 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 proposed nozzleman.
 - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that proposed repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
 - c. Mortar Manufacturer's Certificate of Proper Installation.
 - 5. Statements of Qualification:
 - a. Repair mortar system applicator.
 - 6. Field and laboratory test reports.

1.4 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.
- B. 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 vertical orientation of at least 10 feet by 10 feet

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with average thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in vertical 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 Engineer.

2. 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 proposed 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: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.
- C. Where Required by Engineer: Demonstration Mockup for Repair System C – Polymer Modified Repair Mortar System:
 1. Prepare one demonstration mockup in vertical orientation of average size and thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in vertical 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 Engineer.
 2. 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 proposed curing procedure and materials, including overhead and vertical applications.

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- d. Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
 - e. Demonstrate mixing and application procedures.
 - f. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.
- D. Pre-repair Conference:
1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Engineer.
 2. Schedule and conduct prior to conducting mockups and incorporation of respective products into Project. Notify Engineer 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.

1.5 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

2.1 REPAIR SYSTEM A – SHOTCRETE MORTAR

- A. Mortar Materials:

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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.
 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.
 5. Mortar shall not produce a vapor barrier.
- 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.
 4. Or approved equal

2.2 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 conform to the following criteria:
 1. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 psi minimum.

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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. System shall not produce a vapor barrier.
 8. Sprayable, extremely low permeability, sulfate resistant, easy to use and requiring only addition of water.
 9. Free of chlorides and other chemicals causing corrosion.
- 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

2.3 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 renovation 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 belowgrade repairs.

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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

2.4 REPAIR SYSTEM D – SITE-MIXED PORTLAND-CEMENT MORTAR

A. Mortar Materials:

1. Use same materials as concrete to be repaired with no coarse aggregate, per Section 03 30 00, Cast-in-Place Concrete.
2. For repairs to exposed concrete, make trial batches to check color compatibility of repair mortar with existing surrounding concrete.
3. When repair is too dark, substitute white portland cement for part of the gray portland cement to produce desired color closely matching color of surrounding concrete.

2.5 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.

2.6 REINFORCEMENT

A. Deformed Steel Reinforcement:

1. 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.

2.7 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:

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- 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.
 - d. Bonding agent shall not produce a vapor barrier.
 - e. Compatible with and from same manufacturer as the 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

2.8 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.9 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 - EXECUTION

3.1 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.

3.2 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: Approval of Engineer required for use.

3.3 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer, and review proposed extent of repair with Engineer.
- B. Remove unsound, honeycombed, deteriorated, or otherwise defective areas of concrete from work areas.

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1. Use 8,000 psi minimum high-pressure water blasting machine as required for Site conditions.
 2. Remove concrete to abrade substrate concrete surfaces to 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 existing adjacent surface remove existing concrete 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 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 Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or feathered edges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water 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. Otherwise evident that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by 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. 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

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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 in manner and location acceptable to Owner.

3.4 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing reinforcement is not exposed, and when mortar application is more than 3 inches deep, unless otherwise shown on Drawings.
- B. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to reinforcement with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- C. Coat exposed new 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.

3.5 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].

3.6 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.

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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 and in accordance with manufacturer's instructions. Steel trowel finish when finish coat is not applied.
- K. Rebound Removal: Continuously throughout shotcrete mortar application, remove rebound, sand, and miscellaneous debris, and dispose off Site at an approved disposal facility.
- L. Cure as specified in Article Curing.

3.7 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, unless noted otherwise.
- C. Bonding Agent:
 1. Use bonding agent when manufacture required 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.
 3. Consult with manufacturer for optimum and minimum acceptable degrees of surface tackiness of coat.
- D. Work mortar firmly and quickly into repair area.
- E. Finish repair mortar to match adjacent concrete surface.
- F. Cure as specified in Article Curing.

3.8 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 to specified surface finish, in accordance with requirements of repair material's printed instructions.
- D. Finish repair mortar to match adjacent concrete surface.

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- E. Cure as specified in Article Curing, and in accordance with manufacturer's printed instructions.

3.9 REPAIR SYSTEM D – SITE-MIXED PORTLAND-CEMENT REPAIR MORTAR PLACEMENT

- A. Use site-mixed portland-cement repair mortar on the following concrete surfaces:
 - 1. Walls.
- B. Prepare mortar to a stiff consistency with no more mixing water necessary for handling and placing.
- C. Mix site-mixed portland-cement repair mortar in accordance with requirements of ACI 301.
- D. Apply scrub coat of mortar worked into existing substrate surface with a stiff bristled brush. Use of epoxy resin bonding agent is not acceptable.
- E. Work mortar firmly and quickly into repair area before scrub slurry coat begins to dry.
- F. Finish repair mortar to match adjacent concrete surface.

3.10 CURING

- A. Prior to 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 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 approval is obtained from 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.

3.11 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:

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1. Test in accordance with ASTM C109/C109M, except modified by making samples using repair mortar.
 2. Obtain production samples of mixed wet mortar materials from nozzle, or mixer, during construction for compliance with Specifications for testing at 7 days, and 28 days.
 3. Provide a minimum of three samples for each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing.
 4. Record location 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.
 2. Record locations on in situ bond tests on each type of applied repair mortar.
- D. Testing laboratory retained by Owner will provide the following:
1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of mixed material will be obtained from each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.
 - c. Record location where repair mortar is being applied at time production samples are obtained.
 2. Direct Tension Bond Test:
 - a. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.
 - b. Record locations of Bond Tests on each type of applied repair mortar tested.
- E. Retest mortar repairs that do not meet test requirements.
- F. Repair and fill holes using same repair mortar where core samples have been removed.

3.12 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge. Remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.

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- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

3.13 MANUFACTURER'S SERVICES

- A. Provide repair mortar system manufacturer's representative at Site to review acceptability of surface preparation, mixing and installation assistance, inspection, and Certification of Proper Installation.

3.14 CLEANING

- A. Remove overshot shotcrete, Repair System A, low-pressure spray, Repair System B, and site-mixed portland-cement, Repair System D repair mortar and rebound materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or repair areas, finishing, and curing, and dispose offsite at an approved disposal site.

END OF SECTION

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SECTION 03 01 33

REPAIR OF HORIZONTAL CONCRETE SURFACES

PART 1 - GENERAL

1.1 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. 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.

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- 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.

1.2 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: Surface defect such as honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch diameter, cracks in liquid containment structures and belowgrade habitable spaces 0.005-inch wide and wider, cracks in other structures 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 which include but are not limited to fins, form pop-outs, and other projections, and at exposed concrete which includes texture irregularities, stains, and other color variations that cannot be removed by cleaning.
- 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: Concrete less than 60 days old forming structures constructed as part of the Work.

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1.3 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 in existing concrete.

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 are prepackaged, shrinkage compensated, specially designed for use on horizontal surfaces that are exposed to weather.
 - b. Mortar Manufacturer's Certificate of Proper Installation.
4. Statements of Qualification:
 - a. Repair mortar system applicator.
5. Field and laboratory test results.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator: Trained and experienced applicator endorsed by repair mortar system manufacturer.

B. Demonstration Mockup for Repair Mortar:

C. Pre-repair Conference:

1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer 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.

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- 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.

1.5 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

2.1 REPAIR MORTAR SYSTEM NO. 1—MAGNESIUM PHOSPHATE REPAIR MORTAR

- A. One-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,
- F. ASTM C666/C666M, Procedure A, at 300 Cycles: 80 percent RDM minimum.
- G. Sulfate Resistance, ASTM C1012/C1012M, Length Change after 52 Weeks:
- H. 0.09 percent maximum.
- I. Application Temperature Range: 20 degrees F to 85 degrees F for normal weather applications.
- J. Manufacturers and Products:
 1. BASF Construction Chemicals, LLC - Building System, Shakopee, MN; MasterEmaco T 545.
 2. Euclid Chemical Co., Cleveland, OH; Eucospeed MP.
 3. Or approved equal.

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2.2 REPAIR MORTAR SYSTEM NO. 2—HIGH EARLY STRENGTH REPAIR MORTAR

- A. One-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 10^6 psi minimum.
 - 2. 28 Days: 4.5 by 10^6 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.

2.3 REPAIR MORTAR SYSTEM NO. 3—SHRINKAGE COMPENSATED REPAIR MORTAR

- A. One-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:
 - 1. 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.

2.4 REPAIR MORTAR SYSTEM NO. 4—METALLIC AGGREGATE REPAIR MORTAR

- A. One-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.
- D. Density: 215 pound per cubic foot.
- E. Manufacturers and Products:

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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.

2.5 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: 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; SikaTop 111 PLUS.
 4. Or approved equal.

2.6 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.

2.7 REINFORCEMENT

- A. Deformed Steel reinforcement:
 1. Per Section 03 21 00, Steel Reinforcement.

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- 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.

2.8 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. Bonding agent shall not produce a vapor barrier.
 - 4. Compatible with, and from same manufacturer as the, 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.

2.9 EPOXY BONDING AGENT

- A. Two-component, moisture insensitive, 100 percent solids epoxy resin.
- B. Tensile Strength, ASTM D638, at 14 Days: 4,400 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.

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- 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. Or approved equal.

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

3.1 GENERAL

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system.

3.2 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.
 - 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.

3.3 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer. Review proposed extent of repair with Engineer.
- B. Remove unsound, deteriorated, or otherwise defective areas of concrete from Work areas.
 - 1. Use 8,000 psi minimum high-pressure water blasting machine, as appropriate to suit Site conditions.

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2. Remove concrete to abrade substrate concrete surface to 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 existing adjacent surface, remove existing 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 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 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.
- 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. Otherwise evident that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by 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.

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- 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 old joint.
 - 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 in manner and location acceptable to Owner.

3.4 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing steel reinforcement is not exposed and when mortar application is more than 4 inches deep, unless otherwise shown on Drawings.
- B. Replace deteriorated steel reinforcement with new steel reinforcement equivalent in cross-sectional area to original steel reinforcement. Weld new bars to existing where indicated.
- C. Fasten steel reinforcement to chairs with tie wire to prevent from moving during placement of repair mortar.
- D. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh 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.
- E. 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.

3.5 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.

3.6 PLACEMENT

- A. Repair Mortar System Nos. 1, 2, 3, and 5:
 - 1. Remove standing and free water from prepared area.

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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.

3.7 FINISHING

- A. Spray full strength evaporation retardant on fresh concrete to prevent rapid drying during hot and windy weather.

3.8 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.

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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.

3.9 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 modified by making samples using repair mortar.
 2. Obtain production samples of mixed materials from mixer during construction for compliance with Specifications.
 3. Provide minimum of three samples for each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater for testing.
 4. Record location 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.
 2. Record locations on in situ bond tests on each type of applied repair mortar.
- D. Testing laboratory retained by Owner will provide the following:
 1. Compression Strength Test:
 - a. Testing will follow a “modified” ASTM C109/C109M.
 - b. A minimum of three production samples of mixed material will be obtained from each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days. Record location where repair mortar is being applied at time production samples are obtained.
 2. Direct Tension Bond Test:
 - a. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.
 - b. Record locations of bond tests on each type of applied repair mortar tested.
- E. Retest mortar repairs that do not meet test requirements.

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- F. Repair and fill holes using same repair mortar where core samples have been removed.

3.10 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge, remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.
- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

3.11 MANUFACTURERS' SERVICES

- A. Provide mortar manufacturer's representative at Site to advice on product selection, review acceptability of surface preparation, mixing and 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 repair areas, finishing, and curing, and dispose offsite at approved disposal site.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 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.
 - 2. NSF International (NSF): 61, Drinking Water System Components - Health Effects.

1.2 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.

1.3 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.
- D. Limit panel deflection to $1/360^{\text{th}}$ of each component span to achieve tolerances specified.
- E. Form liner designer shall verify compatibility of proposed concrete mix with proposed form liner.

1.4 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Formwork drawings and calculations sealed by a State of California licensed professional engineer.
 - b. Double Wall Construction (new wall placed against an existing wall): Drawings and details of double-wall forming.

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2. Product Data:
 - a. Form release agent.
 - b. Form ties.
 - c. Products to be used for sealing tie holes.
- B. Informational Submittals:
 1. Statement of qualifications for formwork designer.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Formwork Designer: Formwork, falsework, and shoring design shall be designed by a State of California licensed professional engineer .

PART 2 - PRODUCTS

2.1 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.
 2. Where steel forms 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. 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.

2.2 ACCESSORIES

- A. Form Release Agent:
 1. Material:
 - a. Shall not bond with, stain, or adversely affect concrete surfaces.

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- b. Shall not impair subsequent treatments of concrete surfaces when applied to forms.
 - c. Ready-to-use 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
 3. Manufacturers and Products: For use with potable water structures. Environmentally safe, meeting local, state, and federal regulations and usable in potable water facilities. Certified as meeting NSF 61.
 - a. Atlas Tech Products; Atlas Bio-Guard.
 - b. Dayton Superior; Dayton Bio-Release EF.
 - c. Hill and Griffith Company; Grifcote LV-50-Plus.
 - d. Or approved equal
- B. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces.
- C. Form Snap-Ties:
 1. Material: Steel.
 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: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
 1. Integral steel waterstop 0.103-inch thick and 0.625-inch diameter tightly and continuously welded to tie.

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2. 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.
 3. Orient waterstop perpendicular to tie and symmetrical about center of tie.
 4. 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. Elastic Vinyl 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

3.1 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 discoloration of concrete from rust.

3.2 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 Engineer's approval of size prior to placement of beveled edge.

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- C. Wall Forms:
 - 1. Do not reuse forms with damaged surfaces.
 - 2. Locate form ties and joints in uninterrupted uniform pattern.
 - 3. Inspect form surfaces prior to installation to ensure conformance with specified tolerances.
- D. Double-Wall Construction (new wall cast against existing wall):
 - 1. Joint Filler Attachment:
 - a. Use attachments to secure premolded joint filler to one wall only.
 - b. Secure premolded joint filler without gaps and separations keeping concrete from second wall pour from penetrating thickness and space occupied by premolded joint filler.
 - 2. Do not use form ties or other devices permanently penetrating premolded joint filler between walls or produce a rigid connection between walls.
 - 3. First cast wall shall obtain the greater of the wall design concrete strength or the construction strength required, as determine by form design engineer, prior to casting second wall. Strength determination shall be based on field cast and cured test cylinders.
 - 4. Do not use formwork that leaks mortar.
 - 5. Provide premolded joint filler or sealant to minimize transfer of movement from one structure to the other.
- E. Curb, Sidewalk, and Driveway Forms:
 - 1. Provide standard steel or wood forms.
 - 2. Set forms to true lines and grades, and securely stake in position.
- F. Form Tolerances: Provide forms in accordance with ACI 117 and ACI 318, and the following tolerances for finishes specified:
 - 1. 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.
 - 2. Wall Tolerances:
 - a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
 - b. 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.

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- 2) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
 - c. 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.
 - d. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
 - e. Form Offset: Between adjacent pieces of formwork, facing material shall not exceed 1/4 inch.
3. 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 become part of finished 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.

3.3 FORM REMOVAL

- A. Nonsupporting forms, sides of beams, walls, columns, and similar parts of Work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours from time of concrete placement if:
 1. Concrete is sufficiently hard so as not to sustain damage by form removal operations.

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2. Curing and protection operations are maintained.
- B. Elevated Structural Slabs or Beams: 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.

3.4 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC 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

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 03 15 00

CONCRETE JOINTS AND ACCESSORIES

PART 1 - GENERAL

1.1 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.
 3. NSF International (NSF): 61, Drinking Water System Components - Health Effects.

1.2 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. Joint Filler(s) for Potable Water Structures: Confirmation material is certified to meet requirements of NSF 61.
 - b. Letter stating compatibility between liquids being contained and materials used for:
 - 1) Waterstops.
 - 2) Joint fillers.
 - c. 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.

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- 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.

1.3 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

2.1 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. At no place shall the thickness be less than 3/8 inch.
- F. Type Required in Construction Joints: Flat ribbed, 6 inches wide with parallel longitudinal ribs or protrusions on each side of strip center. At no place shall the thickness be less than 3/8 inch.
- 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. 1.60 pounds for 3/8 inch by 6 inches.
 - 2. 2.30 pounds for 3/8 inch by 9 inches.
- J. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction.

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- 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 732 (6 inches by 3/8 inch) and Style 735 (9 inches by 3/8 inch).
 - c. Durajoint, Garrettsville, OH.; Type 9 (6 inches by 3/8 inch), and Type 10 (9 inches by 3/8 inch).
 - d. BoMetals, Carrollton, GA.: 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. RCB17 (6 inches by 3/8 inch) and No. RCB18 (9 inches by 3/8 inch).
 - f. Or approved equal

2.2 HYDROPHILIC WATERSTOP

- A. For use at construction joints only, where new concrete is placed against existing concrete where 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

2.3 INJECTION-TYPE WATERSTOP

- A. Reinjectable waterstop hose system for use where shown on Drawings.
- B. Reinjectable Water Stop Hose:
 1. Fabricated of polyvinyl chloride (PVC) compound.
 2. Contain discharge openings to allow for disbursement of an injection material into expansion joint.
 - a. Discharge openings designed to be sealed tight during concreting operation to prevent entry of mixing water and cement slurry.
 3. Allows free and uniform discharge of injection material over entire length of hose during injection process.
 4. Able to be internally cleaned by using water and vacuum pressure.

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- C. Injection Material: Hydrophilic or hydrophobic resin grout for use in expansion joints as recommended by reinjectable waterstop hose manufacturer.
- D. Manufacturers and Products:
 - 1. Greenstreak/BBZ, St. Louis, MO.; Fuko Injection Hose System with Multigel 850.
 - 2. Deneef Construction Chemicals, Inc., Houston, TX.; TRIOject Injection Hose System with Hydro Active Grout.
 - 3. Or approved equal

2.4 RETROFIT PVC WATERSTOP

- A. Material: See Article Plastic Waterstop.
- B. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction
- C. Stainless Steel Batten Bar: AISI Type 304. Size and configuration in accordance with manufacturer's instructions.
- D. Manufacturers and Products:
 - 1. Vinylex Corp., St Louis, MO; No. RET638 (6 inches by 3/8 inch) and No. RET912 (9 inches by 3/8 inch).
 - 2. Greenstreak, St. Louis, MO; Style 609 (6 inches by 3/8 inch) and Style 667 (9 inches by 1/2 inch).
 - 3. BoMetals, Carrollton, GA; No. RF-912 (9 inches by 1/2 inch).
 - 4. Or approved equal

2.5 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.

2.6 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: Monmouth Rubber and Plastics, Corp, Long Branch, NJ; Durafoam DK5151. Or approved equal

2.7 BUILDING PREFORMED CONTROL JOINT

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- A. One-Piece, Flexible, Polyvinyl Chloride Joint Former:
 - 1. Manufacturer and Product: WR Meadows, Inc., Hampshire, IL; Keyway. Or approved equal
- B. One-Piece Galvanized Steel Strip with Preformed Groove:
 - 1. Manufacturer and Product: BoMetals, Inc. Carrollton, GA; QuickKey or ProKey Joint. Or approved equal
- C. Furnish in full-length, unspliced pieces.

2.8 POURABLE JOINT FILLERS

- A. General:
 - 1. 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.
 - 2. For Potable Water Containment structures, meet requirements of NSF 61.
- B. Filler for Potable or Non-Potable Water Containment Structures:
 - 1. Multicomponent sealant, self-leveling or nonsag as required for level, sloping, or vertical joints.
 - 2. Color: White.
 - 3. Manufacturer and Product: Sika Corp., Lyndhurst, NJ; Sikaflex-2c SL. Or approved equal
- C. 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: W.R. Meadows, Inc., Elgin, IL; Gardox. Or approved equal

2.9 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.

2.10 ACCESSORIES

- A. Joint Sealant:
 - 1. Polyurethane as specified in Section 07 92 00, Joint Sealants.
- B. One-Part Polyurethane, Immersible:

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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

3.1 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.

3.2 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.

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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. Contraction Joint and Control Joint:
 1. Coat concrete surfaces above and below plastic waterstop with bond breaker.
 2. Do not damage or coat waterstop.
- D. 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.

3.3 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.

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- 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.
 - d. Allow at least 10 minutes before new splice is pulled or strained in any way.
 - e. 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.
 - f. Use only factory made waterstop fabrications for all intersections, changes of directions and transitions.
 - g. Field splice permitted only for straight butt welds.
- 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.
- D. Injection-Type Waterstop:
1. Install reinjectable waterstop hose in accordance with manufacturer's instructions.
 2. After concrete has been placed and cured for a minimum of 28 days, inject specified injection material into reinjectable waterstop hose in accordance with manufacturer's instructions.
 3. Upon completion of injection process, clean out remaining injection material in hose in accordance with manufacturer's instructions to allow for future injections.

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- E. Split Face PVC Waterstop: Install split face PVC waterstop in accordance with manufacturer's instructions.
- F. Retrofit PVC Waterstop:
 - 1. Install retrofit PVC waterstop in accordance with manufacturer's instructions.
 - 2. Prepare surface of existing concrete in accordance with manufacturer's instructions. Apply a bed of epoxy, approximately 1/8 inch thick and slightly wider than waterstop base, to concrete surface.
 - 3. Place the retrofit waterstop in place prior to the curing of the epoxy, securing waterstop with stainless steel batten bars and stainless steel post-installed anchors. Fasten one side at a time, making sure retrofit profile is positioned to eliminate any air pockets or voids between waterstop and existing concrete.
 - 4. Butt splice by thermally fusing the free ends together prior to attaching to wall in accordance with manufacturer's instructions.

3.4 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.
- C. Sponge Rubber Joint Filler: Install per manufacturer's written instructions.
- D. Pourable Joint Filler:
 - 1. General:

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- 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.
- E. 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.

3.5 CONTRACTION JOINT INSTALLATION

- A. Place bond breaker above and below waterstop.
- B. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface. Do not roughen surface.

3.6 CONTROL JOINT INSTALLATION

- A. Locate steel reinforcement as shown.
- B. Install waterstop.
- C. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface. Do not roughen surface.
- D. Install bond breaker to concrete surfaces above and below waterstop.

3.7 PREFORMED CONTROL JOINTS

- A. Use only where specifically shown; do not use in water-holding basins.
- B. Locate slightly below top of slab.
- C. Install in accordance with manufacturer's written instructions in straight, full-length pieces.
- D. Steel Strip Type with Preformed Groove: Brace to withstand pressure of concrete during and after placement using only approved stakes and other secondary installation materials.

3.8 MANUFACTURER'S SERVICES

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- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.

3.9 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with 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.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

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SECTION 03 21 00
STEEL REINFORCEMENT

PART 1 - GENERAL

1.1 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. 315, Details and Detailing of Concrete Reinforcement.
 - c. 318, Building Code Requirements for Structural Concrete and Commentary.
 - d. 350, Code Requirements for Environmental Engineering Concrete Structures.
 - e. 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.

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6. Wire Reinforcement Institute (WRI): WWR-500, Manual of Standard Practice, Structural Welded Wire Reinforcement.
7. California Building Standards Commission (CBSC): California Building Code (CBC).

1.2 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. Welding Qualification: Prior to welding, submit welder qualifications and nondestructive testing procedures in accordance with Section 05 05 23, Welding.
4. Test results of field testing.

1.3 QUALITY ASSURANCE

- A. Welder Qualifications: Certified in accordance with AWS D1.4/D1.4M.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
2. ASTM A615/A615M, Grade 60, where welding is not required.

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3. ASTM A706/A706M, Grade 60, for reinforcing to be welded.
 4. ASTM A767/767M, Grade 60, for galvanized 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: Erico Products, Inc., Cleveland, OH; Cadweld T-Series. 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.

2.2 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 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

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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.
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. 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.

2.3 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend bars cold.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.

3.2 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 Engineer.

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3. Welded Splices: Accomplish by full penetration groove welds and develop a minimum of 125 percent of yield strength of bar.
 4. Stagger splices in adjacent bars where indicated and as shown on the Drawings.
- E. Mechanical Splices and Connections:
1. Use only in areas specifically approved in writing by 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.
- 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.
- 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. Welding Reinforcement:
1. Only ASTM A706/A706M bars may be welded.
 2. Do not perform welding until welder qualifications are approved.
- I. Straightening and Rebending: Field bending of steel reinforcement bars is not permitted.
- J. Unless permitted by Engineer, do not cut reinforcing bars in field.

3.3 WELDED WIRE FABRIC INSTALLATION

- A. Use only where specifically shown.
- B. Extend fabric to within 2 inches of edges of slab and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.
- C. Tie laps and splices securely at ends and at least every 24 inches with tie wire.
- D. Place welded wire fabric on concrete blocks and rigidly support equal to that provided for reinforced bars. Do not use broken concrete, brick, or stone.
- E. Follow ACI 318 and WRI WWR-500.
- F. Do not use fabric that has been rolled. Install flat sheets only.

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3.4 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with 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.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

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CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 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. 214R, Guide to Evaluation of Strength Test Results of Concrete.
 - c. 301, Specifications for Structural Concrete.
 - d. 304.2R, Placing Concrete by Pumping Methods.
 - e. 305.1, Specification for Hot Weather Concreting.
 - f. 306.1, Standard Specification for Cold Weather Concreting.
 - g. 309R, Guide for Consolidation of Concrete
 - h. 315, Details and Detailing of Concrete Reinforcement.
 - i. 318, Building Code Requirements for Structural Concrete
 - j. 350, Code Requirements for Environmental Engineering Concrete Structures
 - k. 350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.
 - l. 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. C40, Test Method for Organic Impurities in Fine Aggregates for Concrete.
 - e. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

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- f. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- g. C94/C94M, Standard Specification for Ready-Mixed Concrete.
- h. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
- i. C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- j. C138, Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- k. C143/C143M, Standard Test Method for Slump of Hydraulic-Cement Concrete.
- l. C150/C150M, Standard Specification for Portland Cement.
- m. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
- n. C227, Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).
- o. C231/C231M, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- p. C260/C260M, Standard Specification for Air-Entraining Admixtures for Concrete.
- q. C289, Test Method for Potential Alkali Silica Reactivity of Aggregates (Chemical Method).
- r. C309, Liquid Membrane-Forming Compounds for Curing Concrete.
- s. C494/C494M, Standard Specification for Chemical Admixtures for Concrete.
- t. C595/C595M, Standard Specification for Blended Hydraulic Cements.
- u. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- v. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- w. C979/C979M, Standard Specification for Pigments for Integrally Colored Concrete.
- x. C989, Standard Specification for Slag Cement for Use in Concrete and Mortars.
- y. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
- z. C1017/C1017M, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

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- aa. C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method.
 - bb. C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
 - cc. C1218/C1218M, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - dd. C1240, Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - ee. C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
 - ff. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - gg. C1567, Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
 - hh. C1582/C1582M, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.
 - ii. C1602/C1602M, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
 - jj. D1751, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - kk. D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
 - ll. E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
 - mm. E1155, Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
3. National Ready Mixed Concrete Association (NRMCA).

1.2 DEFINITIONS

- A. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.
- B. 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.

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- C. 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.
- D. 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.
- E. Hot Weather: As defined in ACI 305.1.
- F. Hydraulic Structure: Liquid containment structure.
- G. New Concrete: Less than 60 days old.

1.3 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) Aggregates, including specified class designation for coarse aggregate.
 - 4) Admixtures.
 - 5) 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 analysis.

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- 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. Chloride ion content must be included.
2. Product Data: Specified ancillary materials.
3. Detailed plan for curing and protection of concrete placed and cured in cold weather. Details shall include, but not be limited to, the following:
 - a. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.
 - b. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - c. Methods for temperature protection during placement.
 - d. Types of covering, insulation, housing, or heating to be provided.
 - e. Curing methods to be used during and following protection period.
 - f. Use of strength accelerating admixtures.
 - g. Methods for verification of in-place strength.

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- h. Procedures for measuring and recording concrete temperatures.
 - i. Procedures for preventing drying during dry, windy conditions.
 4. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F. Plan shall include, but not be limited to, the following:
 - a. Procedures for measuring, and recording temperatures of reinforcement and other embedded items prior to concrete placement.
 - b. Use of retarding admixture.
 - c. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
 - d. Types of shading and wind protection to be provided.
 - e. Curing methods, including use of evaporation retardant.
 - f. Procedures for measuring and recording concrete temperatures.
 - g. Procedures for preventing drying during dry, windy conditions.
 5. Thermal Control Plan: For concrete sections with a minimum specified dimension that is greater than 2 feet 6 inches.
 6. 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 required.
 7. Tightness test results.

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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.

1.4 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. Thermal Control Plan: When required, shall include the following minimum requirements:
 1. Calculated or measured adiabatic temperature rise of concrete.
 2. Upper limit for concrete temperature at time of placement.
 3. Description of specific measures and equipment that will be used to ensure maximum temperature in placement will not exceed specified maximum temperature limit.
 4. Calculated maximum temperature in placement based on expected conditions at time of placement and use of proposed measures to control temperatures.
 5. Description of specific measures and equipment that will be used to ensure temperature difference will not exceed specified temperature difference limit.

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6. Calculated maximum temperature difference in placement based on expected conditions at time of placement and use of proposed measures to control temperature differences.
 7. Description of equipment and procedures that will be used to monitor and log temperatures and temperature differences.
 8. Drawing showing locations for temperature sensors in placement.
 9. Description of format and frequency of providing temperature data to Engineer.
 10. Description of measures to address and reduce excessive temperatures and temperature differences, if they occur.
 11. Description of curing procedures, including materials and methods, and curing duration.
 12. Description of formwork removal procedures to ensure temperature difference at temporarily exposed surface will not exceed temperature difference limit, and how curing will be maintained.
 13. Alternate temperature limits when permitted by Engineer.
 - a. Determination of alternate temperature limits shall be based on detailed thermal and crack analyses.
 - b. Analyses shall be stamped by Contractor's Licensed Design Engineer.
 14. If concrete design mixture is changed, thermal control plan must be updated.
- 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. Engineer.
 2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer 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.

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- 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

2.1 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): 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 4 percent.
 - 2) Shall not be produced from process that has utilized hazardous or potentially hazardous materials.

B. Aggregates: 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.

2. Fine Aggregates:

- a. Clean, sharp, natural sand.
- b. ASTM C33/C33M.

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- 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 3 percent mass of total sample.
 - 2) Limit coal and lignite to 0.5 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.
- 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 C 494/C 494M, Type B.
 - 5. Accelerating Admixture: ASTM C 494/C 494M, 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.

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- 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. Corrosion Inhibiting Admixtures: ASTM C1582/C1582M.
 9. 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
 10. Do not use calcium chloride as an admixture.
- 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: 500 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.

2.2 ANCILLARY MATERIALS

- A. Bonding Agent: Unless otherwise specified, in accordance with the following:
1. ASTM C881/C881M, Type V.
 2. Two-component, moisture insensitive, 100 percent solids epoxy.
 3. Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
 4. Manufacturers and Products:
 - a. BASF Building Systems Inc., Shakopee, MN; Concessive Standard LVI.
 - b. Euclid Chemical Co., Cleveland, OH; Euco # 352 Epoxy System LV.
 - c. Prime Resins, Conyers, GA; Prime Bond 3000 to 3900 Series.
 - d. Sika Chemical Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod.

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- e. 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. Repair Material:
 - 1. Contain only trace amounts of chlorides and other chemicals that can potentially cause steel to oxidize.
 - 2. Where repairs of exposed concrete are required, prepare mockup using proposed repair materials and methods, for confirmation of appearance compatibility prior to use.
 - 3. Obtain Manufacturer's Certificate of Compliance that products selected are appropriate for specific applications.
 - 4. Repair mortar shall be site mixed.
 - 5. Prepare concrete substrate and mix, place, and cure repair material in accordance with manufacturer's written recommendations.
 - 6. Manufacturers and Products:
 - a. BASF Building Systems Inc., Shakopee, MN; EMACO S-Series products.
 - b. Sika Chemical Corp., Lyndhurst, NJ; SikaTop-Series.
 - c. Or approved equal

2.3 CONCRETE MIX DESIGN

- A. General:
 - 1. See Supplement 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.

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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 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 in columns, piers, pilasters, and walls.
 6. Use water-reducing admixture or high-range, water-reducing 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.
- C. Proportions:
1. Design mix to meet aesthetic, durability, and strength requirements.
 2. Where fly ash is included in mix, maximum fly ash content shall be 15 percent of weight of total cementitious materials.

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- D. Concrete Shrinkage Limits: Where shrinkage limits are specified, design mix for following shrinkage limits and 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 shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
 5. 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.
 2. Unless otherwise permitted, target slump value is 4 inches at point of delivery, for concrete without high-range, water reducing admixture.
 3. Design mixes that include a high-range, water-reducing 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.
 4. Slump tolerance shall meet requirements of ACI 117.
- F. Combined Aggregate Gradation:
1. Combined Gradation Limits: 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

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Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2"Max.	1"Max.	3/4"Max.
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

2.4 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.

2.5 TEMPERATURE LIMITS

- A. For concrete sections with a minimum specified dimension that is greater than 2 feet 6 inches, and unless otherwise permitted:
 - 1. Provide documentation that maximum concrete temperature in structure will not exceed 158 degrees Fahrenheit, and maximum temperature differential between center of section and external surfaces of concrete will not exceed 35 degrees Fahrenheit.

2.6 SOURCE QUALITY CONTROL

- A. Source Quality Control Inspection: Engineer 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

3.1 PLACING CONCRETE

- A. Preparation: Meet requirements ACI 301, except as modified herein.
- B. Inspection: Notify Engineer 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.

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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 first layer to prevent cold joints.
 3. Placement frequency shall be such that lift lines will not be visible in exposed 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.

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4. Conveyor Belts:
 - a. Approved by 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. Concrete sections with a minimum specified dimension that is greater than 2 feet 6 inches:
 1. Cure and protect concrete in accordance with accepted thermal control plan and as follow:
 - a. Minimum curing period shall be 14 days.
 - b. Unless otherwise permitted, preserve moisture by maintaining forms in place.
 2. Strength measurement shall be representative of in-place concrete within 2 inches of concrete surface.
 3. Concrete strength shall be verified through correlation of concrete temperature and compressive strengths established by cylinder compressive tests and in accordance with ASTM C1074.
 4. Unless otherwise specified, control concrete temperatures to within specified limits from time concrete is placed until time internal temperature has cooled from its maximum, such that difference between average daily ambient and maximum internal concrete temperature at time of protection removal, is less than specified temperature difference limit.
 5. Unless otherwise specified, place one temperature sensor at center of mass of placement and one temperature sensor at a depth 2 inches from center of nearest exterior surface. Place additional sensor at each location to serve as a backup in event that other temperature sensor fails. In addition, provide temperature sensor in shaded location for monitoring ambient onsite temperature.
 - a. Unless otherwise specified, monitor temperatures hourly using electronic sensors capable of measuring temperature from 32 degrees F to 212 degrees F to an accuracy of 2 degrees F.

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- b. Ensure temperature sensors are operational before placing concrete.
 - c. Unless otherwise specified, provide data from sensors to Engineer on a daily basis, until requirements are met.
 - d. Compare temperatures and temperature differences with maximum limits specified in Article Temperature Limits every 12 hours, unless otherwise permitted. If either exceeds specified limits, take immediate action as described in accepted thermal control plan to remedy situation. Do not place additional mass concrete until cause of excessive temperature or temperature difference has been identified and corrections are accepted.
- H. 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: Unless otherwise shown or permitted, locate construction joints as follows:
 - a. Locate construction joints as shown on Drawings or where approved in joint location submittal required in Section 03 15 00, Concrete Joints and Accessories.
 - b. Provide vertical construction joints in walls and slabs at maximum spacing of 40 feet, unless shown or approved otherwise.
 - c. When vertical expansion, contraction, or control joint spacing does not exceed 60 feet, intermediate construction joints are not required.
 - d. 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.
- I. Minimum Time between Adjacent Placements:
1. Construction or Control Joints: 7 days 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.

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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.
- J. 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.
- K. Hot Weather:
1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 301, ACI 305.1, and as follows:
 - a. Maintain concrete temperature below 90 degrees F at time of placement, or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
 - b. Provide for windbreaks, shading, fog spraying, sprinkling, ice, wet cover, or other means as necessary to maintain concrete at or below specified temperature.
 2. Concrete Curing: As specified in Section 03 39 00, Concrete Curing.
- L. Cold Weather Placement:
1. Unless otherwise permitted, shall be in accordance with requirements of ACI 306.1 and as follows:
 - a. Cold weather requirements shall apply when ambient temperature is below 40 degrees F or approaching 40 degrees F and falling.
 - b. Do not place concrete over frozen earth or against surfaces with frost or ice present. Frozen earth shall be thawed to acceptance of Engineer.
 - c. Unless otherwise permitted, do not place concrete in contact with surfaces less than 35 degrees F; requirement is applicable to all surfaces including reinforcement and other embedded items.
 - d. Provide supplemental external heat as needed when other means of thermal protection are unable to maintain minimum surface temperature of concrete as specified in ACI 306.1.
 - e. Maintain minimum surface temperature of concrete as specified in ACI 306.1 for no less than 3 days during cold weather conditions.

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- f. Cure concrete as specified in Section 03 39 00, Concrete Curing.
 - 1) Protect concrete from freezing until end of curing period and until concrete has attained a compressive strength of 3,500 psi or design compressive strength if less than 3,500 psi.
2. Provide maximum and minimum temperature sensors placed on concrete surfaces spaced throughout Work to allow monitoring of concrete surface temperatures representative of Work. Unless otherwise permitted, record surface temperature of concrete at least once every 12 hours during specified curing period.
3. External Heating Units: Do not exhaust heater flue gases directly into enclosed area as it causes concrete carbonation as a result of concentrated carbon dioxide.
4. Maintain curing conditions as specified in Section 03 39 00, Concrete Curing.

3.2 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. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated.
- 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.

3.3 REPAIRING CONCRETE

- A. General:
 1. Repair defective areas of concrete.
 2. Repair horizontal concrete surfaces in accordance with Section 03 01 33, Repair of Horizontal Concrete Surfaces.
 3. Repair vertical and overhead concrete surfaces in accordance with Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
 4. Repair concrete surfaces using specified materials. Select system, submit for review, and obtain approval from Engineer prior to use.
 5. Develop repair techniques with material manufacturer on surface that will not be visible in final construction prior to starting actual repair work and show how finish color will blend with adjacent surfaces. Obtain approval from Engineer.

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6. Obtain quantities of repair material and manufacturer's detailed instructions for use to provide 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 or upgrade finish by other means until acceptable to 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.
- 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, as specified in Section 03 62 00, Nonshrink Grouting.
 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.
- 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.

3.4 CONCRETE WALL FINISHES

- A. Type W-1 (Ordinary Wall Finish):
1. Patch tie holes.
 2. Knock off projections.

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3. Repair defective areas.
- 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.

3.5 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 purpose of forcing coarse aggregate away from surface and allowing layer of mortar, which will be weak 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, nor will excessive troweling 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.

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2. Wood float finish to compact and seal surface.
 3. Remove laitance and leave surface clean.
 4. Coordinate with other finish procedures.
- D. Type S-3 (Underside Elevated Slab Finish): 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:
1. 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 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.

3.6 CONCRETE SLAB TOLERANCES

- A. Set and maintain concrete forms and perform finishing operations so as to ensure that the completed Work is within the tolerances specified within ACI 117.
- B. Slab Elevation and Thickness:
1. Finish Slab Elevation: Slope slabs to floor drains and gutter. Slabs shall adequately drain regardless of tolerances.
 2. 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.

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3.7 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- B. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

3.8 FIELD QUALITY CONTROL

- A. General:
 - 1. 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.
 - 2. Unless otherwise specified, sample concrete for testing for making test specimens, from point of delivery.
 - 3. When concrete is pumped, sample and test air content at point of delivery and at point of placement.
 - 4. Evaluation will be in accordance with ACI 301 and Specifications.
 - 5. Test specimens shall be made, cured, and tested in accordance with ASTM C31/C31M and ASTM C39/C39M.
 - 6. Frequency of testing may be changed at discretion of Engineer.
 - 7. 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.
 - 8. 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. 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.
 - 3. Provide a minimum of one spare test specimen per sample. Test spare cylinder as directed by Engineer.

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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: 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 drying shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.
 - e. 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.
 - f. 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. Cold Weather Placement Tests:

1. During cold weather concreting, cast cylinders for field curing as follows. Use method that will produce greater number of specimens:
 - a. Six extra test cylinders from last 100 cubic yards of concrete.
 - b. Minimum three specimens for each 2 hours of placing time or for each 100 cubic yards.

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2. These specimens shall be in addition to those cast for lab testing.
 3. Protect test cylinders from weather until they can be placed under same protection provided for concrete of structure that they represent.
 4. Keep field test cylinders in same protective environment as parts of structure they represent to determine if specified strength has been obtained.
 5. Test cylinders in accordance with applicable sections of ASTM C31/C31M and ASTM C39/C39M.
 6. Use test results to determine specified strength gain prior to falsework removal or for prestressing.
- F. 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. Slab Flatness and Levelness: Make measurements within 72 hours of concrete placement.
 - 1) Flatness measurements are not applicable to unshored form surfaces or shored form surfaces after removal of shores.
 - 2) Levelness measurements are not applicable to cambered or sloped surfaces.
 - b. Slab flatness and levelness shall be determined in accordance with ASTM E1155.

3.9 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. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project, including instructions for redosing.
 - b. Establish control limits on concrete mix designs.
 - c. 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.

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3.10 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.

3.11 SCHEDULE OF CONCRETE FINISHES

- A. Form Tolerances: As specified in Section 03 10 00, Concrete Forming and Accessories.
- B. 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
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
Buildings, pipe galleries, and other dry areas/not painted or coated	W-2	W-A
Exterior Slabs		

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Area	Type of Finish	Required Form Tolerances
Water-holding tanks and basins/top of wall	S-5	S-B
Top of footing	S-2	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

3.12 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 A.
 - 2. Concrete Mix Design, Class B.
 - 3. Concrete Mix Design, Class C
 - 4. Concrete Mix Design, Class D
 - 5. Concrete Mix Design, Class E
 - 6. Concrete Mix Design, Class F

3.13 CONCRETE MIX DESIGN, CLASS A

- A. Mix Locations:
 - 1. Roof, floor slabs, columns, walls and all other concrete items not specified elsewhere.
- B. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.42.
 - 2. Minimum concrete compressive strength (f’c) shall be 4,000 psi at 28 days.
 - 3. Maximum aggregate size shall be 1 inch.
 - 4. Designed to conform to shrinkage limits.
 - 5. 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.

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- c. Slabs to receive topping placed monolithically as two-course floor on top of plastic concrete.
- 6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
1	3.0-5.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

- 7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 15 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
- 8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
- 9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 650 pounds per cubic yard.
- C. Refer to PART 1 through PART 3 of this section for additional requirements.

3.14 CONCRETE MIX DESIGN, CLASS B

- A. Mix Locations:
 - 1. 12" and thicker walls, slabs on grade and footings, with written approval of the Engineer of Record.
- B. Mix Properties:
 - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.42.
 - 2. Minimum concrete compressive strength (f'c) shall be 4,000 psi at 28 days.
 - 3. Maximum aggregate size shall be 1 inch.
 - 4. Designed to conform to shrinkage limits.
 - 5. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:

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- 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.
6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
1	3.0-5.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

- 7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 15 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
 - 8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
 - 9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 650 pounds per cubic yard.
- C. Refer to PART 1 through PART 3 of this section for additional requirements.

3.15 CONCRETE MIX DESIGN, CLASS C

- A. Mix Locations:
 - 1. Pea Gravel Mix. Thin sections and areas with congested reinforcing, at the Contractor's option and with the written approval of the Engineer of Record for the specific location. Maximum fine aggregate 43% by weight of aggregate.
- B. 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 4,000 psi at 28 days.
 - 3. Maximum aggregate size shall be 3/8 inch.

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4. Designed to conform to shrinkage limits.
5. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 4 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.
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	4.0-6.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 15 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
 8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
 9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 752 pounds per cubic yard.
- C. Refer to PART 1 through PART 3 of this section for additional requirements.

3.16 CONCRETE MIX DESIGN, CLASS D

- A. Mix Locations:
 1. Site, sidewalks, and other miscellaneous nonstructural concrete.
- B. 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.

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3. Maximum aggregate size shall be 1 inch.
4. Designed to conform to shrinkage limits.
5. 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.
6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
1	3.0-5.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 15 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 520 pounds per cubic yard.

C. Refer to PART 1 through PART 3 of this section for additional requirements.

3.17 CONCRETE MIX DESIGN, CLASS E

- A. Mix Locations:
 1. Lean Concrete.
- B. Mix Properties:
 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.50.

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2. Minimum concrete compressive strength (f'c) shall be 2,000 psi at 28 days.
3. Maximum aggregate size shall be 1-1/2 inch.
4. Designed to conform to shrinkage limits.
5. 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.
6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
1-1/2	3.0-5.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 25 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
 8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
 9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 376 pounds per cubic yard.
- C. Refer to PART 1 through PART 3 of this section for additional requirements.

3.18 CONCRETE MIX DESIGN, CLASS F

- A. Mix Locations:
 1. Access Shaft slabs, beams and walls.
- B. Mix Properties:

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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 5,000 psi at 28 days.
3. Maximum aggregate size shall be 1 inch.
4. Designed to conform to shrinkage limits.
5. Air-entraining admixtures are prohibited in concrete mixtures.
6. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in.‡	Air Content (%)*
1	3.0-5.0
‡See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations. *Tolerance of air content is +1-1/2 percent.	

7. Limit supplementary cementitious materials measured as a percent of weight of total cementitious materials in mix design, as follows:
 - a. Fly Ash and other Pozzolans: 15 percent.
 - b. Total cementitious materials include ASTM C150/C150M and ASTM C595/C595M cement.
 - 1) Fly ash and other pozzolans in Type IP, blended cement, ASTM C595/C595M.
 8. Provide cementitious materials in accordance with one of the following:
 - a. ASTM C150/C150M Type II/V
 9. Unless otherwise permitted, minimum cementitious materials content in mix design shall be as follows:
 - a. 650 pounds per cubic yard.
- C. Refer to PART 1 through PART 3 of this section for additional requirements.

END OF SECTION

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SECTION 03 39 00

CONCRETE CURING

PART 1 - GENERAL

1.1 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.

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Manufacturers' data indicating compliance with the requirements specified herein for the following products:
 - c. Evaporation retardant.
 - d. Curing compound.
 - e. Penetrating water repellent sealer.
 - f. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Curing Compound:
 - 1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C309 Type I, Class A.
 - 2. Manufacturers and Products:

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- 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. 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

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- 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. Water: Clean and potable, containing less than 500 ppm of chlorides.

PART 3 - EXECUTION

3.1 CONCRETE CURING

- A. General:
 - 1. Cure all concrete in accordance with project specifications and ACI308.1.
 - 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. Where curing compound cannot be used, water curing as described below or special methods using moisture shall be agreed upon by 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 moist curing specified below, by 7 additional days.
- B. Use one of the following methods as approved by 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 for 7 days.

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- 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 when surface will no longer be damaged by traffic.

3.2 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.

3.3 PENETRATING WATER REPELLENT SEALER APPLICATION

- A. Apply where indicated on Interior Finish Schedule.
- B. Before application and with Work above completed, water cure concrete walls and floors for a minimum of 28 days to receive sealer, keep clean, unpainted, and free from membrane curing compounds.
- C. Concrete to receive penetrating sealer shall be dry for a minimum 24 hours immediately prior to application.
- D. 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.
- E. 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.

3.4 CLEAR LIQUID DENSIFIER APPLICATION

- A. Apply where indicated in Interior Finish Schedule.
- B. Before application and with Work above completed, water cure concrete walls and floors for a minimum of 28 days to receive sealer, keep clean, unpainted, and free from membrane curing compounds.
- C. Apply liquid densifier evenly, using three coats, allowing 24 hours between coats.

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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.

3.5 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 to show coverage in one coat.

END OF SECTION

CONCRETE CURING

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SECTION 03 62 00

GROUTING

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
 - b. C307, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
 - c. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - d. C579, Standard Test Methods for Compressive Grout Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - e. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
 - f. C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - g. C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.
 - h. C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - i. C1181, Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.
 - j. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

1.2 SUBMITTALS

- A. Action Submittals:
1. Product data of grouts.
 2. Proposed method for keeping existing concrete surfaces wet prior to placing nonshrink grout.
 3. Forming method for fluid grout placements.
 4. Curing method for grout.
- B. Informational Submittals:

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1. Manufacturer's Written Instructions:
 - a. Adding fiber reinforcing to batching.
 - b. Mixing of grout.
2. Manufacturer's proposed training schedule for grout work.
3. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements.
 - a. Grout free from chlorides and other corrosion-causing chemicals.
 - b. Nonshrink grout properties of Category II and Category III, verifying expansion at 3 days or 14 days will not exceed the 28-day expansion and nonshrink properties are not based on gas or gypsum expansion.
4. Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification: Grout manufacturer's representative.
6. Test Reports:
 - a. Test report for 24-hour evaluation of nonshrink grout.
 - b. Test results and service report from demonstration and training session.
 - c. Field test reports and laboratory test results for field-drawn Samples.
7. List of Contractor's equipment installation staff trained by grout manufacturer's representative in:
 - a. Nonshrink grout installation and curing.
 - b. Epoxy grout installation and curing.

1.3 QUALIFICATIONS

- A. Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer. Experience that has resulted in successful installation of grouts similar to those for this Project.
- B. For grout suppliers not listed herein, provide completed 24-hour Evaluation of Nonshrink Grout Test Form, attached at the end of this section. Provide independent testing laboratory test results for testing conducted within last 18 months.

PART 2 - PRODUCTS

2.1 NONSHRINK GROUT AND EPOXY GROUT SCHEDULE

- A. Furnish nonshrink grout (Category I, II, and III) and epoxy grout for applications as indicated in the following schedule:

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Application	Temperature Range	Max. Placing Time	
	40 deg F to 100 deg F	20 Min.	Greater Than 20 Min.
Precast joints	I or II		II
Machine bases 25 hp or less	II	II	II
Bases for precast vault wall sections	II	II	II
Machine bases 26 hp and up	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout
Baseplates and/or soleplates with vibration, thermal movement, etc.	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout

2.2 NONSHRINK GROUT

A. Category I:

1. Nonmetallic and nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Test in accordance with ASTM C1107/C1107M:
 - a. Grout shall have flowable consistency.
 - b. Flowable for 15 minutes.
4. Grout shall not bleed at maximum allowed water.
5. Minimum strength of flowable grout, 3,000 psi at 3 days, 5,000 psi at 7 days, and 7,000 psi at 28 days.
6. Manufacturers and Products:
 - a. BASF Building System, Inc., Shakopee, MN; MasterFlow 100.
 - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
 - c. Dayton Superior Corp., Miamisburg, OH; 1107 Advantage Grout.
 - d. US MIX Co., Denver, CO; US SPEC GP Grout.
 - e. Five Star Products Inc., Fairfield, CT; Five Star Grout.
 - f. Or approved equal

B. Category II:

1. Nonmetallic, nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.

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3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
 4. Test in accordance with ASTM C1107/C1107M:
 - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
 - b. Temperatures of 40 degrees F, 80 degrees F, and 90 degrees F.
 5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
 6. Minimum strength of fluid grout, 3,500 psi at 1 day, 4,500 psi at 3 days, and 7,500 psi at 28 days.
 7. Maintain fluid consistency when mixed in 1-yard to 9-yard loads in ready- mix truck.
 8. Manufacturers and Products:
 - a. BASF Building Systems, Inc., Shakopee, MN; MasterFlow 928.
 - b. Five Star Products Inc., Fairfield, CT; Five Star Fluid Grout 100.
 - c. Euclid Chemical Co., Cleveland, OH; Hi Flow Grout.
 - d. Dayton Superior Corp., Miamisburg, OH; Sure Grip High Performance Grout.
 - e. US MIX Co., Denver, CO; US SPEC MP Grout.
 - f. Or approved equal
- C. Category III:
1. Metallic and nongas-liberating.
 2. Prepackaged aggregate grout requiring only the addition of water.
 3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
 4. Test in accordance with ASTM C1107/C1107M:
 - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
 - b. Temperatures of 40 degrees F and 100 degrees F.
 5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
 6. Minimum strength of fluid grout, 4,000 psi at 1 day, 5,000 psi at 3 days, and 9,000 psi at 28 days.
 7. Maintain fluid consistency when mixed in 1-yard to 9-yard loads in ready- mix truck.
 8. Manufacturer and Product:
 - a. BASF Building Systems, Inc., Shakopee, MN; MasterFlow 885.
 - b. Euclid Chemical Co, Cleveland, OH; Hi-Flow Metallic Grout.
 - c. Or approved equal

2.3 EPOXY GROUT

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- A. High-strength, nonshrink, high-temperature epoxy grouting material developed for the support of heavy equipment with vibratory loads.
- B. Three-component mixture of a two-component epoxy resin system (100 percent solids) with a graded, precision aggregate blend.
- C. Premeasured, prepackaged system.
- D. Flowable.
- E. Minimum compressive strength in accordance with ASTM C579 Method B, 9,500 psi at 75 degrees F at 7 days, 11,000 psi at post cure.
- F. Maximum creep resistance in accordance with ASTM C1181 at 600 psi, 140 degrees F; 6.0 by 10⁻³ in/in.
- G. Minimum bond strength in accordance with ASTM C882, 2,000 psi.
- H. Minimum tensile strength in accordance with ASTM C307, 2,000 psi.
- I. Maximum coefficient of thermal expansion in accordance with ASTM C531 at 73 degrees F to 210 degrees F, 23.0 by 10⁻⁶ in/in/degrees F.
- J. Working Time: Minimum 2 hours at 50 degrees F; 1.5 hours at 70 degrees F; 50 minutes at 90 degrees F.
- K. Good chemical resistance.
- L. Good effective bearing area.
- M. Noncorrosive.
- N. Moisture insensitive.
- O. Modify resin and aggregate content where recommended by epoxy grout manufacturer to provide desired epoxy grout flow properties.
- P. Manufacturer and Product:
 - 1. BASF Building System, Inc., Shakopee MN; MasterFlow 648.
 - 2. Euclid Chemical Co., Cleveland, OH; E3-G.
 - 3. Dayton Superior Corp., Miamisburg, OH; Pro-Poxy 2000 Normal Set.
 - 4. Five Star Products Inc., Fairfield, CT; DP Epoxy Grout.
 - 5. Or approved equal

PART 3 - EXECUTION

3.1 GROUT

- A. General: Mix, place, and cure grout in accordance with grout manufacturer's representative's training instructions.
- B. Epoxy Grout: Concrete slab shall be fully cured for 28 days to ensure excess water has evaporated. Test concrete surface for moisture in accordance with ASTM D4263 before epoxy grout is placed.

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- C. Form Snap-Tie Hole: Fill tie hole in accordance with requirements of Section 03 30 00, Cast-in-Place Concrete.

3.2 GROUTING MACHINERY FOUNDATIONS

- A. Block out original concrete or finish off at distance shown below bottom of machinery base with grout. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust, and other foreign material that will be in contact with grout.
- C. Sandblast to bright metal all metal surfaces in contact with epoxy grout in accordance with manufacturer's written instructions.
- D. Set machinery in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.
- E. Form with watertight forms at least 2 inches higher than bottom of plate.
- F. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.
- G. If grout cannot be placed from one edge and flowed to the opposite edge, air vents shall be provided through the plate to prevent air entrapment.
- H. Radius all corners of grout pad.
- I. Install expansion joints for epoxy grout placement in accordance with manufacturer's written instructions.

3.3 TANK FOUNDATIONS

- A. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust and other foreign material that will be in contact with grout.
- C. Set tank in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.
- D. Form with watertight forms at least 2 inches higher than bottom of plate.
 - A. Fill space between bottom of tank base and original concrete in accordance with manufacturer's representative's training instructions.

3.4 FIELD QUALITY CONTROL

- A. General:
 - 1. Performed by Project representative's inspection staff.
 - 2. Perform the following quality control inspections. The grout manufacturer's representative shall accompany the Project representative's inspection staff on the first installation of each size and type of equipment.
- B. Evaluation and Acceptance of Nonshrink Grout:

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1. Inspect the surface preparation of concrete substrates onto which nonshrink grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.
 2. Inspect preparation and application of nonshrink grout form work for conformance to the manufacturer's recommendations.
 3. Conduct a final review of completed nonshrink grout installation for conformance to these Specifications.
 4. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
 5. Perform flow cone and bleed tests, and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of nonshrink grout used. Use restraining caps for cube molds in accordance with ASTM C1107/C1107M.
 6. For large grout applications, make three additional cubes and one more flow cone test. Include bleed test for each additional 25 cubic feet of nonshrink grout placed.
 7. Consistency: As specified in Article Nonshrink Grout. Flow cone test in accordance with ASTM C939. Grout with consistencies outside range requirements shall be rejected.
 8. Segregation: As specified in Article Nonshrink Grout. Grout when aggregate separates shall be rejected.
 9. Nonshrink grout cubes shall test equal to or greater than minimum strength specified.
 10. Strength Test Failures: Nonshrink grout work failing strength tests shall be removed and replaced.
 11. Perform bleeding test in accordance with ASTM C940 to demonstrate grout will not bleed.
 12. Store cubes at 70 degrees F.
 13. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C1107/C1107M.
 14. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.
- C. Evaluation and Acceptance of Epoxy Grout:
1. Inspect ambient conditions during various phases of epoxy grouting installation for conformance with the epoxy grout manufacturer's requirements.
 2. Inspect the surface preparation of concrete substrates onto which epoxy grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.
 3. Inspect the surface preparation of the metallic substrates onto which the epoxy primer is to be applied.

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4. Inspect the epoxy-primed metallic substrate for coverage and adhesion.
5. Inspect preparation and application of epoxy grout form work for conformance to the manufacturer's recommendation.
6. Verify consistency obtained is sufficient for the proper field placement at the installed temperatures.
7. Inspect and record that the "pot life" of epoxy grout materials is not exceeded during the installation.
8. Inspect epoxy grout for cure.
9. Inspect and record that localized repairs made to grout voids are in conformance with the specification requirements.
10. Conduct a final review of completed epoxy grout installation for conformance to these Specifications.
11. Compression tests and fabrication of specimens for epoxy grout shall be made in accordance to ASTM C579, Method B, at intervals during construction as selected by the Project representative. A set of three specimens shall be made for testing at 7 days, and each earlier time period as appropriate.
12. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C579.
13. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

3.5 MANUFACTURER'S SERVICES

A. General:

1. Coordinate demonstrations, training sessions, and applicable Site visits with grout manufacturer's representative. Allow 2-week notice to grout manufacturer's representative for scheduling purposes.
2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of grout.
3. Necessary equipment and materials shall be available for demonstration.
4. Conduct training prior to equipment mount installation work on equipment pads.
5. Training for each type of grout shall be not less than 4 hours' duration.

B. Nonshrink Grout Training:

1. Training is required for all Type III grout installations.
2. Provide nonshrink grout installation training by the qualified grout manufacturer's representative for Contractor's workers that will be installing nonshrink grout for baseplates and equipment mounts. Schedule training to allow Engineer's attendance.

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3. Mix nonshrink grouts to required consistency, test, place, and cure on actual Project, such as, baseplates to provide actual on-the-job training.
 4. Use minimum of two bags for each grout Category III. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at 1 day, 3 days, and 28 days. Use remaining grout for final Work.
 5. Include recommended grout curing methods in the training.
 6. Transport test cubes to independent test laboratory and obtain test reports.
 7. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
 8. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.
- C. Epoxy Grout Training:
1. Provide epoxy grout installation training by the qualified epoxy grout manufacturer's representative for Contractor's workers that will be installing epoxy grout for equipment mounts.
 2. Include training in:
 - a. Performance testing such as compressive strength testing of the epoxy grout.
 - b. All aspects of using the products, from mixing to application.
 3. Transport test cubes to independent test laboratory and obtain test reports.
 4. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
 5. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

3.6 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is part of this Specification.
1. 24-hour Evaluation of Nonshrink Grout Test Form and Grout Testing Procedures.

END OF SECTION

SUPPLEMENT 1

(Test Lab Name)

(Address)

(Phone No.)

24-HOUR EVALUATION OF NONSHRINK GROUT TEST FORM

OBJECTIVE: Define standard set of test procedures for an independent testing laboratory to perform and complete within a 24-hour period.

SCOPE: Utilize test procedures providing 24-hour results to duplicate field grouting demands. Intent of evaluation is to establish grout manufacturer's qualifications.

PRIOR TO TEST: Obtain three bags of each type of grout.

1. From intended grout supplier for Project.
2. Three bags of grout shall be of same lot number.

ANSWER THE FOLLOWING QUESTIONS FOR GROUT BEING TESTED FROM LITERATURE, DATA, AND PRINTING ON BAG:

- A. Product data and warranty information contained in company literature and data? Yes _____ No _____
- B. Literature and bag information meet specified requirements? Yes _____ No _____
- C. Manufacturer guarantees grout as specified in Article Guarantee? Yes _____ No _____
- D. Guarantee extends beyond grout replacement value and allows participation with Contractor in replacing and repairing defective areas? Yes _____ No _____
- E. Water demands and limits printed on bag? Yes _____ No _____
- F. Mixing information printed on the bag? Yes _____ No _____

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G. Temperature restrictions printed on bag? Yes _____ No _____

*Rejection of a grout will occur if one or more answers are noted NO.

GROUT TESTING PROCEDURES

A. Bagged Material:

- 1. List lot numbers. _____
- 2. List expiration date. _____
- 3. Weigh bags and record weight. _____

Owner’s Representative will disqualify grout if bag weights have misstated measure plus or minus 2 pounds by more than one out of three bags. (Accuracy of weights is required to regulate amount of water used in mixing since this will affect properties.)

B. Mixing and Consistency Determination:

- 1. Mix full bag of grout in 10-gallon pail.
- 2. Use electric drill with a paddle device to mix grout (jiffy or jiffler type paddle).
- 3. Use maximum water allowed per water requirements listed in bag instructions.
- 4. Mix grout to maximum time listed on bag instructions.
- 5. In accordance with ASTM C939 (flow cone) determine time of mixed grout through the flow cone. _____ seconds
- 6. Add water to attain 20- to 30-second flow in accordance with ASTM C939.
- 7. Record time of grout through cone at new water demand. _____ seconds
- 8. Record total water needed to attain 20- to 30-second flow. _____ pounds
- 9. Record percent of water. _____ percent

C. When fluid grout is specified and additional water is required beyond grout manufacturer’s listed maximum water, ASTM C1107/C1107M will be run at new water per grout ratio to determine whether grout passes using actual water requirements to be fluid. Use new water per grout ratio on remaining tests.

D. Bleed Test:

- 1. Fill two gallon cans half full of freshly mixed grout at ambient temperatures for each category and at required consistency for each.
- 2. Place one can of grout in tub of ice water and leave one can at ambient temperature.
- 3. Cover top of both cans with glass or plastic plate preventing evaporation.
- 4. Maintain 38 degrees F to 42 degrees F temperature with grout placed in ice and maintain ambient temperature for second container for 1 hour.
- 5. Visually check for bleeding of water at 15-minute intervals for 2 hours.
- 6. Perform final observation at 24 hours.

If grout bleeds a small amount at temperatures specified, grout will be rejected.

E. Extended Flow Time and Segregation Test (for Category II and Category III):

- 1. Divide the remaining grout into two 3-gallon cans. Place the cans into the 40-degree F and 90-degree F containers and leave for 20, 40, and 60 minutes.

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Every 20 minutes remove and check for segregation or settlement of aggregate. Use a gloved hand to reach to the bottom of the can, if more than 1/4 inch of aggregate has settled to the bottom or aggregate has segregated into clumps reject the grout.

2. Right after the settlement test mix the grout with the drill mixer for 10 seconds. Take a ASTM C939 flow cone test of grout and record flow time. Maintain this process for 1 hour at ambient temperatures of 40 degrees F and 90 degrees F.
 - a. 20 min_____, sec. @ 40 degrees F.
 - b. 40 min_____, sec. @ 40 degrees F.
 - c. 60 min_____, sec. @ 40 degrees F.
 - d. 20 min_____, sec. @ 90 degrees F.
 - e. 40 min_____, sec. @ 90 degrees F.
 - f. 60 min_____, sec. @ 90 degrees F.

All Category II and Category III grout that will not go through the flow cone with continuous flow after 60 minutes will be disqualified.

Qualified

Disqualified

F. 24-hour Strength Test:

1. Using grout left in mixing cans in accordance with ASTM C1107/C1107M for mixing and consistency determination test and for extended time flow test, make minimum of nine cube samples.
2. Store cubes at 70 degrees F for 24 hours.
3. Record average compressive strength of nine cubes at 24 hours.

Grout will be disqualified if 24-hour compressive strengths are less than 2,500 psi for grouts claiming fluid placement capabilities.

Grouts that have not been disqualified after these tests are qualified for use on the Project for the application indicated in Nonshrink Grout Schedule.

Signature of Independent Testing Laboratory

Date Test Conducted

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SECTION 03 63 00

CONCRETE DOWELING

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
 - 1. American National Standards Institute (ANSI).
 - 2. ASTM International (ASTM):
 - a. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - b. E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 - 3. International Code Council (ICC):
 - a. 2018 International Building Code (IBC).
 - b. Evaluation Services Reports.

1.2 DEFINITIONS

- A. ICC Evaluation Services Report: Published by ICC for products provided by concrete adhesive anchor manufacturers.
- B. Special Inspection: As defined in the ICC IBC and indicated on the Statement of Special Inspection (Plan) on the Drawings.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer's catalog information.
- B. Informational Submittals:
 - 1. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.
 - 2. ICC Evaluation Services Report: Specific to proposed doweling system manufacturer.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: Trained and certified by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

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- A. Container Markings: Include manufacturer's name, product name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- B. Store adhesive components in accordance with manufacturer's written instructions.
- C. Dispose of when:
 - 1. Shelf life has expired.
 - 2. Stored other than per manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Adhesive:
 - 1. Approved by an ICC Evaluation Services Report for conformance to **2018** IBC requirements for doweling of steel reinforcing bars in cracked concrete.
 - 2. Suitable for long-term loads as well as for wind and seismic loads.
 - 3. Meet requirements of ASTM C881/C881M.
 - 4. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
 - 5. Disposable, Self-Contained Cartridge System:
 - c. Capable of dispensing both components in proper mixing ratio.
 - d. Fit into manually or pneumatically operated caulking gun.
 - 6. Mixed Adhesive: Nonsag, light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout.
 - 7. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
 - 8. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT-RE 500-SD (ESR-2322) or HIT-HY 200 (ESR-3187) Adhesive Anchors.
 - b. Powers Fasteners, Brewster, NY; Power PURE110+ Epoxy Adhesive Anchor System (ESR-3298).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-XP Epoxy Adhesive Anchors (ESR-2508).
 - d. Or approved equal
- B. Mixing Nozzles:
 - 1. Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.

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2. Nonremovable internal static mixer required to ensure proper blending of components.
- C. Reinforcing Dowels:
 1. As specified in Section 03 21 00, Steel Reinforcement.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Drilling Equipment:
 1. Drilling Hammers for Dowel Holes:
 - a. Electric or pneumatic rotary type with medium or light impact.
 - b. Hollow drills with flushing air systems are preferred.
 2. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
- B. Hole Diameter: Use drill bit diameter meeting ICC Evaluation Services Report requirements and as recommended by manufacturer.
- C. Obstructions in Drill Path: When existing steel reinforcement is encountered during drilling, obtain Engineer approval for proposed fix.
- D. Doweling:
 1. Install per details shown on Drawings and in accordance with adhesive manufacturer's instructions.
 2. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
 3. Bent Bar Dowels: Where edge distances are critical, and intersection with steel reinforcement is likely, drill hole at 10-degree angle or less and use prebent reinforcing bars.
- E. Adhesive:
 1. Install in accordance with written manufacturer's instructions.
 2. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.

3.2 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 Inspection (Plan) on Drawings. Contractor responsibilities and related information on special inspection and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

1. Special inspection will be performed by the Special Inspector in accordance with ICC ESR requirements and as specified in Section 01 45 33, Special Inspection, Observation, and Testing.
 2. Continuous inspection required where noted on Drawings and where concrete dowels are installed in overhead applications.
 3. Periodic inspection required where continuous inspection is not specified.
 4. Special Inspector will observe installation in accordance with requirements of the ICC Evaluation Services Report and will submit report including the following:
 - a. Product Description: Product name, rod diameter, and length.
 - b. Drill bit compliance.
 - c. Hole diameter, diameter, and depth and cleanliness.
 - d. Adhesive expiration date.
 5. Verification of dowel installation in accordance with manufacturer's published instructions
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

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PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. A615, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - d. C33, Standard Specification for Concrete Aggregates.
 - e. C90, Standard Specification for Loadbearing Concrete Masonry Units.
 - f. C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
 - g. C144, Standard Specification for Aggregate for Masonry Mortar.
 - h. C150, Standard Specification for Portland Cement.
 - i. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
 - j. C270, Standard Specification for Mortar for Unit Masonry.
 - k. C404, Standard Specification for Aggregates for Masonry Grout.
 - l. C426, Test Method for Drying Shrinkage of Concrete Block.
 - m. C476, Standard Specification for Grout for Masonry.
 - n. C618 12 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - o. C744, Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
 - p. C979, Pigments for Integrally Colored Concrete.
 - q. C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
 - r. C1314, Standard Test Method for Compressive Strength of Masonry Prisms.
 - s. C1403, Standard Test Method for Rate of Water Absorption of Masonry Mortars.

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- t. E476, Grout for Reinforced and Nonreinforced Unit Masonry.
 - u. E447, Test Method for Compressive Strength of Masonry Prisms
 - v. E514/E514M, Standard Test Method for Water Penetration and Leakage through Masonry.
- 2. The Masonry Society (TMS):
 - a. TMS 402/ACI 530/ASCE 5; Building Code Requirements for Masonry Structures and Companion Commentaries. (MSJC Code and Commentary).
 - b. TMS 602/ACI530.1/ASCE6; Specification for Masonry Structures.
 - c. 602/American Concrete Institute ACI 530.1/ASCE 6, Specification for Masonry Structures and Companion Commentaries. (Masonry Standards Joint Committee Specifications and Commentary).
 - 3. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. ICC Evaluation Service (ICC-ES) Reports.
 - 4. California Building Standards Commission (CBSC):
 - a. California Building Code (CBC).

1.2 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings.
- 2. Data Sheets:
 - a. Horizontal joint reinforcement.
 - b. Preformed control joint materials.
 - c. Water repellent masonry sealer.
 - d. Grout mix design. Grout proportions.
 - e. Mortar mix design. Mortar proportions.
 - f. Grout sand gradation in accordance with ASTM C404.

B. Informational Submittals:

- 1. Method and Location of Placing Grout: High lift or low lift.
- 2. Mix design test results.
- 3. Certifications:
 - a. Units comply with ASTM C55 and ASTM C90.
 - b. Grout test results conform to ASTM C1019.

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- c. Grout aggregates conform to requirements of ASTM C33, including nonreactivity.
- d. Mortar sand conform to requirements of ASTM C144.
4. Test results of Project samples from masonry unit manufacturer stating that units comply with ASTM C90. Documentation of material testing shall be one less than 1 year old.
5. Test results of proposed grout mix design stating that units comply with ASTM C1019. Documentation of material testing shall be 1 year old or less.
6. Test reports stating aggregates for mortar meet requirements of ASTM C144.
7. Test reports or letter of certification stating aggregates for grout meet requirements of ASTM C404.
8. Method and materials for removal of efflorescence.
9. Field test results to qualify materials.
 - a. Grout tests in accordance with ASTM C1019.
 - b. Prism tests per ASTM C1314.

1.3 QUALITY ASSURANCE

- A. Compliance Requirements: For masonry finish and appearance, dimension tolerances, tolerances of construction, joint tolerances, and wall plumb tolerances, comply with the requirements and criteria of NCMA, ASTM C90, and TMS 602.1.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Keep units and mortar/grout cementitious ingredients, including lime, dry.

PART 2 - PRODUCTS

2.1 COMPRESSIVE STRENGTH OF MASONRY ASSEMBLAGE

- A. Minimum 28-Day Specified Compressive Strength (f'_m) of Masonry: 2,000 psi.

2.2 CONCRETE MASONRY UNITS (CMU)

- A. ASTM C90: Medium weight.
 1. Net Area Compressive Strength: 2,800 psi minimum, in accordance with TMS 602, Table 2.
 2. Nominal Size: 16 inches long by 8 inches high by thickness shown on Drawings.
 3. Color of Units: Natural.
 4. Surface Texture: Smooth.
- B. General Concrete Masonry Unit (CMU) Requirements:

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1. Furnish or cut special shapes for corners, jambs, lintels, and other areas shown or required.
2. Special units shall match color and texture of standard units.
3. Where units are placed so end of unit is exposed, such as at a corner or intersection, exposed end of that block shall have surface to match color and texture of sides of other units.
4. Furnish sound, dry, clean units free of cracks, prior to placing in structure.
5. Vertical Cells to be Grouted: Capable of alignment sufficient to maintain clear, unobstructed continuous vertical cell dimensions in accordance with TMS 602, Table 7.
6. Masonry unit size and shape shall allow for all placement patterns. Use vertical grout dams to prevent materials, such as grout, from escaping from cell being filled to adjacent cells where material is not intended to be placed.

2.3 MORTAR MATERIALS

- A. Portland Cement-Lime Mortar:
 1. ASTM C270.Cement: ASTM C150, Type II portland cement.
 2. Lime: ASTM C207, Type S hydrated.
 3. Aggregates:
 - a. Non-reactive in accordance with ASTM C33, Appendix X1.
 - b. Mortar: ASTM C144, sand.
- B. Water: Fresh, clean, and potable.
- C. Manufacturers and Products:
 1. W.R. Grace; DRY-BLOCK.
 2. Harris Specialty Chemicals.
 3. Axim Italcementi Group; Intrapel.
 4. BASF Chemical Co.; Rheopel Admixture.
 5. Or approved equal
- D. Mortar Color Admixture:
 1. Meet the requirements of ASTM C979.
 2. Manufacturer and Product: Davis Colors, Los Angeles, CA; True Tone Mortar Color. Or approved equal

2.4 GROUT MATERIALS

- A. ASTM C476.
- B. Aggregates:
 1. ASTM C404, fine and coarse.

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2. ASTM C144.
 3. Non-reactive in accordance with ASTM C33, Appendix X1.
- C. Water: Fresh, clean, and potable.

2.5 REINFORCEMENT

- A. Reinforcement: Clean and free from loose rust, scale, and coatings that reduce bond.
- B. Deformed Bars: As specified in Section 03 21 00, Steel Reinforcement.

2.6 PREFORMED CONTROL JOINTS

- A. Solid rubber cross-shape extrusions as manufactured by:
 1. Dayton Superior/Dur-O-Wal Dayton, OH; DA 2001 Control Joint Regular Rubber.
 2. Hohmann and Barnard, Inc, Hauppauge, NY; #RS-Standard.

2.7 MORTAR MIXES

- A. In accordance with ASTM C270, Type S and MSJC Specifications.
- B. Mix Method:
 1. Property Method: Minimum average mortar 28-day compressive strength 1,800 psi.
 2. Proportion Method: Proportion per Table 1 of ASTM C270.
- C. Mixing:
 1. Machine mix in approved mixers in accordance with ASTM C270.

2.8 GROUT MIXES

- A. Compressive Strength Property:
 1. Minimum 2,500 psi at 28 days. Grout strength shall not exceed two times the minimum specified strength.
 2. Proportions: Conform to ASTM C476, Table 1.
- B. Mix Design:
 1. Proportions:
 - a. Design mix to meet property/strength requirements.
 2. Slump: 8-inch minimum, 11-inch maximum.
- C. Mixing:
 1. Do not use water reducers, air entrainment, plasticizing, high-range water reducers, or other non-specified admixtures in grout mixes.
 2. Transit-Mixed Grout: Meet requirements of ASTM C476.

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3. For high lift grouting, add approved grout expansion admixture in accordance with manufacturer's recommendations.
4. Fluid consistency suitable for placing without segregation with a slump of 8 inches to 11 inches.

2.9 WATER REPELLENT MASONRY SEALER

- A. Characteristics:
 1. Water-based blend of silanes and siloxanes.
 2. VOC compliant.
- B. Performance Requirements:
 1. Water Absorption: 95 percent reduction in weight gain when tested in accordance with ASTM C140.
 2. Water Repellency: 99 percent reduction in weight gain when tested in accordance with ASTM E514.
- C. Manufacturers and Products:
 1. W. R. Grace & Co.; Infiniseal DB Sealer.
 2. BASF Construction Chemicals; Enviroseal PBT.
 3. Or approved equal

PART 3 - EXECUTION

3.1 GENERAL

- A. Meet requirements of 2016 CBC, Chapter 21 and The Masonry Society (TMS) 602/American Concrete Institute (ACI)530.1/ASCE 6, Specification for Masonry Structures and Companion Commentaries (MSJC), Part 3, Execution, except as modified in this section.
- B. Moisture Protection:
 1. Keep units dry while stored on Site.
 2. Do not wet units prior to laying.
- C. Provide measures to prevent moisture from entering incomplete walls and open cells.
- D. Cold Weather: Meet requirements of MSJC Specification Section "Cold Weather Construction".
- E. Hot Weather: Meet requirements of MSJC Specification Section "Hot Weather Construction".
- F. After construction during cold weather, maintain newly constructed masonry temperature above 32 degrees F for a minimum of 24 hours using MSJC or other approved cold weather methods.

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- G. After construction and during hot weather, fog spray newly constructed masonry in accordance with MSJC hot weather construction requirements.

3.2 PREPARATION

- A. Concrete Foundations: Meet tolerance requirements of ACI 117 prior to starting any masonry work.
- B. Prepare surface contact area of foundation concrete for initial mortar placement by removing laitance, loose aggregate, and other materials, and anything that would prevent mortar from bonding to foundation.
- C. Patch or grind out-of-tolerance foundation surfaces to receive mortar prior to starting masonry work.
- D. Clean reinforcement dowels and projecting embeds by removing laitance, spillage, or items that will adversely affect grout bond.
- E. Prevent surface damage to foundation concrete that will be exposed to view outside of contact area.

3.3 LAYING MASONRY UNITS

- A. General:
 - 1. Finish Tolerances (Measured on Interior Surfaces): Meet requirements of “Site Tolerance” requirements of Part 3, Execution, of the MSJC Specifications.
 - 2. Place units with chipped edges or corners such that chipped area is not exposed to view.
- B. Wall Units:
 - 1. General:
 - a. If necessary to move a unit after once set in-place, remove from wall, clean, and set in fresh mortar.
 - b. Toothing of masonry units is not permitted.
 - 2. Running Bond:
 - a. Unless otherwise shown, lay up walls in straight, level, and uniform courses using a running bond pattern.
 - b. Place units for continuous vertical cells and mortar joints to prevent materials, such as grout, from escaping from cell being filled to adjacent cells where material is not intended to be placed.
 - c. Corners: Lay standard masonry bond for overlapping units and grout solid.
 - d. Intersecting Walls: Half unit appearance shall not extend and be visible on exterior side of intersecting wall. Provide hooked corner bars in bond beam units as shown on Drawings.
 - 3. Special Shapes:

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- a. Provide and place such special units as corner block, doorjamb block, lintel block fillers, and similar blocks as may be required.
- b. Use required shapes and sizes to work to corners and openings, maintaining proper bond throughout wall.

3.4 BUILT-IN ITEMS

- A. Position door frames, windows, vents, louvers, and other items to be built in wall, and construct wall around them.
- B. Install masonry anchors to secure items to wall.
- C. Fill spaces around items with grout except use mortar at mortar joints.
- D. Do not place electrical, instrumentation, or water conduits in a cell containing parallel reinforcement, unless approved in writing by Engineer. Additionally, pipes, sleeves, and conduits shall meet requirements of TMS 402/ACI 530/ASCE 5, Building Code Requirements for Masonry Structures (MSJC Code) and MSJC specification construction requirements.

3.5 MORTAR JOINTS

- A. General:
 1. Meet masonry erection requirements of MSJC, Part 3, Execution, 3.3B.
 2. As units are laid, remove excess mortar from grout space of cells to be filled. Final grout space, including any remaining mortar projections, shall be as required by MSJC Table “Grout Space Requirements”.
 3. Place mortar before initial setting of cement takes place. Retemper only as required for it to remain plastic. Retempering of colored mortar is not allowed.
- B. Exposed Joints:
 1. Tool joints exposed to view after final construction, unless otherwise noted or shown.
 2. Cut joints flush and as mortar takes its initial set; tool to provide a joint.
 3. Perform tooling with tool that compacts mortar, pressing excess mortar out.
 4. Perform tooling when mortar is partially set, but still sufficiently plastic to bond rather than dragging it out.
 5. Rake out joints that are not tight at time of tooling, point, and then tool.
 6. Rake and tool joints at split-face surfaces, interior and exterior.
- C. Concealed Joints: Strike flush with no further treatment required.

3.6 CONTROL JOINTS

- A. Preformed Control Joints:
 1. Omit mortar from vertical joints.

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2. Place in units fabricated to receive rubber control joint material as wall is built.
3. After wall is grouted, cured, and cleaned, install backing rod and sealant as specified in Section 07 92 00, Joint Sealants.
4. Place and tool sealant to match depth of typical joint.

3.7 REINFORCING

A. Foundation Dowels:

1. Locate first foundation dowel at end of wall in center of first cell; typically 4 inches from end of wall.
2. Locate at each side of control joints and openings and below beam and joist seats, and then locate at maximum required spacing between these bars.
3. Size, number, and location of foundation dowels shall match all typical and additional vertical wall reinforcing, unless otherwise noted.
4. When foundation dowel does not line up with vertical core, do not slope more than 1 horizontal to 6 vertical to bring it into alignment.

B. Vertical Reinforcing:

1. Use deformed bars.
2. Hold in position near ends of bars by wire ties to dowels or by reinforcing positioners.
3. For high lift grouting, hold in position at maximum intervals of 160 bar diameters by reinforcing positioners.
4. Lap reinforcing bars as shown or approved.
5. Wire tie splices together.
6. Minimum Bar Clearance: 1/2-inch from masonry for coarse grout 1/4-inch from masonry for fine grout, from formed surfaces, and from parallel bars in same grout space.

C. Horizontal Reinforcing:

1. Use deformed bars.
2. Lay on webs of bond beam units and place as wall is built. Increase web depth to ensure 1/2-inch cover over top of rebar.
3. Lap reinforcing bars where spliced and wire tie together.
4. Minimum Bar Clearance: 1/2 inch from masonry for coarse grout 1/4 inch from masonry for fine grout, from formed surfaces, and from parallel bars in same grout space.
5. Terminate reinforcing bars 2 inches clear from control joints except horizontal bars at roof and floor courses shall be continuous through joints.

D. Horizontal Joint Reinforcement:

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1. Use as indicated on Drawings.
2. Use manufactured corner and other wall intersection pieces.

3.8 MORTAR PRODUCTION

- A. Mix bulk materials in accordance with MSJC Specification.
- B. Mix prebagged materials with water to produce a workable consistency.
- C. Remix or retemper to maintain workability. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.

3.9 GROUT PLACEMENT

- A. Do not mix, convey, or place with equipment constructed of aluminum.
- B. Secure vertical and horizontal reinforcement, ties, bolts, anchors, and other required embedments in place; inspect and verify before placing grout.
- C. Grout beams over openings in one continuous operation.
- D. Maintain vertical alignment in accordance with ACI 530.1, Table 7:
 1. Place grout within 1-1/2 hours of addition of water to mix.
 2. Use reinforcing positioners to secure vertical reinforcement.
- E. Grouting Requirements:
 1. Solid grout all walls.
 - a. Slump: 8 inches to 11 inches.
 - b. Do not start grouting until wall mortar has cured for 24 hours, minimum.
 2. Fully embed horizontal steel with grout in an uninterrupted pour.
 3. Do not construct wall more than one course above top of grout pour prior to placing grout.
 4. Partial Grouting Requirements:
 - a. Fill cells containing reinforcing steel, anchor bolts, and other embedded items as shown with grout.
 - b. Construct cells to be filled to confine grout within cell.
 - c. Cover tops of unfilled vertical cells under a bond beam with metal lath to confine grout fill to bond beam section.
 - d. Form horizontal construction joints between pours by stopping grout pour 1-1/2 inches below a mortar joint, except at a bond beam; stop pour 1/2 inch below top of masonry unit.
- F. Cleanouts:
 1. Construct in accordance with MSJC specification.

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2. Provide for grout pours heights over 5 feet 4 inches in accordance with the 2016 CBC.
3. Provide of sufficient size to permit cleaning of cell, positioning of reinforcing, and inspection at bottom of every vertical cell containing reinforcing and maximum of 32 inches on center.
4. Location: Concealed from view after final construction, unless otherwise approved by Engineer.
5. After wall has been inspected and approved and prior to grouting, cap cleanouts in a manner that will seal them from grout leakage and provide a flush finish.

3.10 WATER REPELLENT MASONRY SEALER

- A. Remove efflorescence prior to applying water repellents. Dispose of waste generated.
- B. Apply to exposed exterior concrete masonry walls.
- C. Repoint loose, cracked, or disintegrating mortar at least 7 days prior to application. Ensure joint sealants and caulking are fully cured and wall surfaces are clean, dry, and free of chemical cleaners, efflorescence, dirt, oils, mortar smears, and other surface contaminants.
- D. Follow manufacturer's recommendations for weather conditions during application.
- E. Test a 5-foot by 5-foot wall area to ensure proper coverage, desired water repellency properties, and desired surface appearance when sealer is fully dried.
- F. Apply with spray, brush, or roller following manufacturer's recommendations, at a coverage rate of 50 square feet to 150 square feet per gallon, as determined by testing. Use two-coat application where recommended by manufacturer.

3.11 FIELD QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with 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.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.
- C. Masonry shall be tested by independent testing agency, retained by Contractor and approved by Engineer.
- D. Provide adequate facilities for safe storage and proper curing of masonry prisms, mortar samples, and grout samples, as applicable, onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
- E. Masonry Testing:
 1. Masonry strength shall be determined using unit strength method as shown.

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2. Masonry test prisms, when required or desired, shall be constructed onsite with same materials and workmanship to be used for Project and in accordance with ASTM C1314. Method and frequency of prism testing shall be as shown on the Special Inspection and Testing Plan.
 3. Unit Strength Method:
 - a. Method and frequency for mortar, grout, and masonry unit sampling and testing shall be as shown.
 - b. Provide masonry units for test samples required.
- F. Corrective Action:
1. If compressive strength tests made prior to construction of permanent structure fail to meet Specifications, adjustments shall be made to mix designs for mortar, or grout, or both, as needed to produce specified strength.
 2. If strength tests performed on materials representative of in-place construction fail to meet Specifications, prisms or cores shall be cut from constructed walls in sufficient locations to adequately determine strength in accordance with 2016 CBC.

3.12 CLEANING

- A. Immediately after completion of grouting, clean masonry surfaces of excess mortar, grout spillage, scum, stains, dirt, and other foreign substances using clean water and fiber brushes.
- B. Clean walls not requiring painting or sealing so there are no visible stains.

3.13 PROTECTION OF INSTALLED WORK

- A. Do not allow grout and mortar stains to dry on face of exposed masonry.
- B. Protect tops of walls at all times. Cover tops of walls with waterproof paper when rain or snow is imminent and when the Work is discontinued.
- C. Adequately brace walls until walls and roof are completed.
- D. Provide sufficient bracing to protect walls against damage from elements, including wind and snow.
- E. Protect masonry against freezing for minimum 72 hours after being laid.
- F. Protect masonry from damage until final acceptance of the Work. Damaged units will not be accepted.

END OF SECTION

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SECTION 05 05 23

WELDING

PART 1 - GENERAL

1.1 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. ASTM International (ASTM): A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 4. 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. D1.8/D1.8M, Structural Welding Code - Seismic Supplement.
 - e. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - f. D1.3/1.3M, Structural Welding Code - Sheet Steel.
 - g. D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
 - h. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 - i. QC1, Standard for AWS Certification of Welding Inspectors.

1.2 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

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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: Non-destructive 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.

1.3 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.

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- 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.

1.4 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 Engineer.
- D. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.

1.5 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

2.1 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

3.1 GENERAL

- A. Welding and Fabrication by Welding: Conform to governing welding codes referenced in attached Welding and Nondestructive Testing Table.

3.2 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:

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- 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.

3.3 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 evaluating test results.
 7. Maintain records and prepare report confirming results of inspection and testing comply with the Work.

3.4 WELD DEFECT REPAIR

- A. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.

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3.5 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is a part of this specification.
 - 1. Welding and Nondestructive Testing Table.

END OF SECTION

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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
03 40 00 Precast Concrete	AWS D1.1/D1.1M, Structural Welding Code - Steel and AWS D1.4/D1.4M, Structural Welding Code - Reinforcing Steel	No	Yes	Yes	Yes	100% VT; also see Section 03 40 00
05 12 00 Structural Steel Framing	AWS D1.1/D1.1M, Structural Welding Code - Steel	Yes	Yes	Yes	Yes	100% VT and 10% UT or RT of all groove-and-butt joint welds; 10% MT of all fillet welds; also see Section 05 12 00
05 31 00 Steel Decking	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.3/D1.3M, Structural Welding Code - Sheet Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 05 31 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
33 12 17.01 Welded Steel Tank	ASME BPV Code, Section IX or AWS D1.1/D1.1M, Structural Welding Code - Steel	Yes	Yes	Yes	Yes	100% VT and AWWA D100; also see Section 33 12.17.01
40 27.00 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

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 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.

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- 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.

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- 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. NSF International (NSF): 61, Drinking Water System Components—Health Effects.
10. 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.
11. 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.

1.2 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.
- 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.

1.3 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.

1.4 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.

1.5 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.

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- 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.

1.6 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 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.

1.7 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

2.1 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. 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

METAL FABRICATIONS

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

Item	ASTM Reference
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, with weldability supplement S1.
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436
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

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- C. 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.

2.2 ANCHOR BOLTS

- 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.

2.3 POST-INSTALLED CONCRETE ANCHORS

- A. See Section 05 05 19, Post-Installed Anchors.

2.4 STUD SHEAR CONNECTORS

- A. Headed anchor studs (HAS), or threaded anchor studs (TAS), or stud shear connectors, as indicated on Drawings.
 - 1. Carbon Steel: ASTM A108, Standard Quality Grades 1010 through 1020, inclusive either semikilled or killed aluminum or silicon dioxidation, unless indicated otherwise.
 - 2. Stainless Steel: ASTM F593, AISI Type 316, Condition CW, where indicated.
- B. Manufacturers:
 - 1. Nelson Stud Welding, FabriSteel Co., Elyria, OH.
 - 2. Stud Welding Associates, Inc., Elyria, OH.
 - 3. Or approved equal

2.5 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.

2.6 SIDEWALK DOORS – NOT USED

2.7 HATCHES

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span.
- B. Component Fabrication:
 - 1. Access Door Leaf(s): 1/4-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: 1/4-inch thick extruded aluminum angle frame with concrete anchors and integral neoprene gasket strip.

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- 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; 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

2.8 HATCH SAFETY NET

- A. General:
 - 1. Conforms to ASSE A10.11 and OSHA CFR Part 1926.105.
 - 2. Size to fit hatch opening where indicated.
- B. Components and Accessories:
 - 1. Rails and Slide Rings: Aluminum 6061-T6 extruded rails and aluminum-alloy 713.0 slide rings.
 - 2. Corner Hooks and Eyebolts: AISI Type 316 stainless steel.

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3. Netting: Polyester, 5-inch by 5-inch net openings; 5,000 pounds minimum breaking strength.
 4. Bolts, Nuts, and Concrete Anchors: AISI Type 316 stainless steel.
- C. Manufacturer and Product: Safe Approach Inc., Auburn, ME; Hatch Net 121. Or approved equal

2.9 HINGED MANHOLE COVERS – NOT USED

2.10 LADDERS

- A. Fabricate ladders with rails, rungs, landings, and cages to meet applicable requirements of OSHA, CFR Part 1910.27, and ALI A14.3.
1. Design ladder for concentrated load of 200 pounds imposed by user concentrated at points that will cause maximum stress in structural member being considered.
 2. Include weight of ladder and attached appurtenances together with live load in design of rails and fastenings.
 3. Self-closing gates at landings.
- B. Flat Bar Ladder:
1. Punch rails, pass rungs through rails, and weld on outside.
 2. Weld brackets to ladder for fastening ladder to wall.
 3. **Hot-dip galvanize steel after fabrication in accordance with ASTM A123/A123M and ASTM A385/A385M.**
- C. Ladder Safety Post:
1. Telescoping tubular, spring balanced and automatically locking in raised position, with release lever for unlocking.
 2. Post: **Hot-dip galvanized steel in accordance with ASTM A123/A123M.**
 3. Hardware: Stainless steel, AISI Type 316.
 4. Furnish dissimilar metal protective coatings at connections.
 5. Manufacturer and Product: Bilco Co., New Haven, CT; “Ladder Up” to fit ladder rungs. Or approved equal

2.11 SAFETY CLIMB DEVICE

- A. General:
1. Conforms to ALI A14.3 and OSHA CFR Part 1910.27.
 2. Belt and harness shall withstand minimum drop test of 250 pounds in 6-foot free fall.
 3. Fall Prevention System Material: Hot-dip galvanized steel in accordance with ASTM A123/A123M.

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B. Components and Accessories:

1. Main Components: Sleeve or trolley, safety harness, and carrier or climbing rail.
2. Ladder rung clamps with hot-dip galvanized steel mounting brackets and hardware.
3. Removable extension kit with tiedown rod or trolley gate, mandrel, and carrier rail for ladders under manholes and hatches.

C. Manufacturers and Products:

1. Miller by Honeywell, Franklin, PA; Miller Saf-T-Climb.
2. TS Products, Cambridge, Ontario, Canada; TS Safety Rail System.
3. Or approved equal

2.12 FALL ARREST ANCHORS

A. General:

1. Conforms to OSHA CFR Part 1926.502.
2. Minimum Breaking Strength: 5,000 pounds.
3. Material: Stainless steel, AISI Type 304.

B. Components and Accessories:

1. Forged combination eye and base assembly with headed anchor bolt, backer plate, lock washer, and nut.
2. Suitable for embedment in concrete wall.

C. Manufacturers and Products:

1. Thaler Metal Industries, Buffalo, NY; FARA Wall Anchor.
2. Rose Manufacturing Company, Pittsburgh, PA; Anchorage Connector.
3. Or approved equal

2.13 FABRICATED UNITS

2.14 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:

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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: Monmouth Rubber and Plastics Corporation, Long Branch, NJ; Durafoam DK1111LD. Or approved equal

2.15 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.

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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 exterior conditions. 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.

2.16 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.

PART 3 - EXECUTION

3.1 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 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.
 - 2. Provide center flange for water stoppage on sleeves in exterior or water-bearing walls.
 - 3. Provide rubber caulking sealant or a modular mechanical unit to form watertight seal in annular space between pipes and sleeves.
- D. Steel Lintels and Shelf Angles: Provide as required for support of construction not attached to structural steel framing, unless otherwise shown on Drawings.

3.2 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.

3.3 ACCESS COVERS

- A. Install access covers, including floor hatches, in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor 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.

3.4 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.

3.5 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, 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.
- 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.

3.6 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.

3.7 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance:
1. In accordance with CBC 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.

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3.8 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	
Exterior and Interior Wet Areas	Stainless steel (Type 316) headed anchor bolts	
Submerged and Corrosive Areas	Stainless steel (Type 316) 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 (Type 316) 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.

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Service Use and Location	Product	Remarks
5. Connections for Steel Fabrications and Wood Components		
Exterior and Interior Wet and Dry Areas	Stainless steel (Type 316) bolted connections	
6. Connections of Aluminum Components		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel (Type 316) bolted connections, unless otherwise specified with equipment	
7. All Others		
Exterior and Interior Wet and Dry Areas	Stainless steel (Type 316) fasteners	

B. Antiseizing Lubricant: Use on stainless steel threads.

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 06 82 00

FIBERGLASS REINFORCED PLASTIC (FRP) FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiberglass reinforced plastic (FRP) fabrications including but not limited to:
 - a. Grating.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 - Procurement and Contracting Requirements.
 - 2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 - 3. Building code:
 - a. California Building Code (CBC):
 - 1) California Building Code and associated standards 2019- Edition including all amendments, referred to herein as Building Code.

1.3 DEFINITIONS

- A. Skid-resistant:
 - 1. Manufacturer's standard applied abrasive grit coating.
 - 2. Abrasive coated tape is not acceptable.
- B. FRP: Fiberglass Reinforced Plastic.

1.4 SYSTEM DESCRIPTION

- A. All fiberglass reinforced plastic support systems shall be designed by a registered professional structural engineer licensed in the State of California.

1.5 SUBMITTALS

- A. Shop Drawings:

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1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations on reinforcing field cut openings.
 3. Fabrication and/or layout drawings.
 - a. Plan showing profile, location, section and details of each item including anchorage or support system(s).
 - b. Locations and type of joints.
 - c. Materials of construction including shop applied coatings.
 - d. Listing of all accessory items being provided indicating material, finish, etc.
 4. Certifications:
 - a. Certification of Structural Engineer's qualifications.
 - b. Certification that all components and systems have been designed and fabricated to meet the loading requirements specified.
 5. Manufacturer's full line of colors available for each component.
- B. Informational Submittals:
1. Complete design calculations of all supporting structure and fastening conditions.
 - a. Design calculations signed and sealed by professional structural engineer (to be for information only).
 - b. Engineer will not review or take any action on submittal.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle each item to preclude damage.
- B. Store all items on skids above ground.
 1. Keep free of dirt and other foreign matter which will damage items or finish and protect from corrosion and UV exposure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Grating:

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- a. American Grating.
- b. Enduro Composite Systems.
- c. Fibergrate Composite Structures, Inc.
- d. IKG Industries.
- e. International Grating Inc.
- f. Mona Composites.
- g. Seasafe, Inc.
- h. Strongwell.
- i. Or approved equal

B. Submit request for substitution in accordance with Specification Section 01 33 00.

2.2 MATERIALS

A. Fiberglass Reinforced Plastic (FRP):

1. Vinyl ester with fiberglass reinforcing.
 - a. Type V.
2. Fire retardant.
 - a. Flame spread: ASTM E84, 25 or less.
3. Color: To be selected by Engineer when more than one (1) color is available for any one (1) component.

B. Fasteners, Clips, Saddles, and Miscellaneous Components:

1. 316 Stainless steel.

C. Adhesive: Recommended by manufacturer.

D. Skid-resistant Surfacing: Manufacturer-applied abrasive grit coating.

2.3 FABRICATION

A. General:

1. Verify field conditions and dimensions prior to fabrication.
2. Preassemble items in shop to greatest extent possible.
3. All components shall be treated with UV inhibitor.
4. Drill or punch holes with smooth edges.

B. Grating and Solid Plate Material:

1. Design live load:
 - a. 100 PSF uniform live load.
 - b. 300 LBS concentrated load.
 - c. Maximum deflection of 1/300 of span under a superimposed live load.

FIBERGLASS REINFORCED PLASTIC (FRP) FABRICATIONS

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- d. Design for the most severe loading condition noted above.
 2. Minimum grating depth: 1-1/2 IN.
 3. Bar span: Maximum of 1-1/2 IN center to center.
 4. Walking surface: Manufacturer's standard applied abrasive grit coating.
- C. Embedded Grating Supports:
1. Fiberglass.
 2. Size to suit depth of grating.
 3. Provide leg or strap for embedding and anchoring into concrete.
 4. Similar to Strongwell "Duradek Fiberglass Curb Angle."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Set work accurately in location, alignment and elevation, plumb, level, and true.
 1. Measure from established lines and levels.
 2. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
 3. Tolerances:
 - a. Maximum variation from plumb in vertical line: 1/8 IN in 3 FT.
 - b. Maximum variation from level of horizontal line: 1/4 IN in 20 FT.
 - c. Maximum variation from plan location: 1/4 IN in 20 FT.
- C. Coat all exposed surfaces of stainless steel fasteners with minimum 15 MIL gel coating to match component being anchored.
- D. Fasten railings to beams and stair stringers with stainless steel bolts, nuts and washers.
 1. Provide two (2) washers for each bolt.
- E. Attach grating to each end and intermediate support clip or saddle with bolts, nuts and washers.
 1. Maximum spacing: 2 FT OC with minimum of two (2) per side.
 2. Attach clips or saddles to bearing bars only.
 3. Reinforce all field cut openings in accordance with manufacturer's recommendations.
- F. Attach stair treads at ends to stair stringer with hold-down clips, bolts, nuts, and washers.
 1. Minimum two (2) clips per end.

FIBERGLASS REINFORCED PLASTIC (FRP) FABRICATIONS

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- G. File cut ends of all fiberglass to a 1/32 IN radius.
- H. Seal cut ends of all items with catalyzed resin as recommended by manufacturer.
 - 1. Provide same resin used in fabrication of item as a minimum.
- I. Provide all modular framing components as required to suit condition.
 - 1. Install in accordance with manufacturer's recommendations.

END OF SECTION

FIBERGLASS REINFORCED PLASTIC (FRP) FABRICATIONS

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 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.

1.2 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.
- B. Informational Submittals:
 - 1. Sealant product information and Installation instructions.
 - 2. Documentation showing applicator qualifications.
 - 3. Manufacturer's Certificate of Compliance, in accordance with Section A: 01 61 00, Common Product Requirements.
 - 4. Special guarantee.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Experience in installing sealants in projects of similar scope.

1.4 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.

1.5 SPECIAL GUARANTEE

- A. Product: Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall

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provide for correction or, at the option of the Owner, removal and replacement of Work specified in this section found defective during a period of 5 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: No adhesive or cohesive failure of sealant.
- C. Sealed Joints: Watertight and weathertight with normal usage.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- A. Characteristics:
 - 1. Uniform, homogeneous.
 - 2. Free from lumps, skins, and coarse particles when mixed.
 - 3. Non-staining, nonbleeding.
 - 4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
 - 5. Immersible may be substituted for non-immersible.
- B. Color: As selected by Architect from manufacturer's full range.
- C. Type 1—Silicone, Non-sag, Non-immersible:
 - 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 without swelling.
 - 3. Manufacturers and Products:
 - a. BASF; Sonneborn, SL-2.
 - b. Pecora Corp.; Urexspan NR-200.
 - c. Tremco; THC-900/901.

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- d. Sika Chemical Corp.; Sikaflex 2c SL.
 - e. Or approved equal
- E. Type 3—Multipart Polyurethane, Non-sag, Immersible:
- 1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
 - 2. Capable of being continuously immersed in water without swelling.
 - 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, Non-sag, Non-immersible:
- 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 without swelling.
 - 3. Manufacturers and Products for Non-sag:
 - 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.

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- d. Or approved equal
- H. Type 6—One-Part Polyurethane, Non-immersible:
 - 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 7—Multipart Polysulfide, Immersible:
 - 1. Polysulfide base, two-component, chemical curing; ASTM C920, Type M, Grade P or NS, Class 25.
 - 2. Capable of being continuously immersed in water without swelling.
 - 3. Manufacturers and Products:
 - a. W. R. Meadows; Deck-O-Seal Gun Grade, two-part.
 - b. BASF; Sonolastic, two-part Polysulfde.
 - c. Or approved equal
- J. Type 8—One-Part Polysulfide, Nonsag, Non-immersible:
 - 1. Polysulfide base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 12 1/2.
 - 2. Capable of withstanding movement up to 20 percent of joint width.
 - 3. Manufacturer and Product: W. R. Meadows; Deck-O-Seal, one-part. Or approved equal
- K. Type 9—One-Part Acrylic Terpolymer, Non-sag, Non-immersible:
 - 1. Acrylic base, single-component, solvent curing; ASTM C834 non-sag.
 - 2. Capable of withstanding movement up to 7.5 percent of joint width; Shore “A” hardness of 55 maximum.
 - 3. Manufacturer and Product: Tremco; Mono 555. Or approved equal
- L. Type 10—Sanitary Sealant:
 - 1. Silicone sealant similar to Type 1, above, formulated to resist mold growth and repeated exposure to high humidity while retaining adhesion, flexibility, and color.
 - 2. Manufacturers and Products:
 - a. Dow Corning; 786.
 - b. General Electric; Sanitary Sealant SCS1700.

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- c. Or approved equal
- M. Type 11—Fire Penetration Seal:
 - 1. Manufacturers and Products:
 - a. 3M Corp.; Fire Barrier Caulk CP25 and Putty 303.
 - b. General Electric; Pensil Sealant or Foam.
 - c. Unifrax Corporation; Fyre Putty.
 - d. Hilti USA; CP 604.
 - e. Or approved equal
- N. Type 12—One-Part Polycarbonate, Immersible:
 - 1. Polycarbonate base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
 - 2. Capable of being continuously immersed in water.
 - 3. Manufacturer and Product: Pro-Seal Products, Inc.; Pro-Seal 34. Or approved equal
- O. 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

2.2 BACKUP MATERIAL

- A. Non-gassing, 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.

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- 4. Or approved equal

2.3 ANCILLARY MATERIALS

- A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Primer: Non-staining type recommended by sealant manufacturer to suit application.

2.4 PREFORMED SEALS

- A. Preformed Compressible Joint Seals:
 - 1. Widths Up to 5 Inches:
 - a. BASF, Watson Bowman Acme Div.; Wabo Weatherseal II.
 - b. Emseal Joint Systems Limited; Colorseal.
 - c. LymTal International; Iso-flex Joint System.
 - 2. Other Widths: Series or model recommended by seal manufacturer. Or approved equal

PART 3 - EXECUTION

3.1 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 non-sag (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, 6, 7, 8, 9, 10, or 12
Less than 2"	1, 2, 3, 4, or 7
Over 2"	Follow manufacturer’s recommendation

3.2 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.

3.3 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.

3.4 PREFORMED SEALS

- A. Prepare joint surfaces clean and dry, free from oil, rust, laitance, and other foreign material.
- B. Construct joints straight and parallel to each other and at proper width and depth.
- C. Apply joint sealant manufacturer's approved primer and adhesive in accordance with manufacturer's instructions.

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D. Install seal in accordance with manufacturer’s instructions.

3.5 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.

3.6 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 below grade portions of structures)	1, 3, 4, 5, 6, 7, 12
Concrete Floor Slabs (except for water-holding Structures)	2, 5
Slabs Subject to Vehicle and Pedestrian Traffic	2, 5
Masonry Walls	1, 3, 4, 5, 6, 7, 12, 13
Exterior Insulation and Finish System	4
Material Joints At:	
Metal Door, Window, and Louver Frames (Exterior)	1, 5, 6, 8, 12
Metal Door, Window, and Louver Frames (Interior)	1, 5, 6, 8, 9
Wall Penetrations (Exterior)	1, 5, 6, 8, 12
Wall Penetrations (Interior)	1, 5, 6, 8
Floor Penetrations	5, 6, 7
Ceiling Penetrations	1, 3, 4, 5, 6, 7
Roof Penetrations	5
Sheet Metal Flashings	5, 13
Other Joints:	
Threshold Sealant Bed	5
Around Plumbing Fixtures	10
Openings Around Pipes, Conduits, and Ducts Through Fire-Rated Construction	11
Concrete Form Snap-Tie Holes	1, 4, 5

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 - GENERAL

1.1 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.

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- k. SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
- l. SP 13, Surface Preparation of Concrete.
- m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.2 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. PDS: 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.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Data Sheets:
 - 1) For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS 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.

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- 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
 - b. Detailed chemical and gradation analysis for each proposed abrasive material.
- B. Informational Submittals:
1. Applicator's Qualification: List of references substantiating experience.
 2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
 3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
 4. Manufacturer's written verification that submitted material is suitable for the intended use.
 5. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
 6. Manufacturer's written instructions and special details for applying each type of paint.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Experience in 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.

1.5 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.
- B. Storage:
1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.

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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.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
 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.

PART 2 - PRODUCTS

2.1 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.
- B. Experience in manufacture of specified product.
- C. Each of the following manufacturers is capable of supplying most of the products specified herein:
 1. Frazee Paint Company
 2. ICI Dulux Paints
 3. Sherwin Williams Co. (Sherwin Williams)
 4. Vista Paint Corporation (Vista Paints)
 5. Tnemic

2.2 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.

2.3 PAINT MATERIALS

- A. General:
 1. 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 and to existing paint and existing coatings.
 3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

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B. Products:

Product	Definition
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 Epoxy Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish

2.4 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.

2.5 SHOP FINISHES

A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.

B. Surface Preparation: Provide Engineer 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.

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2. Where manufacturer's standard coating is not suitable for intended service condition, 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. Steel Pipe:
 - a. Surface preparation and application of primer 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.
 2. Prepare using each component as packaged by paint manufacturer.
- E. Pumps:
1. Vertical Turbine Pumps:
 - a. Surface preparation, application of primer, finish paint and epoxy shall be performed in accordance with Specification 43 01 20 Vertical Turbine Pump Rehabilitation.
 2. Pump Barrels:
 - a. Surface preparation, application of primer, finish paint and epoxy shall be performed in accordance with Specification 43 01 20 Vertical Turbine Pump Rehabilitation and Specification 43 01 40 Pump Barrel Inspection and Rehabilitation.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Engineer, unless Engineer grants prior approval to perform the Work in Engineer's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

3.2 EXAMINATION

- A. Factory Finished Items:
 1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.

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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.

3.3 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.

3.4 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 equivalent.
 2. Surface with chloride levels exceeding 3 $\mu\text{g}/\text{square centimeter}$ for submerged surfaces and 5 $\mu\text{g}/\text{square centimeter}$ for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR*RID (CHLOR*RID International, Chandler, AZ). Or approved equal.
 3. Follow manufacturer's recommendations and procedures for the use of this product to remove the surface contamination.
- C. Metal Surface Preparation:
 1. Where indicated, meet requirements of SSPC Specifications summarized below:

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- 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

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with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).

2. 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.
3. 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.
4. Hand tool clean areas that cannot be cleaned by power tool cleaning.
5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
6. 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.
7. 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.
8. 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.

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- 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.
9. 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.
- E. Plastic and FRP Surface Preparation:
- 1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
 - 2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.
- F. Existing Painted Surfaces to be Repainted Surface Preparation:
- 1. Test and verify compatibility of exiting paint with manufacturer recommended paint.
 - 2. Detergent wash and freshwater rinse.
 - 3. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
 - 4. Feather surrounding intact coating.
 - 5. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
 - 6. Apply one full finish coat of specified primer to entire surface.
 - 7. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.

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8. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

3.5 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. Engineer 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. Acid Etching:

1. After precleaning, spread the following solution by brush or plastic sprinkling can: One part commercial muriatic acid reduced by two parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
 - a. Rate: Approximately 2 gallons per 100 square feet.
 - b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
 - c. Acid will react vigorously for a few minutes, during which time brushing shall be continued.
 - d. After bubbling subsides (10 minutes), hose down remaining slurry with high pressure clean water.
 - e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
 - f. Thoroughly rinse to remove any residual acid surface condition that may impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching to obtain a “grit sandpaper” surface profile. If not, repeat treatment.

C. Solvent Cleaning:

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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.

3.6 APPLICATION

A. General:

1. The intention of these Specifications is for new, interior and exterior masonry, concrete, and 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.
2. 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.
3. 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.
4. 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.
5. Sand wood lightly between coats to achieve required finish.
6. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
7. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
8. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
9. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
10. Keep paint materials sealed when not in use.
11. 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. Film Thickness and Coverage:

1. Number of Coats:
 - a. Minimum required without regard to coating thickness.

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- 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 Engineer 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.

3.7 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 Engineer before starting work in question.
- B. System No. 5 Exposed Metal—Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 2 or SP 3, Hand Tool Cleaning or Power Tool Cleaning	Epoxy Primer— Ferrous Metal	Spot prime - 1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:

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- a. Exposed metal surfaces, located inside or outside of structures and exposed to weather or in a highly humid atmosphere and the following specific surfaces:
 - 1) Exterior of Exposed Metal Piping and Valves
 - 2) Pump Discharge Header
 - 3) Exterior exposed electrical conduits
 - 4) Exterior pump head
 - 5) Exterior pump motor

C. System No. 6 Exposed Metal—Atmospheric:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust-Inhibitive Primer	1 coat, 2 MDFT
	Alkyd Enamel	2 coats, 4 MDFT

- 1. Use on the following items or areas:
 - a. Exposed metal surfaces, located inside or outside of structures or exposed to weather, including metal doors and frames, vents, louvers, exterior metal ductwork, flashing, sheet metalwork and miscellaneous architectural metal trim, and the following specific surfaces:
 - 1) Electrical and instrumentation and control systems enclosures and cabinets for process.
 - b. Apply surface preparation and primer to surfaces prior to installation. Finish coats need only be applied to surfaces exposed after completion of construction.

D. 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. Galvanized surfaces requiring painting, and the following specific surfaces:
 - 1) Pipe supports

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2) As noted on the drawings

b. After application of System No. 10, apply finish coats as required for exposure.

E. 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.

F. 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, 7 MDFT

1. For steel pipe and fittings, meet all requirements of AWWA C213.

2. Use on the following items:

a. Pump Barrel, interior, exterior submerged, and interior pump head

3.8 COLORS

A. All colors shall match existing colors found on pumps, pipes, appurtenances and supports.

3.9 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 electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, 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 spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

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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. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
- b. 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.
- c. 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.
- d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

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. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.10 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. To field test and verify the compatibility between existing paint and coatings with the recommended new paint and coating system.
 - 2. On first day of application of any coating system.
 - 3. 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.
 - 4. As required to resolve field problems attributable to or associated with manufacturer’s product.
 - 5. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.11 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.

END OF SECTION

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PAINT SYSTEM DATA SHEET

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

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PAINT PRODUCT DATA SHEET

Complete and attach manufacturer’s Technical Data Sheet to this PDS 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.: _____

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SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Society of Mechanical Engineers (ASME): A13.1, Scheme for the Identification of Piping Systems.
 2. ASTM International (ASTM):
 - a. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - b. D709, Standard Specification for Laminated Thermosetting Materials.
 3. The Chlorine Institute, Inc.: WC-1, Wall Chart: Handling Chlorine Cylinders and Ton Containers.
 4. International Code Council (ICC):
 - a. A117.1, Accessible and Usable Buildings and Facilities.
 - b. International Fire Code (IFC): Chapter 27, Hazardous Materials-General Provisions.
 5. National Fire Protection Association (NFPA):
 - a. 704, Standard System for the Identification of the Hazards of Materials for Emergency Response.
 - b. HAZ-01, Fire Protection Guide to Hazardous Materials.
 6. Occupational Safety and Health Act (OSHA).
 7. U.S. Department of Transportation, Federal Highway Administration: Manual on Uniform Traffic Control Devices for Streets and Highways.

1.2 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Drawings showing layouts, actual letter sizes and styles, and Project-specific mounting details.
 - b. Manufacturer's literature showing letter sizes and styles, sign materials, and standard mounting details.
 2. Samples: One full size for each type of nameplate, sign, letter and label specified.
- B. Informational Submittals:

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1. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 GRAPHIC DISPLAY PANEL

- A. Design and Construction: As detailed on Drawings.
- B. Fabricate in accordance with reviewed Shop Drawings and Samples.

2.2 SIGN TYPES

- A. Plastic Sign (Type A):
 1. Exterior: Laminated plastic subsurface image type, 3/16 inch thick with high-gloss finish.
 2. Interior: Plastic, 1/8 inch thick with nondirectional matte finish and raised letters.
 3. Rounded corners.
- B. Metal Sign (Type B):
 1. Material: Baked enamel finished 20-gauge (minimum) steel or 18-gauge (minimum) aluminum signs.
 2. Manufacturers:
 - a. Seton Identification Products.
 - b. Nutheme Illustrated Safety Co.
- C. Fiberglass Sign (Type C):
 1. Material: Three-ply laminated fiberglass, minimum 1/8 inch thick, with contrasting color core message layer between two clear weather-resistant surface layers.
 2. Manufacturers:
 - a. Best Sign Systems.
 - b. Brady Signmark.
- D. Individual Letter and Number Signs (Type E): Cut aluminum, factory painted, for individual letter angle mounting. Provide aluminum plate tiebacks at each letter as recommended by manufacturer.
 1. Manufacturers:
 - a. Eder Metal Letter Co., Milwaukee, WI.
 - b. Spanjer Brothers, Inc., Chicago, IL.
 - c. Andco Industries Corp., Greensboro, NC.
 - d. Gemini Sign Products, Cannon Falls, MN.
 - e. Or approved equal

2.3 IDENTIFICATION LABELS

A. Pipe Labels:

1. Labels: Self-adhesive tape, with separate directional flow arrow banding tape.
2. Material: Pressure sensitive vinyl.
3. Letters and Arrows: Black on OSHA safety yellow background.
4. Color Field and Letter Height: ASME A13.1.
5. Message: Fluid Type.
6. Manufacturers and Products:
 - a. Brady Signmark; B-946 Self-Sticking Vinyl Pipe Markers and Directional Flow Arrow Tape.
 - b. Seton Identification Products; Opti-Code Markers and Arrows-On-A-Roll Tape.
 - c. Or approved equal

B. Equipment Labels:

1. Applies to equipment with assigned tag numbers, where specified.
2. Letters: White engraved, 3/4 inch minimum high.
3. Background: Black.
4. Materials:
 - a. Rigid laminate.
 - b. Multi-layered acrylic.
5. Furnish 1-inch margin with holes at each end of label, for mounting. On fiberglass labels, furnish grommets at each hole.
6. Size:
 - a. 2 inches minimum and 3 inches maximum high, by 14 inches minimum and 18 inches maximum long.
 - b. Furnish same size base dimensions for all labels.
7. Message: Equipment names and tag numbers as used in sections where equipment is specified.
8. Manufacturers:
 - a. Brady Signmark.
 - b. Seton Identification Products.
 - c. Or approved equal

2.4 ANCILLARY MATERIALS

- A. Fasteners: Stainless steel screws or bolts of appropriate sizes.
- B. Wood Posts: Preservative treated 4 by 4 wood as specified in Section 06 10 00, Rough Carpentry.
- C. Pipe Posts: 2-1/2-inch galvanized steel pipe meeting ASTM A53/A53M, Type S, Grade B.
- D. Chain: Type 304 stainless steel, No. 16 single jack chain or No. 2 double loop coil chain.
- E. Manufacturer's standard brackets for wall mounting of two-sided exit signs.
- F. Backer plates of same material as sign for signage mounted on glazing.
- G. Double sided foam tape adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION—GENERAL

- A. In accordance with manufacturer's recommendations.
- B. Mount securely, plumb, and level.

3.2 IDENTIFICATION LABELS

- A. Pipe Labels:
 - 1. Locate at connections to equipment, valves, or branching fittings at wall boundaries.
 - 2. At intervals along piping not greater than 18 feet on center with at least one label applied to each exposed horizontal and vertical run of pipe.
 - 3. At exposed piping not normally in view, such as above suspended ceilings and in closets and cabinets.
 - 4. Supplementary Labels: Provide to Owner those listed on Piping Schedule that do not receive arrows.
 - 5. Apply to pipe after painting in vicinity is complete, or as approved by Engineer.
 - 6. Install in accordance with manufacturer's instructions.
- B. Equipment Labels:
 - 1. Locate and install on equipment or concrete equipment base as shown on Drawings.
 - 2. Anchor to equipment or base for easy removal and replacement with ordinary hand tools.

3.3 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is a part of this specification.

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1. Sign Schedule: Tabulation of characteristics and mounting information for warning, informational and unlighted exit signs on Project. Provide items as scheduled. Meet requirements of Occupational Safety and Health Act (OSHA).

END OF SECTION

SECTION 23 09 00

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install an electric/electronic system of automatic temperature controls complete with all appurtenances.
- B. Equipment Coordination: To ensure that all the equipment is properly coordinated and will function in accordance with the requirements of the Contract Documents, the CONTRACTOR shall obtain all the equipment specified herein from a single supplier in whom shall be vested unit responsibility for the proper function of the complete system. However, the CONTRACTOR shall retain ultimate responsibility under this Contract for equipment coordination, installation, operation and guarantee, and the CONTRACTOR shall furnish and install all labor, equipment, materials, appurtenances, specialty items and services not provided by the supplier but required for a complete and operable system. The equipment covered by this specification is intended to be standard equipment of proven ability as manufactured by reputable concerns having extensive experience in the production of such equipment. The equipment furnished shall be manufactured and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed as shown and specified in the Contract Documents.
- C. General:
 - 1. Descriptions contained hereinafter are for guidance and to show the functions desired. They do not describe or specify all components required to interface equipment. All parts and equipment necessary to meet functional requirements shall be provided.
 - 2. The control system manufacturer shall be completely responsible for the proper operation and functions of all control systems herein specified. He shall be responsible for coordination of all interfaces with other contractors to achieve the required control operation.
- D. Related work specified elsewhere that shall apply to all equipment, materials, labor and services furnished under this section shall include, but not be limited to, the following:
 - 1. Section 23 81 26 Split System- Air Conditioner.
 - 2. Section 23 31 13 Metal Ducts and Accessories.
- E. Items Furnished Under this Section or as otherwise Coordinated by the CONTRACTOR:
 - 1. All wiring from HVAC units, fans, and thermostat.

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2. Thermostats, temperature controllers, outdoor reset controls including mounting accessories, junction boxes, face plates, wall plates, mounting hardware, etc., as required.
3. Power disconnect switches where specified or required.
4. Control panels.
5. Minimum position switches.
6. All interlock wiring unless indicated.

1.2 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Manufacturer shall have experience in producing substantially similar equipment and shall show evidence of installations in satisfactory operation.
- B. **Requirements of Regulatory Agencies:** Comply with applicable provisions of regulatory agencies below and others having jurisdiction.
 1. Underwriters' Laboratories, Incorporated.
 2. National Fire Protection Association.
 3. Local and State Building Codes and Ordinances.
 - a. Uniform Building Code.
 - b. Uniform Mechanical Code.
 4. State of California Title 24 Requirements.
- C. **Reference Standards:** Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
 1. National Electric Code (NEC).
 2. Standards of National Electric Manufacturers Association (NEMA).
 3. Institute of Electrical and Electronic Engineers (IEEE).
 4. Instrument Society of America (ISAL).
 5. Joint Industrial Council (JIC).
- D. **Required Manufacturers Services:**
 1. Furnish a qualified representative of the manufacturer to supervise or perform the following services:
 - a. Installation of the various control systems specified under this Section.
 - b. Initial startup of the various systems.
 - c. Placing the systems in fully automatic operation.
 - d. Final testing of the control systems.

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

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1.3 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
 - 1. All items or equipment furnished under this Section.
 - 2. Control Schematics shall conform to JIC standards. Complete control schematic and point to point internal (panel) and external wiring diagrams. Separate control schematic shall be provided for each panel.
 - 3. Manufacturer's literature, illustrations, Specifications and engineering data, catalog cuts.
 - 4. Sequence of operation description.
- B. Operation and Maintenance Data:
 - 1. Furnish Operation and Maintenance Data, all items of equipment furnished under this Section. The manual shall include maintenance instructions, copies of approved shop and installation drawings for all equipment and manufacturer's recommended lubricant and spare parts lists.
- C. Manufacturer's Qualifications: Submit in accordance with part 1.2.B of this Section.

PART 2 - PRODUCTS

2.1 DESIGN CONDITIONS

- A. Manufacturer: Provide products of one of the following:
 - 1. Honeywell Incorporated.
 - 2. Or approved equal.

2.2 TEMPERATURE CONTROLLERS (Not used)

2.3 THERMOSTATS

- A. Type: Across the line.
 - 1. Heavy duty type.
 - 2. Integral thermometers.
 - 3. Adjustable set points.
 - 4. Contacts shall have proper ampere rating for intended use.
 - 5. With locking cover.
 - 6. 120 Vac, single phase, 60 Hz.
- B. Type: Two Position room thermostat.
 - 1. Thermostat Range:
 - a. Heating: 45°F to 75°F.
 - b. Cooling: 65°F to 105°F.

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2. 120 volts, single phase, 60 Hz
 3. Integral thermometers.
 4. Adjustable set points (dial window with internal adjustment).
 5. Contacts shall have proper ampere rating for intended use.
 6. With locking cover.
 7. Subbase to provide off-on-auto switching at thermostat.
 8. Plastic guard.
 9. Furnish all mounting accessories as required.
- C. Locking covers shall be provided for all thermostats furnished.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Thermostats shall be installed 5 feet above finished floor in place of the existing thermostats. Wall plates, face plates and mounting hardware shall be provided as required for a complete installation.
- B. Where thermostats must be located on exterior walls, provide an insulating mounting panel.
- C. Furnish and install all mounting accessories junction boxes, wall boxes wall plates as required for installation of all thermostats and smoke detectors.
- D. Provide and install all mounting hardware and accessories as required for all field installed devices.
- E. HVAC contractor shall provide all controls, electrical and instrumentation for a complete and operable system.

3.2 PERFORMANCE

- A. Sequence of system operation shall be as indicated on the control diagrams and/or as herein specified.
 1. MCC/ELECTRICAL ROOM:
 - a. MLPS FAN COIL UNIT-01 and MLPS- EF-2 shall operate in sequence with the following operations:
 - 1) Theromostat >70°F and < 80° F: MLPS –EF-2 ON Low Speed; MLPS FAN COIL UNIT-01 OFF
 - 2) Thermostat > 80°F- <90°F: MLPS FAN COIL UNIT-01 FAN ONLY ON and COOLING ON and MLPS-EF-02 OFF
 - 3) Thermostat > 90°F: MLPS FAN COIL UNIT-01 FAN & COOLING ON and MLPS-EF-02 ON High Speed

INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

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- 4) Below 70°F all equipment automatically stops
- 5) In manual mode, each ventilation component can be operated.

END OF SECTION

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SECTION 23 31 13

METAL DUCTS AND ASSESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install complete duct systems with all appurtenances required for proper operation.
- B. Equipment Coordination: To ensure that all the equipment is properly coordinated and will function in accordance with the requirements of the Contract Documents, the CONTRACTOR shall obtain all the equipment specified herein from a single supplier in whom shall be vested unit responsibility for the proper function of the complete system. However, the CONTRACTOR shall retain ultimate responsibility under this Contract for equipment coordination, installation, operation and guarantee, and the CONTRACTOR shall furnish and install all labor, equipment, materials, appurtenances, specialty items and services not provided by the supplier but required for a complete and operable system. The equipment covered by this specification is intended to be standard equipment of proven ability as manufactured by reputable concerns having extensive experience in the production of such equipment. The equipment furnished shall be manufactured and installed in accordance with the best practice and methods and shall operate satisfactorily when installed as shown and specified in the Contract Documents.
- C. Related work specified elsewhere that shall apply to all equipment, materials, labor and services furnished under this section shall include, but not be limited to, the following:
 - 1. Section 23 81 26, Split Systems- Air Conditioners.
 - 2. Section 23 09 00, Instrumentation and Control Devices for HVAC

1.2 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer shall have experience in the production of substantially similar equipment and shall show evidence of satisfactory operation in at least 5 installations.
- B. Requirements of Regulatory Agencies: Comply with the applicable provisions of regulatory agencies below and others having jurisdiction.
 - 1. Local and State Building Codes and Ordinances.
 - a. Uniform Building Code.
 - b. Uniform Mechanical Code.
 - c. Title 24 of the California Administrative Code.

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2. Underwriters' Laboratories, Incorporated.
 3. National Fire Protection Association.
- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified. Specific provisions of this Contract shall supersede the Standards in case of conflict:
1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
 2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
 - a. HVAC Duct Construction Standards.
- D. Field Measurements: Take field measurements where required prior to installation to ensure proper fitting of Work.

1.3 submittals

- A. Shop Drawings: Submit for approval the following:
1. 1/4-inch scale duct layouts.
 2. Dimensions with field measurements required per Paragraph 1.2.D of this Section.
 3. Details of construction.
 4. Details of installation.
 5. Manufacturer's literature, illustrations, specifications and engineering data.
 6. Accessories.
 7. Registers, grilles and diffusers.
 8. Other technical data related to the specified material and equipment as requested by Engineer.
 9. Duct sealants.
 10. Deviations from Contract Documents.
 11. Gravity intake louver
- B. Test Reports: Submit the following test reports for approval where required.
1. HVAC Systems
- C. Manufacturer's Qualifications: In accordance with Part 1.2.A of this Section.

1.4 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Store equipment and materials so as to keep free from moisture, damage, and deterioration.

1.5 GENERAL REQUIREMENTS

- A. The Contract Drawings show the general arrangement and extent of work to be done, but the exact location and arrangement of all parts shall be determined as the work progresses, to conform in the best possible manner with its surroundings. The exact location of all parts of the work must be governed by the general building plans and the actual building conditions. Piping, equipment, ducts, etc. found to interfere with the construction of the building, plumbing apparatus and piping, electrical wiring or other obstructions, etc. shall be located to clear such obstructions. Connections shown to the various units are intended as an indication only. The actual connections shall be made and to best suit each particular case, provide for expansion, circulation and minimize the amount of space required.
- B. The Contract Drawings do not show all offsets, fittings, accessories and details which may be required. CONTRACTOR shall examine all of the General, Electrical, Mechanical, Structural and other Drawings and Specifications for conditions which may affect the installation of his work, and shall arrange his work accordingly. Provide all required items to complete the systems to the extent required by the Contract Documents.
- C. If piping or ductwork can be run to better advantage, CONTRACTOR, before proceeding with the Work, shall prepare and submit complete drawings showing all details of the proposed rearrangement for written approval.

PART 2 - PRODUCTS

2.1 DUCTWORK

- A. Materials:
 - 1. Galvanized Steel:
 - a. Supply air ductwork, exhaust air ductwork, plenums and all air conditioning units ductwork.
 - b. Do not use straps for hanging ductwork use steel rods with angles of the same material as the duct. Supports shall be designed in accordance with UBC or ANSI A58.1 for seismic zone.
- B. Construction: Conform to SMACNA (Sheetmetal and Air Conditioning Contractors' National Association, Inc.) Standards.
 - 1. All sheet metal duct, plenum and casing construction shall conform to the pressure classifications shown on the Contract Drawings and shall be in accordance with the construction details and installation details in the latest edition of the SMACNA HVAC Duct Construction Standards.
 - 2. Rectangular duct construction alternatives selected by the Contractor from HVAC DS tables and shall be identified by duct system and shall

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be submitted in schedule form to the contracting authority prior to beginning installation of ductwork.

3. Unless specified, all ductwork sheet metal thicknesses shall be as follows:
 - a. For ducts of larger dimensions up to 24 inches: 24 gage.
4. Hanger rods shall be minimum 3/8 inch for all ducts with half perimeter up to 72 inches, and 1/2 inch diameter for all ducts with half perimeter larger than 72 inches. A pair of rods shall be provided at each duct support point. Maximum hanger spacing shall be 8 feet for ducts with half perimeter up to 72 inches and 6 feet for ducts with half perimeter larger than 72 inches. Hanger Construction and installation shall conform to SMACNA Standards, except as specified.
5. Stiffener angles shall be steel of the following sizes and spaced as follows:
 - a. Ducts up to 42-in. in either direction, 1-1/2 x 1-1/2 x 1/8-in angles, 4-ft 0-in on centers.

C. Leakage:

1. Non-corrosive air systems not to exceed 7 percent.

D. Weatherproof Duct Gage: 16 gage regardless of size.

2.2 INTAKE GRAVITY LOUVER

A. Greenheck, PO Box 410, Schofield, Wisconsin 54476. Phone (715) 359-6171. Fax (715)355-2399. Website: www.greenheck.com- ESD-603

B. General:

1. Provide fixed and type louvers of size and design shown.
2. Heads, sills and jamb sections are to have formed caulking slots or be designed to retain caulking. Head sections are to have exterior drip lip, and sill sections an integral water stop.
3. Furnish louvers with sill extension or separate sill as shown.
4. Frame is to be mechanically fastened or welded construction with welds dressed smooth and flush.
5. Louver shall be provided with a mounted on the inside of the room a gravity back-draft damper to allow air into the room but not venting out through the fixed louver.
6. The ENGINEER will select the exterior color of the louver as part of the submittal process.

C. Performance Characteristics:

1. Weather louvers are to have a minimum of 60 percent free area and to have zero water penetration below 1025 fpm.

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2. Louvers are to bear AMCA certified rating seals for air performance and water penetration ratings.

D. Aluminum Louvers:

1. General: Frames, blades, sills and mullions (sliding interlocking type); 2 mm (0.081-inch) thick extruded 6063-T5 or -T52 aluminum. Blades to be drainable type and have reinforcing bosses.
2. Louvers, fixed: Make frame sizes 13 mm (1/2-inch) smaller than openings. Single louvers frames are not to exceed 1676 mm (66 inches) wide.
3. Louvers are to withstand the effects of gravity loads and the following wind loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors.
4. Screens: A 1/2 inch (13 mm) mesh, stainless steel metal screen with stainless steel frame shall be installed between the fixed louver and the back-draft damper.

2.3 Accessories

A. Splitter Dampers:

1. Reference: SMACNA Standards.
2. Manufacturer: Provide products of one of the following:
 - a. Hart and Cooley.
 - b. Titus.
 - c. Or approved equal.
 - d. Material: Aluminum.
 - e. Adjustment: Manual adjusting lever with locking device.

B. Balancing Dampers:

1. Reference: SMACNA Standards.
2. Manufacturer: Provide products of one of the following:
 - a. Honeywell.
 - b. Arrow United Industries, Incorporated.
 - c. Or approved equal.
3. Material: Same material as duct.
4. Blades: Opposed blades, key operated with vinyl edge seals.
5. Provide outside handle, quadrant, approved position indicator, locking device and linkage for manual operation or motorized operation.

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6. Performance:
 - a. Damper Leakage: Not more than 16 cfm per square foot at 4-inch W.G.
 - b. Certification: Manufacturer shall provide certified test data.
- C. Belt Guards:
 1. Reference: OSHA.
 2. Construction: Expanded hinged steel or hinged sheet steel for weather protection where required.
 3. Size: Fabricate guards to receive 2-inch larger pulleys without alteration to the guard.
 4. Trim openings at shafts for tachometer readings.
 5. Motor shaft opening to be slotted for belt adjustment.
 6. Secure guards to driven machine or foundation (not to motors).
- D. Sheet Metal Safing: Provide stainless steel sheet metal safing to close off and seal airtight all unused areas behind louvers.
- E. Flexible Connections: (For fan coil and filter housing units):
 1. Reference: SMACNA Standards.
 2. Material:
 - a. 3/16-inch thick, 6-inch wide fabric reinforced neoprene.
 - b. 0.080 gauge, 3-inch wide aluminum strip.
- F. Screens: 1/2 inch (13 mm) mesh, stainless steel metal screen with stainless steel frame.

2.4 Registers, Grilles And Diffusers

- A. Manufacturer: Provide equipment as manufactured by one of the following:
 1. Carnes.
 2. Hart and Cooley.
 3. Titus.
 4. Or equal.
- B. Supply Registers:
 1. Type: Horizontal front blades, double deflection individually adjustable with key-operated opposed blade damper behind.
 2. Construction:
 - a. Frame and Blades: Aluminum in aluminum and galvanized steel ducts.
- C. Supply Grilles:

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1. As specified above less key-operated opposed blade damper.
- D. Return Register:
 1. Type: Horizontal, straight, adjustable front blades, set at 45 degrees, single deflection with key-operated opposed blade damper behind to match supply register.
 2. Construction:
 - a. Frame and Blades:
 - 1) Stainless steel or anodized in stainless steel duct.
 - 2) Aluminum in aluminum and galvanized steel ducts.
- E. Return Grilles:
 1. As specified above for return registers less key-operated opposed blade damper.

2.5 PAINTING

- A. Inside portions of ductwork which are visible behind registers and/or grilles, etc., shall be painted with flat black enamel.
- B. Touch up marks and abrasions to match original finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All ductwork shall conform accurately to the dimensions shown, the ducts shall be straight and smooth inside with joints neatly finished; ductwork shall be installed so as to preclude the possibility of vibration under all operating conditions.
- B. Tape and seal all joints as per SMACNA Standards.
- C. Elbows shall have a minimum centerline radius of 1-1/2 times the width of the duct. Turning vanes shall be provided at all square elbows. Turning vanes shall be double wall and shall be quiet and free from vibration when the system is in operation.
- D. Provide flexible connections at inlet and discharge of air handling equipment.
- E. Test holes shall be provided at each duct connection to each air handling unit.
- F. Provide manual splitter dampers and volume dampers where indicated on the Contract Drawings and as required to facilitate accurate volume control. The duct of the damper shall be reinforced to prevent vibration.
- G. Provide access doors for all dampers for inspection and maintenance.
- H. Air volume extractors shall be provided where indicated on the Contract Drawings and at each supply register or small duct taps or where required for scooping or extracting air into the outlet or duct. The extractors shall have

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fully adjustable, gang operated curved blades controlled through an external manual adjustable device.

- I. Install all ductwork and accessories to provide a system free from buckling, warping breathing or vibration.
- J. Provide air filter gages (0-1"Water Column) for measuring the air differential pressure through filters at all filter sections and filter banks for all air handling units.
- K. All expansion joints and ducts shall be suitably supported at each end by support guides within 12 inches of joint.
- L. All ducts at flexible connections with air handling equipment, duct fans and scrubber exhaust fans shall be supported at free end within 12 inches of flexible connection.
- M. Provisions shall be made for supporting all ductwork, dampers, and other ductwork accessories, where necessary.
- N. Manually operated, opposed blade or single blade, quadrant-type volume dampers shall be provided in each branch duct take-off after leaving the main duct. Splitter dampers shall be provided only where shown or specified.
- O. Flexible connection joints shall be airtight and have a minimum allowance of 1-inch slack all around. Flexible connections shall be designed to be removed from the line and be reinstalled without disassembling adjacent ductwork. Connections shall be installed with a minimum 4-inch clearance between metal parts on fan connections, equipment connections, and air distribution devices.
- P. Collars attached to flexible duct shall be a minimum of 6 inches in length. Collars shall be inserted into flexible duct a minimum of 2 inches before fastening.
- Q. Flexible duct shall be secured to the collar using a draw band. If the collar exceeds 12 inches in diameter, the draw band shall be positioned behind a bead on the metal collar.
- R. Hanger or saddle material in contact with the flexible duct shall not be less than 3 inches wide.

3.2 ADJUSTMENT

- A. Set balancing control devices for approximate positions in preparation for final testing and balancing.
 - B. Start fan system and check for excessive leaks and vibration and correct.
- CLEANING
- C. Remove all loose materials and obstructions from interior of ducts.
 - D. Remove debris and waste materials resulting from installation.

END OF SECTION

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SECTION 23 81 26

SPLIT SYSTEMS- AIR CONDITIONER

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: CONTRACTOR shall provide all labor, materials, equipment and incidentals required to furnish and install air conditioning split system consisting of an air cooled condensing unit complete with compressor, condenser coil, fan, motor and a ceiling mounted, direct expansion refrigerant coil and air handling unit complete with all controls, piping and appurtenances required for proper operation and to comply with requirements as shown and specified.

1.2 REFERENCES:

- A. The following is a list of standards
1. Section 23 31 13, Metal Ducts and Accessories.
 2. Section 23 09 00, Instrumentation and Control Devices for HVAC

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer shall have experience in producing similar type equipment. Equipment shall be installed by a State of California Licensed CONTRACTOR, licensed in the appropriate specialty. Evidence must be provided of installations in satisfactory operation.
- B. Requirements of Regulatory Agencies: Comply with applicable provisions of regulatory agencies below and others having jurisdiction:
1. Permits: Not Required
 2. Local and State Building Codes and Ordinances:
 - a. Uniform Building Code.
 - b. Model Energy Code.
 - c. Title 24 Energy Conservation Regulations.
 3. Underwriters' Laboratories, Inc.
 4. National Fire Protection Agency.
 5. Air-Conditioning and Refrigeration Institute.
- C. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. Air Conditioning and Refrigeration Institute Standards No. 210 and 270.
 2. Underwriters' Laboratories Listed.
 3. American Standards for Testing and Materials (ASTM) B 75.

- D. Source Quality Control: Perform the following shop tests and inspections at the factory:
 - 1. Coils shall be pneumatically leak tested under water at 200 psig.
 - 2. Fan wheels and shafts shall be statically and dynamically balanced.
 - 3. Refrigeration system and controls shall be tested prior to shipment.

1.4 SUBMITTALS

- A. Shop Drawings: Submit for approval Shop Drawings showing the following:
 - 1. Dimensions and weight.
 - 2. Details of construction.
 - 3. Wiring and control diagrams.
 - 4. Manufacturer's literature, illustrations, specifications and engineering data.
 - 5. Other materials and equipment requested by the ENGINEER.
- B. Submit seismic calculations
- C. Operation and Maintenance Data: Submit complete manuals including:
 - 1. Copies of all Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.
 - 2. Furnish operation and maintenance manuals.
- D. Test Reports: Submit the following test certifications for approval.
 - 1. ARI Label.
 - 2. UL Label.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Material:
 - 1. Unit shall be protectively packed and crated to prevent any damage to unit.
 - 2. Manufacturer's recommendations for rigging of unit shall be complied with.
 - 3. Unit shall be structurally designed to withstand stresses of hoisting.
- B. Storage of Material:
 - 1. Store unit in a clean, dry area, out of the weather.
 - 2. Cap all pipe connections.
 - 3. Unit shall remain in original crate till time of actual installation.
 - 4. Unit shall be tightly covered to protect against dirt, water, mechanical injury or chemical damage.

1.6 JOB CONDITIONS

- A. Protection
 - 1. Wall penetrations shall be capped to prevent precipitation from entering building prior to installation of piping.

PART 2 - PRODUCTS**2.1 DESIGN CONDITIONS**

- A. Product and Manufacturer: Provide unit as manufactured by one of the following:
 - 1. Carrier
 - 2. Trane
 - 3. Or approved equal.
- B. Ambient Conditions: Capable of operating at rated capacities at 120°F.
- C. Capacity: (Refer to schedule on the Contract Drawings).

2.2 DETAILS OF CONSTRUCTION (CD-01; FC-01)

- A. Assembly:
 - 1. Unit shall be completely factory pre-assembled, pre-piped, and pre-wired; consisting of compressor, condenser coils, condenser fan and motor, refrigerant receiver, sight glass, charging valve, unit controls and a holding charge for refrigerant-410A. Unit shall be designed for outdoor mounting and shall have a minimum refrigerating capacity and characteristics as shown on the Contract Drawings. Units shall be provided with liquid lines, and insulated suction lines, pre-charged rigid copper refrigerant tubing of sufficient length to connect evaporator coil in the air handling unit.
- B. Casing:
 - 1. Casing shall be low silhouette type constructed of minimum 18 gage zinc coated steel; exterior surfaces phosphatized, painted with epoxy primer, and finished with baked on enamel. Supporting channel, fan and motor base and motor mount shall have a heavy zinc coating. Coil frame shall be minimum 12 gage zinc coated steel. Provide removable access panels for proper access to all controls and parts requiring maintenance. Provide for water drainage. Compressor shall mount in a separate compartment.
- C. Condenser Fan and Drive:
 - 1. Condenser fan and drive shall be axial flow propeller fan having zinc plated or aluminum statically and dynamically balanced blades and permanently lubricated ball bearing. Fan shall be powered by weatherproof, permanently lubricated ball bearing motor with weatherproof slingers, motors shall have built-in current and thermal overload protection; shafts ground and polished steel.

D. Refrigerant Compressor:

1. Compressor shall be direct-drive, 3,600 rpm, hermetic reciprocating or scroll compressor with centrifugal oil pump; two-point lubrication for each bearing and connecting rod; crankcase heater and well; high strength, ring-type suction and discharge valves; large gas passages and minimum clearance volumes; reversing valve and rubber-in- shear isolators.
2. Motor is suction gas-cooled and has a voltage utilization range of plus or minus 10 percent of nameplate voltage. Internal temperature and current-sensitive motor overloads protect compressors under loss of charge and other abnormal operating conditions.

E. Condensing Coil:

1. Condensing coil shall be designed specifically for air cooled condensing; constructed of 3/8-inch diameter seamless copper tubing and heavy-duty aluminum fins mechanically bonded to the tubes; factory tested at 425 psig air pressure under water and vacuum dehydrated at 175°F. Unit shall be provided with metal grilles for coil protection. Coils shall be coated with hersite protection system.

F. Controls:

1. Control box and controls shall be mounted on exterior of casing with controls directly accessible when access panel is removed; controls factory pre-wired complete with magnetic contactors for both compressor and condenser fan motors, reversing valves, three-phase compressor overload protection, high and low pressure cutouts, oil pressure switch and non-recycling pump-down control relay, crankcase heater relay, low ambient control, condenser fan interlock and anti-recycle timers for compressor, etc., as required. Control box shall be NEMA 4X.

G. Refrigerant Piping:

1. Refrigerant piping shall be as specified by the manufacturer.
2. Refrigerant piping insulation shall be as specified by the manufacturer.

H. Indoor Unit/Direct Expansion Coil:

1. Casing shall be of galvanized steel.
2. All coil capacities, pressure drops, leaving air temperature and selection procedures shall be certified in accordance with ARI Standard 410-74.
3. Coils shall be provided with insulated drain pan plumbed to a point of disposal.
4. Coils shall have same end connections.
5. Coils shall be supplied with refrigerant distributor circuited to meet required capacity.

6. Coils shall be proof-tested at 450 psig and leak tested at 300 psig air pressure under water. Each coil shall be cleaned, dehydrated and charged with dry nitrogen before shipment.
 7. Indoor unit shall be properly supported per UBC Seismic requirements.
- I. Motors:
1. Power supply for motors shall be 208 volts, 1 phase, 60 Hz. or 230 volts, 3 phase, 1 phase, 60 Hz. as noted on contract drawings and as field verified by Contractor. Electrical disconnects and ancillary controls shall be provided
- J. Indoor Air Handling Unit Air Filter:
1. The Fan Coil unit shall be provided with two stage filtration (coarse and fine filter inserts).
 2. Provide 4 replacement filters for each type and size.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine mounting pad to receive each unit for:
1. Horizontal/vertical mounting surfaces.
 2. Proper anchorage.
 3. Unevenness, irregularities, and incorrect dimensions that would affect quality and execution of installation.
- B. Examine piping, and electrical connections prior to installing unit for defects, errors, or omissions which would prevent installation of the unit.
- C. Examine unit at time of delivery for damaged or missing components.

3.2 INSTALLATION

- A. Rig units into place (outdoor and indoor units).
- B. Make final connections of piping and control wiring, as detailed on the Contract Drawings and approved Shop Drawings.

3.3 ADJUSTMENT AND CLEANING

- A. Remove all debris, waste material, and loose foreign matter from interior of unit prior to starting equipment.
- B. Clean tar, dirt or marks from exterior of units.
- C. Adjust all controls for proper settings.
- D. Adjust refrigeration suction and discharge pressures according to manufacturer's recommendations.

END OF SECTION

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SECTION 26 05 02

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 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.

1.2 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 (1000 Volts Maximum).
 - b. Z535.4, Product Safety Signs and Labels.
 - 3. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 - 4. Underwriters Laboratories, Inc. (UL).

1.3 ELECTRIC SERVICE DIVISION OF RESPONSIBILITY

- A. Incoming underground electrical service facilities provided by the SDG&E. Under this Contract provide customer required service provisions and electrical work including, but not limited to secondary duct system. The padmount transformer replacement and secondary conductors and metering equipment installation is by SDG&E.

1.4 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 Underwriters Laboratories Inc. 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.

1.5 ENVIRONMENTAL CONDITIONS

- A. The following areas are classified nonhazardous and wet. Use materials and methods required for such areas.
 - 1. Outdoor above grade areas not covered above.
 - 2. Below grade vaults.
- B. The following areas are classified as indoor and dry:
 - 1. Electrical Room.

PART 2 - PRODUCTS

2.1 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.

2.2 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 Engineer.

2.3 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: 1/4 inch.

2.4 SIGNS AND LABELS

- A. Sign size, lettering, and color shall be in accordance with NEMA Z535.4.

PART 3 - EXECUTION

3.1 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 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 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 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.

3.2 ANCHORING AND MOUNTING

- A. Equipment anchoring and mounting shall be in accordance with manufacturer's requirements for seismic zone criteria given in Section 01 61 00, Common Product Requirements.

3.3 COMBINING CIRCUITS INTO COMMON RACEWAY

- A. Drawings show each homerun circuit to be provided. Do not combine power or control circuits into common raceways without authorization of Engineer.
- B. 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 Engineer.

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- d. Raceways shall be sized per General Circuit and Raceway Schedule and do not exceed 40 percent fill.
 - 1) Changes shall be documented on record drawings.
- e. Discrete control circuits from devices in the same general area to the same destination.
 - 2) No power or analog control circuits shall be combined in same conduit with discrete circuits.
 - 3) 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.
- f. Raceways shall be sized per the General Circuit and Raceway Schedule and do not exceed 40 percent fill.
 - 1) Changes shall be documented on record drawings.
- g. Power circuits from loads in same general area to same source location (such as: panelboard, switchboard, low voltage motor control center).
- h. 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.
- i. 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.
 - 1) All Other Power Circuits: Do not combine power circuits without authorization of Engineer.

3.4 NAMEPLATES, SIGNS, AND LABELS

A. Arc Flash Protection Warning Signs:

- 1. Field mark switchgear, ATS and panelboards to warn qualified persons of potential arc-flash hazards. Locate marking so to be clearly visible to persons before working on energized equipment.
- 2. Use arc flash hazard boundary, energy level, PPE level and description, shock hazard, bolted fault current, and equipment name from study required in Section 26 05 70, Electrical Systems Analysis as basis for warning signs.

B. Equipment Nameplates:

- 1. Provide a nameplate to label electrical equipment including switchgear, switchboards, motor control centers, panelboards, motor starters,

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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.

3.5 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.

3.1 CLEANING AND TOUCHUP PAINTING

- D. Cleaning: Throughout the Work, clean interior and exterior of devices and equipment by removing debris and vacuuming.
- E. 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 Engineer.

3.6 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 Engineer.

END OF SECTION

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Miramar Reservoir Pump Station (MRPS) Improvement Project
Attachment E - Technicals

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SECTION 26 05 04

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 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. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - b. C12.1, Code for Electricity Metering.
 - c. ICS 2, Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
 - d. ICS 5, Industrial Control and Systems: Control Circuit and Pilot Devices.
 - e. KS 1, Enclosed and Miscellaneous Distribution Switches (600 Volts Maximum).
 3. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 4. 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. 943, Standard for Ground-Fault Circuit-Interrupters.
 - g. 1059, Standard for Terminal Blocks.

1.2 SUBMITTALS

- A. Action Submittals:
- B. Provide manufacturers' data for the following:

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1. Control devices.
 2. Control relays.
 3. Circuit breakers.
 4. Fused switches.
 5. Nonfused switches.
 6. Timers.
 7. Fuses.
 8. Magnetic contactors.
 9. Enclosures: Include enclosure data for products having enclosures.
- C. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.
- D. Informational Submittals: Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.

PART 2 - PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER THERMAL MAGNETIC, LOW VOLTAGE

- A. General:
- B. Type: Molded case.
- C. Trip Ratings: 15 amps to 800 amps.
- D. Voltage Ratings: 120, 240, 277, 480, and 600V ac.
- E. Suitable for mounting and operating in any position.
- F. UL 489.
- G. Operating Mechanism:
- H. Overcenter, trip-free, toggle type handle.
- I. Quick-make, quick-break action.
- J. Locking provisions for padlocking breaker in OPEN position.
- K. ON/OFF and TRIPPED indicating positions of operating handle.
- L. Operating handle to assume a CENTER position when tripped.
- M. Trip Mechanism:
- N. Individual permanent thermal and magnetic trip elements in each pole.
- O. Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
- P. Two and three pole, common trip.

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- Q. Automatically opens all poles when overcurrent occurs on one pole.
- R. Test button on cover.
- S. Calibrated for 40 degrees C ambient, unless shown otherwise.
- T. Do not provide single-pole circuit breakers with handle ties where multi-pole circuit breakers are shown.
- U. Short Circuit Interrupting Ratings:
- V. Equal to, or greater than, available fault current or interrupting rating shown.
- W. Series Connected Ratings: Do not apply series connected short circuit ratings.
- X. 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.
- Y. Connections:
- Z. Supply (line side) at either end.
- AA. Mechanical wire lugs, except crimp compression lugs where shown.
- BB. Lugs removable/replaceable for breaker frames greater than 100 amperes.
- CC. Suitable for 75 degrees C rated conductors without derating breaker or conductor ampacity.
- DD. Use bolted bus connections, except where bolt-on is not compatible with existing breaker provisions.

2.2 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:
- F. Mechanical lugs, except crimp compression lugs where shown.
- G. Lugs removable/replaceable.
- H. Suitable for 75 degrees C rated conductors at NEC 75 degrees C ampacity.
- I. Fuse Provisions:
- J. 30-amp to 600-amp rated shall incorporate rejection feature to reject all fuses except Class R.
- K. 601-amp rated and greater shall accept Class L fuses, unless otherwise shown.
- L. Enclosures: See Article Enclosures.

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- M. Interlock: Enclosure and switch to prevent opening cover with switch in ON position. Provide bypass feature for use by qualified personnel.

2.3 FUSE, 250-VOLT AND 600-VOLT

- A. Power Distribution, General:
- B. Current-limiting, with 200,000 ampere rms interrupting rating.
- C. Provide to fit mountings specified with switches.
- D. UL 248.
- E. Power Distribution, Ampere Ratings 1 Amp to 600 Amps:
- F. Class: RK-1.
- G. Type: Dual element, with time delay.
- H. Manufacturers and Products:
 - 1. Bussmann; Types LPS-RK (600 volts) and LPN-RK (250 volts).
 - 2. Littelfuse; Types LLS-RK (600 volts) and LLN-RK (250 volts).
 - 3. Or approved equal
- I. Power Distribution, Ampere Ratings 601 Amps to 6,000 Amps:
- J. Class: L.
- K. Double O-rings and silver links.
- L. Manufacturers and Products:
 - 1. Bussmann; Type KRP-C.
 - 2. Littelfuse, Inc.; Type KLPC.
 - 3. Or approved equal
- M. Cable Limiters:
- N. 600V or less; crimp to copper cable, bolt to bus or terminal pad.
- O. Manufacturer and Product: Bussmann; K Series. Or approved equal
- P. Ferrule:
- Q. 600V or less, rated for applied voltage, small dimension.
- R. Ampere Ratings: 1/10 amp to 30 amps.
- S. Dual-element time-delay, time-delay, or nontime-delay as required.
- T. Provide with blocks or holders as indicated and suitable for location and use.
- U. Manufacturers:
 - 1. Bussmann.
 - 2. Littlefuse, Inc.
 - 3. Or approved equal

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2.4 PUSHBUTTON, INDICATING LIGHT, AND SELECTORSWITCH

- 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:
- E. ON or START: Green.
- F. OFF or STOP: Red.
- G. Pushbutton and selector switch lockable in OFF position where indicated.
- H. Legend Plate:
- I. Material: Aluminum.
- J. Engraving: Enamel filled in high contrasting color.
- K. Text Arrangement: 11-character/spaces on one line, 14-character/spaces on each of two lines, as required, indicating specific function.
- L. Letter Height: 7/64 inch.
- M. Manufacturers and Products:
- N. Heavy-Duty, Oil-Tight Type:
 - 1. General Electric Co.; Type CR 104P.
 - 2. Square D Co.; Type T.
 - 3. Eaton/Cutler-Hammer; Type 10250T.
 - 4. Or approved equal
- O. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
 - 1. Square D Co.; Type SK.
 - 2. General Electric Co.; Type CR 104P.
 - 3. Eaton/Cutler-Hammer; Type E34.
 - 4. Crouse-Hinds; Type NCS.
 - 5. Or approved equal

2.5 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.

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- 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:
- I. Capable of wire connections without special preparation other than stripping.
- J. Capable of jumper installation with no loss of terminal or rail space.
- K. Individual, rail mounted.
- L. Marking system, allowing use of preprinted or field-marked tags.
- M. Manufacturers:
 - 1. Weidmuller, Inc.
 - 2. Ideal.
 - 3. Electrovert USA Corp.
 - 4. Or approved equal

2.6 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:
- D. Pneumatic type, timer adjustable as shown.
- E. Field convertible from ON delay to OFF delay and vice versa.
- F. Latching Attachment: Mechanical latch, having unlatching coil and coil clearing contacts.
- G. 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

2.7 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).

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- 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

2.8 ELAPSED TIME METER

- A. Drive: Synchronous motor.
- B. Range: 0 hour to 99,999.9 hours, nonresettype.
- 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

2.9 MAGNETIC CONTACTOR

- A. UL listed.
- B. Electrically operated, electrically held.
- C. Main Contacts:
- D. Power driven in one direction with mechanical spring dropout.
- E. Silver alloy with wiping action and arc quenchers.
- F. Continuous-duty, rated as shown.
- G. Poles: As shown.
- H. Control: As shown.
- I. Auxiliary Contacts: Quantity as shown, rated 7200VA make, 720VA break, at 600V, A600 per NEMA ICS 5.
- J. Enclosures: See Article Enclosures.
- K. 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

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2.10 SUPPORT AND FRAMING CHANNELS

- A. Carbon Steel Framing Channel:
- B. Material: Rolled, mild strip steel, 12-gauge minimum, ASTM A1011/A1011M, Grade 33.
- C. Finish: Hot-dip galvanized after fabrication.
- D. Paint Coated Framing Channel: Carbon steel framing channel with electro-deposited rust inhibiting acrylic or epoxy paint.
- E. PVC-Coated Framing Channel: Carbon steel framing channel with 40-mil polyvinyl chloride coating.
- F. Stainless Steel Framing Channel: Rolled, Type 316 stainless steel, 12-gauge minimum.
- G. Extruded Aluminum Framing Channel:
- H. Material: Extruded from Type 6063-T6 aluminum alloy.
- I. Fittings fabricated from Alloy 5052-H32.
- J. Nonmetallic Framing Channel:
- K. Material: Fire retardant, fiber reinforced vinyl ester resin.
- L. Channel fitting of same material as channel.
- M. Nuts and bolts of long glass fiber reinforced polyurethane.
- N. Manufacturers:
 - 1. B-Line Systems, Inc.
 - 2. Unistrut Corp.
 - 3. Or approved equal

2.11 UNINTERRUPTIBLE POWER SUPPLY SYSTEM(UPS)

- A. General:
- B. Function: Provides isolated, regulated uninterrupted ac output power during a complete or partial interruption of incoming line power.
- C. Type: Continuous-duty, online, double conversion, power isolated.
 - 1. Major Parts: Rectifier, inverter, battery charger, sealed batteries, bypass switch, AC circuit breakers, control and monitor electronics.
- D. Performance:
- E. Capacity: 1,350/1,500 watts/va minimum, unless otherwise shown on Drawings.
- F. Input Power:
 - 1. 120V ac single-phase, three-wire plus ground, 60-Hz, unless otherwise noted.
 - 2. Connections: Hardwired.

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- G. Output Power:
 - 1. 120V ac single-phase, plus ground, 60-Hz, unless otherwise noted.
 - 2. Connections: hardwired.
- H. Online Efficiency: 87 percent minimum, unless otherwise noted.
- I. Backup Runtime:
 - 1. Full Load: 30 minutes minimum, unless otherwise noted.
 - 2. Include battery extension module.
- J. Continuous no-break power with no measurable transfer time.
- K. Sine-Wave Output Voltage Total Harmonic Distortion (THD): Plus or minus 5 percent or less.
- L. Input Voltage Range: 120 vac plus or minus 10 percent.
- M. Output Voltage Regulation: Plus or minus 3 percent nominal.
- N. Operating Temperature: 0 degree C to 40 degrees C (32 degrees F to 104 degrees F).
- O. Operating Relative Humidity: 5 percent to 95 percent without condensation.
- P. Lightning and Surge Protection: Pass lightning standard IEEE C62.41, Categories A and B tests.
- Q. Features:
 - 1. Common Fail Signal Output: Provide 120V rated contact with closes upon any UPS failure.
 - 2. Ethernet connection.
- R. Enclosures: Tower mount.
- S. Manufacturer and Product: Eaton 9130 Tower UPS with extended battery module, or approved equal.

2.12 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.

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PART 3 - EXECUTION

3.1 GENERAL

- A. Install equipment in accordance with manufacturer's recommendations.

3.2 PUSHBUTTON, INDICATING LIGHT, AND SELECTORSWITCH

- 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.

3.3 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:
- D. Carbon Steel Channel: Zinc-rich primer.
- E. Painted Channel: Rust-inhibiting epoxy or acrylic paint.
- F. Nonmetallic Channel: Epoxy resin sealer.
- G. PVC-Coated Channel: PVC patch.

END OF SECTION

**SECTION 26 05 05
CONDUCTORS**

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. B3, Standard Specification for Soft or Annealed Copper Wire.
 - b. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - c. 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.
 3. National Electrical Manufacturers' Association (NEMA):
 - a. WC 70, Standard for Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

1.2 SUBMITTALS

- A. Action Submittals:
1. Product Data:
 - a. Wire and cable.
 - b. Wire and cable accessories.
 2. Manufactured Wire Systems:
 - a. Product data.
 - b. Rating information.
 - c. Dimensional drawings.
 - d. Special fittings.
 3. Cable Pulling Calculations:
 - a. Ensure submitted and reviewed before cable installation.
 - b. Provide for the following cable installations:
 - 1) Medium voltage cable runs that cannot be hand pulled.
 - 2) Multiconductor 600-volt cable sizes larger than 2 AWG that cannot be hand pulled.

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- 3) Power and control conductor, and control and instrumentation cable installations in ductbanks.
- 4) Feeder circuits; single conductors #4/0 and larger.

B. Informational Submittals:

1. Journeyman lineman or electrician splicing credentials.
2. Certified Factory Test Report for conductors 600 volts and below.

1.3 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 Underwriters Laboratories Inc. shall conform to those standards and shall have an applied UL listing mark.

PART 2 - PRODUCTS

2.1 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 XHHW-2.
- D. 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.

2.2 600-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.

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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, 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:
 - f. Okonite Co.
 - g. Alpha Wire Corp.
 - h. Belden.
 - i. Or approved equal
- C. Type 2, 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:
 - j. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
 - k. 20 AWG, seven-strand, tinned copper drain wire.
 - l. Insulation: 15-mil nominal PVC.

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- m. Jacket: 4-mil nylon.
- n. Color Code: Triad conductors black, red, and blue.
- 5. Manufacturers:
 - o. Okonite Co.
 - a. Alpha Wire Corp.
 - b. Belden.
 - c. Or approved equal

2.3 GROUNDING CONDUCTORS

- A. Equipment: Stranded copper with green, Type XHHW-2 insulation.
- B. Direct Buried: Bare stranded copper.

2.4 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.
- 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: 3M Co.; Type SCS-HB. 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.

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- b. Size: 1/2 inch by 2 inches.
 - c. Manufacturer and Product: Raychem; Type CM-SCE. 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.

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- 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: Thomas & Betts; TY-RAP. 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

2.5 PULLING COMPOUND

- A. Nontoxic, noncorrosive, noncombustible, nonflammable, water-based lubricant; UL listed.

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- 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

2.6 MANUFACTURED WIRING SYSTEMS

- A. System Rating:
 - 1. 20 amperes load-carrying capacity each phase with final assemblies consisting of maximum of three-phase conductors.
 - 2. Composition: Type MC cable with 90 degrees C insulation and stranded copper conductors.
- B. Cable Configuration: Three, single-phase, five-wire circuit with standard color wire coding:
 - 1. 208/120 Volt: Black, red, blue, white, green.
 - 2. 480/277 Volt: Brown, orange, yellow, white, green.
- C. Locking Mechanism: Latch/strike with voltage clearly marked on latch.
- D. NFPA 262 listed for use in air handling plenums, listed to connect or disconnect under load, and manufactured in accordance with NFPA 70, Article No. 604.

2.7 WARNING TAPE

- A. As specified in Section 26 05 33, Raceway and Boxes.

2.8 SOURCE QUALITY CONTROL

- A. Conductors 600 Volts and Below: Test in accordance with UL 44 and UL 854.

PART 3 - EXECUTION

3.1 GENERAL

- A. Conductor installation shall be in accordance with manufacturer's recommendations.
- B. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.

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- 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 for copper conductors and aluminum conductors.
- 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.

3.2 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
240/120 Volts, Three-Phase, Four-Wire, Delta, Center Tap, Ground on Single-Phase	Grounded Neutral Phase A High (wild) Leg Phase C	White Black Orange Blue

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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.

3.3 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.

3.4 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 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.

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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. Below Grade 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 for Process Systems, leave pigtailed of adequate length for bundled connections.

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5. Cable Protection:
 - a. Maintain integrity of shielding of instrumentation cables.
 - b. 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

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SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. Institute of Electrical and Electronics Engineers (IEEE): C2, National Electrical Safety Code (NESC).
 - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

1.2 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Product data for the following:
 - 1) Exothermic weld connectors.
 - 2) Mechanical connectors.
 - 3) Compression connectors.
 - 4) Specialty tools.

1.3 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 Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.

PART 2 - PRODUCTS

2.1 GROUND ROD

- A. Material: Copper-clad.
- B. Diameter: Minimum 3/4 inch.
- C. Length: B: 10 feet.

2.2 GROUND CONDUCTORS

- A. As specified in Section 26 05 05, Conductors.

2.3 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:
 - 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:
 - 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

2.4 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

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

3.6 CONNECTIONS

- A. General:
 - 1. Above grade Connections: Install exothermic weld, mechanical, or compression-type connectors; or brazing.
 - 2. Below grade 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 Engineer 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 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.

3.7 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.

3.8 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.

3.9 TRANSFORMER GROUNDING

- A. Bond neutrals of transformers within buildings to system ground network, and to any additional indicated grounding electrodes.

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- 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

1.1 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. 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. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - d. TC 2, Electrical Polyvinyl Chloride (PVC) Conduit.
 - e. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - f. TC 6, Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation.
 5. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 6. Underwriters Laboratories Inc. (UL):
 - a. 1, Standard for Safety for Flexible Metal Conduit.
 - b. 5, Standard for Safety for Surface Metal Raceways and Fittings.

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- c. 6, Standard for Safety for Electrical Rigid Metal Conduit – Steel.
- d. 360, Standard for Safety for Liquid-Tight Flexible Steel Conduit.
- e. 514B, Standard for Safety for Conduit, Tubing, and Cable Fittings.
- f. 651, Standard for Safety for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- g. 651A, Standard for Safety for Type EB and A Rigid PVC Conduit and HDPE Conduit.
- h. 870, Standard for Safety for Wireways, Auxiliary Gutters, and Associated Fittings.
- i. 1660, Standard for Safety for Liquid-Tight Flexible Nonmetallic Conduit.

1.2 SUBMITTALS

A. Action Submittals:

- 1. Manufacturer’s Literature:
 - a. Rigid galvanized steel conduit.
 - b. PVC Schedule 40 conduit.
 - c. PVC-coated rigid galvanized steel conduit, submittal to include copy of manufacturer’s warranty.
 - d. Flexible metal, liquid-tight conduit
 - e. Flexible, nonmetallic, liquid-tight conduit.
 - f. Conduit fittings.
 - g. Wireways.
 - h. Surface metal raceway.
 - i. Junction and pull boxes used at or below grade.
 - j. Large junction and pull boxes.
 - k. Terminal junction boxes.
- 2. Equipment and machinery proposed for bending metal conduit.
- 3. Method for bending PVC conduit less than 30 degrees.
- 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 conduit installations, underground and concealed conduits including, but not limited to ductbanks, under floor slabs, concealed in floor slabs, and concealed in walls.

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- 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. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection and Testing.
 - 3. Manufacturer's certification of training for PVC-coated rigid galvanized steel conduit installer.

1.3 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 Underwriters Laboratories, Inc. 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

2.1 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-Coated Rigid Galvanized Steel Conduit:

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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.
- D. Flexible Metal, Liquid-Tight Conduit:
1. UL 360 listed for 105 degrees C insulated conductors.
 2. Material: Galvanized steel with extruded PVC jacket.
- E. Flexible Metal, Nonliquid-Tight Conduit:
1. Meet requirements of UL 1.
 2. Material: Galvanized steel.

2.2 FITTINGS

- A. Rigid Galvanized Steel and Intermediate Metal Conduit:
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

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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
- B. PVC-Coated Rigid Galvanized Steel Conduit:
1. Meet requirements of UL 514B.
 2. Fittings: Rigid galvanized steel type, PVC coated by conduit manufacturer.

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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: Ocal; OCAL-BLUE XJG. Or approved equal
- C. Flexible Metal, Liquid-Tight Conduit:
1. Metal insulated throat connectors with integral nylon or plastic bushing rated for 105 degrees C.
 2. Insulated throat and sealing O-rings.
 3. Manufacturers and Products:
 - a. Thomas & Betts; Series 5331.
 - b. O-Z/Gedney; Series 4Q.
 - c. Or approved equal
- D. Watertight Entrance Seal Device:
1. New Construction:
 - a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
 - b. Manufacturer and Product: O-Z/Gedney; Type FSK or Type WSK, as required. Or approved equal
 2. Cored-Hole Application:
 - a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
 - b. Manufacturer and Product: O-Z/Gedney; Series CSM. Or approved equal

2.3 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.

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2. Cover: Gasketed, weatherproof, malleable iron, 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:

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- a. Exterior Surfaces: 40-mil PVC.
- b. Interior Surfaces: 2-mil urethane.
4. Manufacturers:
 - a. Robroy Industries.
 - b. Ocal.
 - c. Or approved equal
- E. Nonmetallic:
 1. Box: PVC.
 2. Cover: PVC, weatherproof, with stainless steel screws.
 3. Manufacturer and Product: Carlon; Type FS or Type FD, with Type E98 or Type E96 covers. Or approved equal

2.4 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. Large Sheet Steel Box:
 1. NEMA 250, Type 1.
 2. Box: Code-gauge, galvanized steel.
 3. Cover: Full access, screw type.
 4. Machine Screws: Corrosion-resistant.
- D. Large 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: O-Z/Gedney; Series YW. Or approved equal
 8. Manufacturers and Products, Recessed Type:

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- a. Crouse-Hinds; Type WJBF.
 - b. O-Z/Gedney; Series YR.
 - c. O-Z/Gedney; Series YS-A, YL-A.
 - d. Killark.
 - e. Or approved equal
- E. Large Stainless Steel Box:
1. NEMA 250 Type 4X.
 2. Box: 14-gauge, ASTM A240/A240M, Type 304 stainless steel with white enamel painted interior mounting panel.
 3. Cover: Hinged with clamps.
 4. Hardware and Machine Screws: ASTM A167, Type 304 stainless steel.
 5. Manufacturers:
 - a. Hoffman Engineering Co.
 - b. Robroy Industries.
 - c. Wiegman.
 - d. Or approved equal

2.5 METAL WIREWAYS

- A. Meet requirements of UL 870.
- B. Type: Steel-enclosed, lay-in type.
- C. Cover: Removable, screw type.
- D. Rating: Outdoor raintight.
- 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

2.6 ACCESSORIES

- A. Duct Bank Spacers:
 1. Modular Type:

RACEWAY AND BOXES

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- 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: SP Products; Quik Duct. Or approved equal
- B. Identification Devices:
1. Raceway Tags:
 - a. Material: Permanent, polyethylene.
 - b. Shape: Round.
 - c. Raceway Designation: Pressure stamped, embossed, or engraved.
 - d. 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 3 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
 3. Buried Raceway Marker:

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- a. Material: Sheet bronze, consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction.
 - b. Designation: Engrave to depth of 3/32 inch; ELECTRIC CABLES, in letters 1/4-inch high.
 - c. Minimum Dimension: 1/4 inch thick, 10 inches long, and 3/4 inch wide.
- C. Raceway Coating: Clean and paint in accordance with Section 09 90 00, Painting and Coating.
- D. 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
- E. Wraparound Duct Band:
1. Material: Heat-shrinkable, cross-linked polyolefin, precoated with hot-melt adhesive.
 2. Width: 50 mm minimum.

PART 3 - EXECUTION

3.1 GENERAL

- A. Conduit and tubing sizes shown are based on use of copper 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. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.
- G. Group raceways installed in same area.
- H. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.
- I. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.

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- J. Block Walls: Do not install raceways in same horizontal course or vertical cell with reinforcing steel.
- K. Install watertight fittings in outdoor, underground, or wet locations.
- L. 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.
- M. Metal conduit shall be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.
- N. Do not install raceways in concrete equipment pads, foundations, or beams without Engineer approval.
- O. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.
- P. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.
- Q. Install conduits for fiber optic cables, telephone cables, and Category 6 data cables in strict conformance with the requirements of TIA 569B.

3.2 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.

3.3 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 Engineer.
- E. Slabs and Walls (Requires Engineer Approval):
 - 1. Trade size of conduit not to exceed one-fourth of slab or wall thickness.

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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 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.

3.4 CONDUIT APPLICATION

- A. Diameter: Minimum 3/4 inch (exposed), and 1 inch buried.
- B. Exterior, Exposed:
1. PVC-coated rigid galvanized steel.
- C. Interior, Exposed:
1. Rigid galvanized steel.
 2. PVC-coated rigid galvanized steel.
- D. Concrete-Encased Ductbank:
1. PVC Schedule 40.
- E. Under Slabs-On-Grade:
1. PVC Schedule 40.
- F. Transition from Underground or Concrete Embedded to Exposed: PVC-coated rigid steel conduit.
- G. Under Equipment Mounting Pads: PVC Schedule 40 conduit.
- H. Exposed outdoor and corrosive Areas:
1. PVC-coated rigid galvanized steel

3.5 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 Engineer where flexible connection is required to minimize vibration:

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1. Conduit Size 4 Inches or Less: Flexible, liquid-tight conduit.
 2. Conduit Size Over 4 Inches: Nonflexible.
 3. Wet or Corrosive Areas: Flexible, nonmetallic or flexible metal liquid-tight.
 4. Dry Areas: Flexible, metallic liquid-tight.
- B. Diameter: Minimum 1/2 inch.
- C. Suspended Lighting Fixtures in Dry Areas: Flexible steel, nonliquid-tight conduit.
- D. Outdoor Areas, Process Areas Exposed to Moisture, and Areas Required to be Oiltight and Dust-Tight: Flexible metal, liquid-tight conduit.
- E. Flexible Conduit Length: 18 inches minimum, 60 inches maximum; sufficient to allow movement or adjustment of equipment.

3.6 PENETRATIONS

- A. Make at right angles, unless otherwise shown.
- B. Notching or penetration of structural members, including footings and beams, not permitted.
- C. 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.
- D. Concrete Walls, Floors, or Ceilings (Aboveground): Provide non-shrink grout dry-pack, or use watertight seal device.
- E. 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.

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- b. Terminate conduit with flexible metal 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. Existing or Precast Wall (Underground): Core drill wall and install watertight entrance seal device.
 5. 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.

3.7 SUPPORT

- A. Support from structural members only, at intervals not exceeding NFPA 70 requirements. Do not exceed 8 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 20 percent extra space for future conduit.
- C. Application/Type of Conduit Strap:
 1. Rigid Steel Conduit: Zinc coated steel, pre-galvanized 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:
 - a. Dry, Noncorrosive Areas: Galvanized.
 - b. Wet, Noncorrosive Areas: Stainless steel.
 - c. Corrosive Areas: Stainless steel.
- 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.

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- F. Support aluminum conduit on concrete surfaces with stainless steel or nonmetallic spacers, or aluminum or nonmetallic framing channel.

3.8 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 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.

3.9 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: PVC female adapter.
- C. Belled-End Conduit: Bevel un-belled end of joint prior to joining.

3.10 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.

3.11 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.

3.12 TERMINATION AT ENCLOSURES

- A. Cast Metal Enclosure: Install manufacturer's pre-molded insulating sleeve inside metallic conduit terminating in threaded hubs.
- B. Sheet 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. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.
 - 4. PVC-Coated Rigid Galvanized Steel Conduit: Provide PVC-coated, liquid-tight, metallic connector.
 - 5. PVC Schedule 40 Conduit: Provide PVC terminal adapter with lock nut, except where threaded hubs required above.
- C. 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.

3.13 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. Transition from Underground to Exposed: Rigid galvanized steel PVC-coated rigid steel conduit.
- I. 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.
- J. Metallic Raceway Coating: Along entire length, clean and paint in accordance with Section 09 90 00, Painting and Coating.
- K. 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.
- L. Provide expansion/deflection fittings in conduit runs that exit building or structure below grade. Conduit from building wall to fitting shall be PVC-coated rigid steel.
- M. Concrete Encasement:
 - 1. As specified in Section 03 30 00, Cast-in-Place Concrete.
 - 2. Concrete Color: Red.
- N. Backfill:
 - 1. As specified in Section 31 23 23, Trench Backfill.
 - 2. Do not backfill until inspected by Engineer.

3.14 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, 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.

3.15 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:

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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 Engineer.
 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. Light Switch:
 - a. 48 inches above floor.
 - b. When located next to door, install on lock side of door.
 3. Thermostat: 54 inches above floor.
 4. Convenience Receptacle:
 - a. General Interior Areas: 18 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. Industrial Areas, Workshops: 48 inches above floor.
 - d. Outdoor Areas: 36 inches above finished grade
 5. Special-Purpose Receptacle: 18 inches above floor or as shown.
 6. Switch, Motor Starting: 48 inches above floor, unless otherwise indicated on Drawings.
- E. Supports:
1. Support boxes independently of conduit by attachment to building structure or structural member.

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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.
- F. Boxes Supporting Fixtures: Provide means of attachment with adequate strength to support fixture.

3.16 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:
1. Noncorrosive Dry Areas: Galvanized.
 2. Noncorrosive Wet Areas: Stainless steel.
 3. Corrosive Areas: Stainless steel.
- 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.

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- 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 Below Grade:
 - 1. Install boxes for below grade 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 Engineer'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.

3.17 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.

3.18 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.
- C. Buried Raceway Marker:
 - 1. Install at grade to indicate direction of underground raceway.
 - 2. Install at bends and at intervals not exceeding 100 feet in straight runs.

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3. Embed and secure to top of concrete base, sized 14 inches long, 6 inches wide, and 8 inches deep; top set flush with finished grade.

3.19 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

MIRAMAR RESERVOIR PUMP STATION IMPROVEMNTS

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SECTION 26 05 70
ELECTRICAL SYSTEMS ANALYSIS

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI).
 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C57.12.00, Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
 - b. 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
 - c. 399, Recommended Practice for Industrial and Commercial Power System Analysis.
 - d. 1584, Guide for Performing Arc Flash Hazard Calculations.
 3. National Electrical Manufacturers Association (NEMA): Z535.4, Product Safety Signs and Labels.
 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 70E, Standard for Electrical Safety in the Workplace.
 5. Occupational Safety and Health Standards (OSHA): 29 CFR, Part 1910 Subpart S, Electrical.

1.2 SUBMITTALS

- A. Action Submittals:
1. Short circuit study.
 2. Protective Device Coordination Study: Submit within 90 days after approval of short circuit study. Submit final study before shipment of equipment.
 3. Arc Flash Study: Submit initial study with protective Device Coordination Study. Submit final study prior to equipment energization.
 4. Arc flash warning labels; submit sample with initial study.

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5. Electronic files on thumb drive of final studies including all engineering software input files, output reports, and libraries.

1.3 QUALITY ASSURANCE

- A. Short circuit and protective device coordination and arc flash studies shall be prepared by a professional electrical engineer registered in the State of California.

1.4 SEQUENCING AND SCHEDULING

- A. Initial complete short circuit study shall be submitted and reviewed before Engineer will review Shop Drawings for equipment for incoming service equipment.
- B. Initial complete protective device coordination and arc flash studies shall be submitted within 90 days after approval of initial short circuit study.
- C. Initial complete arc flash study shall be submitted and accepted prior to energization of the electrical equipment.
- D. Revised short circuit, protective device coordination, and arc flash studies, and arc flash labels shall be submitted 10 days before energizing electrical equipment.
- E. Final short circuit, protective device coordination, harmonic, and arc flash studies shall be completed prior to Project Substantial Completion. Final version of study shall include as-installed equipment, materials, and parameter data or settings entered into equipment based on study.
- F. Submit final arc flash labels described herein and in compliance with NEMA Z535.4 prior to Project Substantial Completion.

1.5 GENERAL STUDY REQUIREMENTS

- A. Equipment and component titles used in the studies shall be identical to equipment and component titles shown on Drawings.
- B. Perform studies using one of the following electrical engineering software packages:
 1. SKM Power Tools for Windows.
 2. ETAP.
- C. Perform complete fault calculations for each existing, proposed and ultimate source combination.
 1. Source combination may include present and future power company supply circuits, large motors, or generators.
- D. Utilize proposed load data for study obtained from Contract Documents.
- E. Existing System and Equipment:

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1. Extent of existing system to be included in study is limited to system elements that affect new system and equipment.
 2. Include fault contribution of existing motors and equipment in study.
 3. Include impedance elements that affect new system and equipment.
 4. Include protective devices in series with new equipment.
- F. Device coordination time-current curves for medium and low voltage distribution system; include individual protective device time-current characteristics.

1.6 SHORT CIRCUIT STUDY

A. General:

1. Prepare in accordance with IEEE 399.
2. Use cable impedances based on copper conductors, except where aluminum conductors are specified or shown.
3. Use bus impedances based on copper bus bars, except where aluminum bus bars are specified or shown.
4. Use cable and bus resistances calculated at 25 degrees C.
5. Use medium-voltage cable reactances based on use of typical dimensions of shielded cables with 133 percent insulation levels.
6. Use 600-volt cable reactances based on use of typical dimensions of THHN/THWN conductors.
7. Use transformer impedances 92.5 percent of “nominal” impedance based on tolerances specified in IEEE C57.12.00.

B. Provide:

1. Calculation methods and assumptions.
2. Typical calculation.
3. Tabulations of calculated quantities.
4. Results, conclusions, and recommendations.
5. Selected base per unit quantities.
6. One-line diagrams.
7. Source impedance data, including electric utility system and motor fault contribution characteristics.
8. Impedance diagrams.
9. Zero-sequence impedance diagrams.

- C. Calculate short circuit interrupting and momentary (when applicable) duties for an assumed three-phase bolted fault at each:

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1. Electric utility's supply termination point.
 2. Main switchgear.
 3. Low-voltage switchboards.
 4. Motor control centers.
 5. Branch circuit panelboards.
 6. Future load contributions as shown on one-line diagram.
- D. Provide bolted line-to-ground fault current study for areas as defined for three-phase bolted fault short circuit study.
- E. Verify:
1. Equipment and protective devices are applied within their ratings.
 2. Adequacy of switchgear bus bars to withstand short circuit stresses.
 3. Adequacy of transformer windings to withstand short circuit stresses.
 4. Cable and busway sizes for ability to withstand short circuit heating, in addition to normal load currents.
- F. Tabulations:
1. General Data:
 - a. Short circuit reactances of rotating machines.
 - b. Cable and conduit material data.
 - c. Bus data.
 - d. Transformer data.
 - e. Circuit resistance and reactance values.
 2. Short Circuit Data for each source combination:
 - a. Fault impedances.
 - b. X to R ratios.
 - c. Asymmetry factors.
 - d. Motor contributions.
 - e. Short circuit kVA.
 - f. Symmetrical and asymmetrical fault currents.
 3. Equipment Evaluation:
 - a. Equipment bus bracing, equipment short circuit rating, transformer, cable, busway.
 - b. Maximum fault current available.

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- G. Written Summary:
 - 1. Scope of studies performed.
 - 2. Explanation of bus and branch numbering system.
 - 3. Prevailing conditions.
 - 4. Selected equipment deficiencies.
 - 5. Results of short circuit study.
 - 6. Comments or suggestions.
- H. Suggest changes and additions to equipment rating and/or characteristics.
- I. Notify Engineer in writing of existing circuit protective devices improperly rated for new fault conditions.
- J. Revise data for “as-installed” condition.

1.7 PROTECTIVE DEVICE COORDINATION STUDY

- A. General:
 - 1. Prepare in accordance with IEEE 242.
 - 2. Proposed protective device coordination time-current curves for distribution system, graphically displayed on conventional log-log curve sheets.
 - a. Provide separate curve sheets for phase and ground fault coordination for each scenario.
 - b. Each curve sheet to have title and one-line diagram that applies to specific portion of system associated with time-current curves on that sheet. Limit number of devices shown to four to six.
 - c. Identify device associated with each curve by manufacturer type, function, and, if applicable, recommended tap, time delay, instantaneous and other settings recommended.
 - d. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
 - e. Apply motor protection methods that comply with NFPA 70.
- B. Plot Characteristics on Curve Sheets:
 - 1. Electric utility’s relays.
 - 2. Electric utility’s fuses including manufacturer’s minimum melt, total clearing, tolerance, and damage bands.
 - 3. Medium-voltage equipment relays.
 - 4. Medium-voltage and low-voltage fuses including manufacturer’s

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- minimum melt, total clearing, tolerance, and damage bands.
5. Low-voltage equipment circuit breaker trip devices, including manufacturers tolerance bands.
 6. Pertinent transformer full-load currents at 100 percent.
 7. Transformer magnetizing inrush currents.
 8. Transformer damage curves; appropriate for system operation and location.
 9. ANSI transformer withstand parameters.
 10. Significant symmetrical and asymmetrical fault currents.
 11. Motor overload relay settings for motors greater than 40 hp.
 12. Ground fault protective device settings.
 13. Other system load protective devices for largest branch circuit and feeder circuit breaker in each motor control center.
- C. Primary Protective Device Settings for Delta-Wye Connected Transformer:
1. Secondary Line-to-Ground Fault Protection: Primary protective device operating band within transformer's characteristics curve, including a point equal to 58 percent of IEEE C57.12.00 withstand point.
 2. Secondary Line-to-Line Faults: 16 percent current margin between primary protective device and associated secondary device characteristic curves.
- D. Separate medium voltage relay characteristics curves from curves for other devices by at least 0.4-second time margin.
- E. Tabulate Recommended Protective Device Settings:
1. Relays:
 - a. Current tap.
 - b. Time dial.
 - c. Instantaneous pickup.
 - d. Electronic settings data file.
 2. Circuit Breakers:
 - a. Adjustable pickups.
 - b. Adjustable time-current characteristics.
 - c. Adjustable time delays.
 - d. Adjustable instantaneous pickups.
 - e. I²t In/Out.
 - f. Zone interlocking.

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- g. Electronic settings data file.
- F. Written Summary:
 - 1. Scope of studies performed.
 - 2. Summary of protective device coordination methodology.
 - 3. Protective device bolted fault current.
 - 4. Arcing fault current.
 - 5. Protective device trip/delay time.
 - 6. Breaker opening time.
 - 7. Solidly grounded column.
 - 8. Equipment type.
 - 9. Gap.
 - 10. Arc flash boundary.
 - 11. Working distance.
 - 12. Incident energy.
- G. Analyze short circuit, protective device coordination, and arc flash calculations and highlight equipment that is determined to be underrated or causes incident energy values greater than 40 cal/cm². Propose approaches to reduce energy levels.
- H. Prepare report summarizing arc flash study with conclusions and recommendations which may affect integrity of electric power distribution system. As a minimum, include the following:
 - 1. Equipment manufacturer's information used to prepare study.
 - 2. Assumptions made during study.
 - 3. Reduced copy of one-line drawing; 11 inches by 17 inches maximum.
 - 4. Arc flash evaluations summary spreadsheet.
 - 5. Bus detail sheets.
 - 6. Arc flash warning labels printed in color on thermally bonded adhesive backed UV and weather-resistant labels.

PART 2 - PRODUCTS

2.1 ARC FLASH WARNING LABELS

- A. Arc flash warning labels printed in color on thermally bonded adhesive backed, UV- and weather-resistant labels.

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PART 3 - EXECUTION

3.1 GENERAL

- A. Adjust relay and protective device settings according to values established by coordination study.
- B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
- C. Notify Engineer in writing of required major equipment modifications.
- D. Provide laminated one-line diagrams (minimum size 11 inches by 17 inches) to post on interior of electrical room doors.
- E. Provide arc flash warning labels on equipment as specified in this section.

END OF SECTION

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PART 1 - GENERAL

1.1 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. 43, Recommended Practice for Testing Insulating Resistance of Rotating Machinery.
 - b. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - c. C2, National Electrical Safety Code.
 - d. C37.20.1, Standard for Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.
 - e. C37.20.2, Standard for Metal-Clad Switchgear.
 - f. C37.20.3, Standard for Metal-Enclosed Interrupter Switchgear.
 - g. C37.23, Standard for Metal-Enclosed Bus.
 - h. C62.33, Standard Test Specifications for Varistor Surge-Protective Devices.
 2. 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.
 3. International Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
 4. 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.
 5. National Institute for Certification in Engineering Technologies (NICET).
 6. Occupational Safety and Health Administration (OSHA): CFR 29, Part 1910, Occupational Safety and Health Standards.

1.2 SUBMITTALS

- A. Informational Submittals:
1. Submit 30 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. Energization Plan: Prior to initial energization of electrical distribution equipment; include the following:
 - a. Owner's representative sign-off form for complete and accurate arc flash labeling and proper protective device settings for equipment to be energized.
 - b. Staged sequence of initial energization of electrical equipment.
 - c. Lock-Out-Tag-Out plan for each stage of the progressive energization.
 - d. Barricading, signage, and communication plan notifying personnel of newly energized equipment.
 3. Submit test or inspection reports and certificates for each electrical item tested within 30 days after completion of test:
 4. 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 Engineer and returned, insert a copy of each in Operation and Maintenance Manual.
 5. Programmable Settings: At completion of Performance Demonstration Test, submit final hardcopy printout and electronic files on compact disc of as-left setpoints, programs, and device configuration files for:
 - a. Circuit breaker settings.
 - b. Intelligent overload relays.
 - c. Variable frequency drives.
 - d. Soft starters.
 - e. Power metering devices.
 - f. Uninterruptible power supplies.
 - g. Active Harmonic Filters.
 - h. Electrical communications modules.

1.3 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 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.

1.4 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 Engineer prior to de-energization.
 - 2. Minimized to avoid extended period of interruption to the operating plant equipment.
- D. Notify Engineer at least 24 hours prior to performing tests on energized electrical equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Perform tests in accordance with requirements of Section 01 91 14, Equipment Testing and Facility 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. Set, test, and calibrate protective relays, circuit breakers, fuses power monitoring meters and other applicable devices in accordance with values established by short circuit, and coordination studies as specified in Section 26 05 70, Electrical Systems Analysis.
- E. Adjust mechanisms and moving parts of equipment for free mechanical movement.
- F. Adjust and set electromechanical electronic relays and sensors to correspond to operating conditions, or as recommended by manufacturer.
- G. Verify nameplate data for conformance to Contract Documents and approved Submittals.
- H. Realign equipment not properly aligned.
- I. Properly anchor electrical equipment found to be inadequately anchored.
- J. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench/screw driver to manufacturer's recommendations, or as otherwise specified in NETA ATS.
- K. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.
- L. Provide proper lubrication of applicable moving parts.
- M. Inform Engineer of working clearances not in accordance with NFPA 70.
- N. 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.

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- O. 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 Engineer door and panel sections having dented surfaces.
 - 5. Repair or replace, as determined by Engineer 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 Engineer, refinish entire assembly.
- P. Replace fuses and circuit breakers that do not conform to size and type required by the Contract Documents or approved Submittals.

3.2 CHECKOUT AND STARTUP

- A. Voltage Field Test:
 - 1. Check voltage at point of termination of power company supply system to Project when installation is essentially complete and is in operation.
 - 2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.
 - 3. Record supply voltage (all three phases simultaneously on same graph) for 24 hours during normal working day.
 - a. Submit Voltage Field Test Report within 5 days of test.
 - 4. Unbalance Corrections:
 - a. Make written request to power company to correct condition if balance (as defined by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.
 - b. Obtain written certification from responsible power company official that voltage variations and unbalance are within their normal standards if corrections are not made.
- B. Equipment Line Current Tests:
 - 1. Check line current in each phase for each piece of equipment.

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2. Make line current check after power company has made final adjustments to supply voltage magnitude or balance.
3. 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.

3.3 SWITCHGEAR AND SWITCHBOARD ASSEMBLIES

- A. Visual and Mechanical Inspection:
 1. Insulator damage and contaminated surfaces.
 2. Proper barrier and shutter installation and operation.
 3. Proper operation of indicating devices.
 4. Improper blockage of air-cooling passages.
 5. Proper operation of drawout elements.
 6. Integrity and contamination of bus insulation system.
 7. Check door and device interlocking system by:
 - a. Closure attempt of device when door is in OFF or OPEN position.
 - b. Opening attempt of door when device is in ON or CLOSED position.
 8. Check key interlocking systems for:
 - a. Key captivity when device is in ON or CLOSED position.
 - b. Key removal when device is in ON or CLOSED position.
 - c. Closure attempt of device when key has been removed.
 - d. Correct number of keys in relationship to number of lock cylinders.
 - e. Existence of Other Keys Capable of Operating Lock Cylinders: Destroy duplicate sets of keys.
 9. Check nameplates for proper identification of:
 - a. Equipment title and tag number with latest one-line diagram.
 - b. Pushbutton.
 - c. Control switch.
 - d. Pilot light.
 - e. Control relay.
 - f. Circuit breaker.
 - g. Indicating meter.
 10. Verify fuse and circuit breaker ratings, sizes, and types conform to those specified.

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11. Check bus and cable connections for high resistance by low resistance ohmmeter and calibrated torque wrench applied to bolted joints.
 - a. Ohmic value to be zero.
 - b. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
 12. Check operation and sequencing of electrical and mechanical interlock systems by:
 - a. Closure attempt for locked open devices.
 - b. Opening attempt for locked closed devices.
 - c. Key exchange to operate devices in OFF-NORMAL positions.
 13. Verify performance of each control device and feature.
 14. Control Wiring:
 - a. Compare wiring to local and remote control and protective devices with elementary diagrams.
 - b. Proper conductor lacing and bundling.
 - c. Proper conductor identification.
 - d. Proper conductor lugs and connections.
 15. Exercise active components.
 16. Perform phasing check on double-ended equipment to ensure proper bus phasing from each source.
- B. Electrical Tests:
1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
 - b. Each phase of each bus section.
 - c. Phase-to-phase and phase-to-ground for 1 minute.
 - d. With switches and breakers open.
 - e. With switches and breakers closed.
 - f. Control wiring except that connected to solid state components.
 - g. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
 2. Overpotential Tests:
 - a. Applied ac or dc voltage and test procedure in accordance with IEEE C37.20.1, C37.20.2, C37.20.3 and NEMA PB 2. Alternatively use NETA ATS, Table 100.2.

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- b. Each phase of each bus section.
 - c. Phase-to-phase and phase-to-ground for 1 minute.
 - d. Test results evaluated on a pass/fail basis.
3. Current Injection Tests:
- a. For entire current circuit in each section.
 - b. Secondary injection for current flow of 1 ampere.
 - c. Test current at each device.
4. Control Wiring:
- a. Apply secondary voltage to control power and potential circuits.
 - b. Check voltage levels at each point on terminal boards and each device terminal.
5. Operational Test:
- a. Initiate control devices.
 - b. Check proper operation of control system in each section.

3.4 PANELBOARDS

- A. Visual and Mechanical Inspection: Include the following inspections and related work:
1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
 2. Exercise and perform operational tests of mechanical components and other operable devices in accordance with manufacturer's instruction manual.
 3. Check panelboard mounting, area clearances, and alignment and fit of components.
 4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
 5. Perform visual and mechanical inspection for overcurrent protective devices.
- B. Electrical Tests: Include the following items performed in accordance with manufacturer's instruction:
1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
 - b. Each phase of each bus section.

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- c. Phase-to-phase and phase-to-ground for 1 minute.
 - d. With breakers open.
 - e. With breakers closed.
 - f. Control wiring except that connected to solid state components.
 - g. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Ground continuity test ground bus to system ground.

3.5 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 1,000-volt dc megohmmeter for 600-volt insulated conductors.

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- 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.

3.6 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 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 microohms across each switch blade and fuse holder.
 - b. Investigate deviation of 50 percent or more from adjacent poles or similar switches.

3.7 MOLDED AND INSULATED CASE CIRCUIT BREAKERS

- A. General: Inspection and testing limited to circuit breakers rated 100 amperes and larger and to motor circuit protector breakers rated 100 amperes and larger.
- B. Visual and Mechanical Inspection:

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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 1,000-volt dc megohmmeter for 480-volt and 600-volt circuit breakers 500-volt dc megohmmeter for 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 microohms 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.

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- g. Instantaneous pickup value shall be within values established by NEMA AB 4, Table 5-4. Alternatively, use NETA ATS, Table 100.8.

3.8 LOW VOLTAGE POWER CIRCUIT BREAKERS

A. Visual and Mechanical Inspection:

1. Proper mounting, cell fit, and element alignment.
2. Proper operation of racking interlocks.
3. Check for damaged arc chutes.
4. Proper contact condition.
5. Bolt torque level in accordance with NETA ATS, Table 100.12.
6. Perform mechanical operational and contact alignment tests in accordance with manufacturer's instructions.
7. Check operation of closing and tripping functions of trip devices by activating ground fault relays, undervoltage shunt relays, and other auxiliary protective devices.
8. Verify primary and secondary contact wipe, gap setting, and other dimensions vital to breaker operation are correct.
9. Check charging motor, motor brushes, associated mechanism, and limit switches for proper operation and condition.
10. Check operation of electrically operated breakers in accordance with manufacturer's instructions.
11. Check for adequate lubrication on contact, moving, and sliding surfaces.

B. Electrical Tests:

1. Insulation Resistance Tests:
 - a. Utilize 1,000-volt dc megohmmeter for 480-volt and 600-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 microohms across each pole.
 - b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
3. Primary Current Injection Test to Verify:

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- 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 characteristic when adjusted to setting sheet parameters shall be within manufacturer's published time-current tolerance band.

3.9 INSTRUMENT TRANSFORMERS

A. Visual and Mechanical Inspection:

1. Visually check current, potential, and control transformers for:
 - a. Cracked insulation.
 - b. Broken leads or defective wiring.
 - c. Proper connections.
 - d. Adequate clearances between primary and secondary circuit wiring.
2. Verify Mechanically:
 - a. Grounding and shorting connections have good contact.
 - b. Withdrawal mechanism and grounding operation, when applicable, operate properly.
3. Verify proper primary and secondary fuse sizes for potential transformers.

B. Electrical Tests:

1. Current Transformer Tests:
 - a. Insulation resistance test of transformer and wiring-to-ground at 1,000 volts dc for 30 seconds.
 - b. Polarity test.
2. Potential Transformer Tests:
 - a. Insulation resistance test at test voltages in accordance with NETA ATS, Table 100.9, for 1 minute on:
 - 1) Winding-to-winding.
 - 2) Winding-to-ground.
 - b. Polarity test to verify polarity marks or H1-X1 relationship as applicable.
3. Insulation resistance measurement on instrument transformer shall not be less than that shown in NETA ATS, Table 100.5.

3.10 METERING

A. Visual and Mechanical Inspection:

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1. Verify meter connections in accordance with appropriate diagrams.
2. Verify meter multipliers.
3. Verify meter types and scales conform to Contract Documents.
4. Check calibration of meters at cardinal points.
5. Check calibration of electrical transducers.

3.11 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds in panelboard, switchboard, and switchgear assemblies for proper connection and tightness.
2. Ground bus connections in panelboard, switchboard, enclosed circuit breakers and switchgear assemblies for proper termination and tightness.
3. Effective transformer core and equipment grounding.
4. Accessible connections to grounding electrodes for proper fit and tightness.
5. Accessible exothermic-weld grounding connections to verify that molds were filled, and proper bonding was obtained.

B. Electrical Tests:

1. Fall-of-Potential Test:
 - a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
 - b. Main ground electrode system resistance to ground to be no greater than 5 ohm(s).
2. Two-Point Direct Method Test:
 - a. In accordance with IEEE 81, Section 8.2.1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
 - b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.
3. Neutral Bus Isolation:
 - a. Test each neutral bus individually with neutral bonding jumper removed at service entrance or separately derived system.
 - b. Evaluate ohmic values by measuring resistance between ground bus and neutral bus.
 - c. Investigate values less than 50 megohms.

3.12 GROUND FAULT SYSTEMS

A. Inspection and testing limited to:

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1. Zero sequence grounding systems.
2. Residual ground fault systems.
- B. Visual and Manual Inspection:
 1. Neutral main bonding connection to ensure:
 - a. Zero sequence sensing system is grounded ahead of neutral disconnect link.
 - b. Ground strap sensing system is grounded through sensing device.
 - c. Neutral ground conductor is solidly grounded.
 2. Verify control power has adequate capacity for system.
 3. Manually operate monitor panels for:
 - a. Trip test.
 - b. No trip test.
 - c. Nonautomatic rest.
 4. Zero sequence system for symmetrical alignment of core balance transformers about current carrying conductors.
 5. Relay check for pickup and time under simulated ground fault conditions.
 6. Verify nameplate identification by device operation.
- C. Electrical Tests:
 1. Test system neutral insulation resistance with neutral ground link removed; minimum 1 megohm.
 2. Determine relay pickup by primary current injection at the sensor. Relay pickup current within plus or minus 10 percent of device dial or fixed setting.
 3. Test relay timing by injecting 300 percent of pick-up current or as specified by manufacturer. Relay operating time in accordance with manufacturer's time-current characteristic curves.
 4. Test system operation at 55 percent rated control voltage, if applicable.
 5. Test zone interlock system by simultaneous sensor current injection and monitoring zone blocking functions.

3.13 AC INDUCTION MOTORS

- A. General: Inspection and testing limited to motors rated 5 horsepower and larger.
- B. Visual and Mechanical Inspection:
 1. Proper electrical and grounding connections.
 2. Shaft alignment.

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3. Blockage of ventilating air passageways.
 4. Operate motor and check for:
 - a. Excessive mechanical and electrical noise.
 - b. Overheating.
 - c. Correct rotation.
 - d. Check vibration detectors, resistance temperature detectors, or motor inherent protectors for correct function.
 - e. Excessive vibration, in excess of values in NETA ATS, Table 100.10.
 5. Check operation of space heaters.
- C. Electrical Tests:
1. Insulation Resistance Tests:
 - a. In accordance with IEEE 43 at test voltages established by NETA ATS, Table 100.1 for:
 - 1) Motors above 200 horsepower for 10-minute duration with resistances tabulated at 30 seconds, 1 minute, and 10 minutes.
 - 2) Motors 200 horsepower and less for 1-minute duration with resistances tabulated at 30 seconds and 60 seconds.
 - b. Insulation resistance values equal to, or greater than, ohmic values established by manufacturers.
 2. Calculate polarization index ratios for motors above 200 horsepower. Investigate index ratios less than 1.5 for Class A insulation and 2.0 for Class B insulation.
 3. Insulation resistance test on insulated bearings in accordance with manufacturer's instructions.
 4. Measure running current and voltage and evaluate relative to load conditions and nameplate full-load amperes.
 5. Overpotential Tests:
 - a. Applied dc voltage in accordance with IEEE 95.
 - b. Limited to 4,000-volt motors rated 1,000 horsepower and greater.
 - c. Test results evaluated on pass/fail basis.

3.14 LOW-VOLTAGE MOTOR CONTROL

- A. Visual and Mechanical Inspection:
1. Proper barrier and shutter installation and operation.
 2. Proper operation of indicating and monitoring devices.
 3. Proper overload protection for each motor.

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4. Improper blockage of air-cooling passages.
5. Proper operation of drawout elements.
6. Integrity and contamination of bus insulation system.
7. Check door and device interlocking system by:
 - a. Closure attempt of device when door is in OFF or OPEN position.
 - b. Opening attempt of door when device is in ON or CLOSED position.
8. Check key interlocking systems for:
 - a. Key captivity when device is in ON or CLOSED position.
 - b. Key removal when device is in OFF or OPEN position.
 - c. Closure attempt of device when key has been removed.
 - d. Correct number of keys in relationship to number of lock cylinders.
 - e. Existence of other keys capable of operating lock cylinders; destroy duplicate sets of keys.
9. Check nameplates for proper identification of:
 - a. Equipment title and tag number with latest one-line diagram.
 - b. Pushbuttons.
 - c. Control switches.
 - d. Pilot lights.
 - e. Control relays.
 - f. Circuit breakers.
10. Verify fuse and circuit breaker sizes and types conform to Contract Documents.
11. Verify current and potential transformer ratios conform to Contract Documents.
12. Check bus connections for high resistance by low-resistance ohmmeter and calibrated torque wrench applied to bolted joints.
13. Ohmic value to be zero. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer
14. Check operation and sequencing of electrical and mechanical interlock systems by:
 - a. Closure attempt for locked open devices.
 - b. Opening attempt for locked closed devices.
 - c. Key exchange to operate devices in OFF-NORMAL positions.
15. Verify performance of each control device and feature furnished as part of motor control center.

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16. Control Wiring:
 - a. Compare wiring to local and remote control, and protective devices with elementary diagrams.
 - b. Check for proper conductor lacing and bundling.
 - c. Check for proper conductor identification.
 - d. Check for proper conductor lugs and connections.
 17. Exercise active components.
 18. Inspect contactors for:
 - a. Correct mechanical operations.
 - b. Correct contact gap, wipe, alignment, and pressure.
 - c. Correct torque of connections.
 19. Compare overload heater rating with full-load current for proper size.
 20. Compare fuse, motor protector, and circuit breaker with motor characteristics for proper size.
 21. Perform phasing check on double-ended motor control centers to ensure proper bus phasing from each source.
- B. Electrical Tests:
1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
 - b. Bus section phase-to-phase and phase-to-ground for 1 minute on each phase.
 - c. Contactor phase-to-ground and across open contacts for 1 minute on each phase.
 - d. Starter section phase-to-phase and phase-to-ground on each phase with starter contacts closed and protective devices open.
 - e. Test values to comply with NETA ATS, Table 100.1.
 2. Current Injection through Overload Unit at 300 Percent of Motor Full-Load Current and Monitor Trip Time:
 - a. Trip time in accordance with manufacturer's published data.
 - b. Investigate values in excess of 120 seconds.
 3. Control Wiring Tests:
 - a. Apply secondary voltage to control power and potential circuits.
 - b. Check voltage levels at each point on terminal board and each device terminal.

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- c. Insulation resistance test at 1,000 volts dc on control wiring, except that connected to solid state components; 1 megohm minimum insulation resistance.
4. Operational test by initiating control devices to affect proper operation.

3.15 AUTOMATIC TRANSFER SWITCHES

A. Visual and Mechanical Inspection:

1. Check doors and panels for proper interlocking.
2. Check connections for high resistance by low-resistance ohmmeter.
3. Check positive mechanical and electrical interlock between normal and alternate sources.
4. Check for proper operation:
 - a. Manual transfer function switch.
 - b. Generator under load and non-load conditions.
 - c. Auto-exerciser of generator under load and no-load conditions.
5. Verify settings and operation of control devices.

B. Electrical Tests:

1. Insulation Resistance Tests:
 - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1, for each phase with switch CLOSED in both source positions.
 - b. Phase-to-phase and phase-to-ground for 1 minute.
 - c. Test values in accordance with manufacturer's published data.
2. Contact Resistance Test:
 - a. Contact resistance in microohms across each switch blade for both source positions.
 - b. Investigate values exceeding 500 micro-ohms.
 - c. Investigate values deviating from adjacent pole by more than 50 percent.
3. Set and calibrate in accordance with Specifications, manufacturer's recommendations, and Coordination Study.
 - a. Voltage and frequency sensing relays.
 - b. Time delay relays.
 - c. Engine start and shutdown relays.
4. Perform automatic transfer tests by:
 - a. Simulating loss of normal power.

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- b. Return to normal power.
- c. Simulating loss of alternate power.
- d. Simulating single-phase conditions for normal and alternate sources.
- 5. Monitor and verify operation and timing of:
 - a. Normal and alternate voltage sensing relays.
 - b. Engine-start sequence.
 - c. Timing delay upon transfer and retransfer.
 - d. Engine cool down and shutdown.
 - e. Interlocks and limit switch functions.
 - f. Engine cool down and shutdown feature.

3.16 LOW VOLTAGE SURGE ARRESTORS

- A. Visual and Mechanical Inspection:
 - 1. Adequate clearances between arrestors and enclosures.
 - 2. Ground connections to ground bus.
- B. Electrical Tests:
 - 1. Varistor Type Arrestors:
 - a. Clamping voltage test.
 - b. Rated RMS voltage test.
 - c. Rated dc voltage test.
 - d. Varistor arrestor test values in accordance with IEEE C62.33, Section 4.4 and Section 4.9.

3.17 PHOTOVOLTAIC EQUIPMENT

- A. See Section 26 31 00.

END OF SECTION

SECTION 26 24 13

SWITCHBOARDS – LOW VOLTAGE

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall furnish and install, where indicated, a free-standing, dead-front type low voltage distribution switchboard, utilizing individual mounted circuit protective devices as specified herein, and as shown on the contract drawings.

1.2 REFERENCES

- A. The low voltage distribution switchboards and all components shall be designed, manufactured and tested in accordance with the latest applicable following standards:
 - 1. NEMA PB-2
 - 2. UL Standard 891
 - 3. UL standard 1066
 - 4. UL standard 489
 - 5. UL Standard 1449 latest edition

1.3 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Where noted in the contract documents provide seismic qualified equipment.

1.4 REGULATORY REQUIREMENTS

- A. The low-voltage switchboard shall be UL labeled.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and

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renewal parts lists where applicable, for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton
- B. Square D
- C. Or approved equal

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others shall be submitted per Section 4-6 of the SSP.

2.2 RATINGS

- A. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current of 65,000 amperes symmetrical at rated voltage or as shown on the contract documents.
- B. Bus voltage and current rating to be as indicated on the contract documents.

2.3 CONSTRUCTION

- A. Switchboard shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides and rear shall be covered with removable bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide adequate ventilation within the enclosure.
- B. All sections of the switchboard shall be front and rear aligned with depth as shown on the drawings. All protective devices shall be group mounted. Devices shall be front removable and load connections front accessible enabling switchboard to be mounted against a wall. The switchboard shall be integrated and bused to the automatic transfer switch (Section 26 36 23).
- C. The assembly shall be provided with adequate lifting means.
- D. The switchboard shall be equal to Eaton type Pow-R-Line C utilizing the components herein specified and as shown on the drawings.
- E. The switchboard shall be suitable for use as service entrance equipment and be labeled in accordance with UL requirements.

2.4 BUS

- A. All bus bars shall be silver-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on NEMA standard temperature rise criteria.
- B. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.

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- C. A 1/4 x 2 inch copper ground bus (minimum) shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchboard.
- D. All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with conical spring-type washers.

2.5 WIRING/TERMINATIONS

- A. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished as required. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.
- B. Mechanical-type terminals shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size as indicated on the drawings.
- C. Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.
- D. All control wire shall be type SIS, bundled and secured with nylon ties. Insulated locking spade terminals shall be provided for all control connections, except where saddle type terminals are provided integral to a device. All current transformer secondary leads shall first be connected to conveniently accessible short-circuit terminal blocks before connecting to any other device. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips. Provide wire markers at each end of all control wiring.

2.6 MAIN PROTECTIVE DEVICES

- A. Protective devices shall be fixed mounted insulated case low-voltage power circuit breakers, Eaton type Magnum DS or approved equal. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating. The main breaker shall be ALSIG with ARMS arc flash reduction feature.
- B. Main and tie breakers shall be true two-step stored energy devices and shall be manually operated unless otherwise indicated on contract documents.
- C. All main and tie circuit breakers shall have a minimum symmetrical interrupting capacity of 65,000 amperes. Main and tie circuit breakers shall have 30-cycle short-time withstand ratings equal to 18 times their frame ratings.
- D. All main and tie insulated case circuit breakers shall be UL1066 listed.
- E. All insulated case circuit breakers shall have three windows in the front cover to clearly indicate any electrical accessories that are mounted in the breaker. The accessory shall have a label that will indicate its function and voltage. The accessories shall be plug and lock type and UL listed for easy field installation. They shall be modular in design and shall be common to all frame sizes and ratings.

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- F. The breaker control interface shall have color-coded visual indicators to indicate contact open or closed positions as well as mechanism charged and discharged positions. Manual control pushbuttons on the breaker face shall be provided for opening and closing the breaker. The power circuit breaker shall have a “Positive On” feature. The breaker flag will read “Closed” if the contacts are welded and the breaker is attempted to be tripped or opened.
- G. Each main and tie insulated case circuit breaker shall be equipped with a tripping system consisting of three current sensors, true RMS microprocessor-based trip unit and flux-transfer shunt trip. Interchangeable current sensors with their associated rating plug shall establish the continuous trip rating of each circuit breaker. The trip unit shall be equal in all aspects to Eaton type Digitrip RMS 520MC with ARM feature.
- H. The trip unit shall be provided with an Arcflash Reduction Maintenance System for breakers 1200 amps and above and where indicated. The Arcflash Reduction Maintenance System shall allow the operator to enable a maintenance mode using a switch which enables a preset accelerated instantaneous override trip to reduce arc flash energy. A blue LED on the trip unit shall indicate the trip unit is in the maintenance mode. The use of zone selective interlocking to emulate this feature does not meet the intent of these specifications and will not be accepted.
- I. The trip unit shall have LEDs to indicate mode of trip following an automatic trip operation. The indication of the mode of trip shall be retained after an automatic trip. A reset button shall be provided to turn off the LED indication after an automatic trip. Provide battery backup for LEDs.
- J. The trip unit shall be provided with a making-current release circuit. The circuit shall be armed for approximately two cycles after breaker closing and shall operate for all peak fault levels above 25 times the ampere value of the rating plug.
- K. Trip unit shall have selectable thermal memory for enhanced circuit protection.
- L. Protective device coordination shall be provided by the addition of the following individually adjustable time/current curve shaping solid-state elements:
 - 1. Long delay pickup and time
 - 2. Short delay pickup and time, and include I^2t settings
 - 3. Instantaneous pickup
 - 4. Ground fault current pickup and time, and include I^2t settings or ground alarm only
- M. The trip unit shall have provisions for a single test kit to test each of the trip functions.
- N. The trip unit shall provide zone interlocking for the short-time delay and ground fault delay trip functions for improved system coordination where indicated on contract documents. If provided, factory shall wire the zone interlocking system.
- O. The trip unit shall have a 4-character LCD display showing phase, neutral, and ground current. The accuracy of these readings shall be +/- 2% of full scale.

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- P. The trip unit shall have provisions for connection to client's remote monitoring and control network. All monitored parameters and breaker status shall be transmitted in industry standard proto.

2.7 FEEDER PROTECTIVE DEVICES

- A. All feeder protective devices shall be Eaton or approved equal molded case circuit breakers with inverse time tripping characteristics.
- B. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non welding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
- C. Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the contract documents.
- D. All molded case circuit breakers shall be equipped with true RMS sensing electronic trip units and inverse time-current characteristics.
- E. Provide trip units with integral arc flash reduction mode for 400A frame and above. The use of zone selective interlocking to emulate this feature does not meet the intent of these specifications and will not be allowed.
- F. Ground fault protection shall be provided where indicated.
- G. Where indicated provide 100% rated UL listed circuit breakers.

2.8 ACCESSORIES

- A. Provide shunt trips, bell alarms and auxiliary switches as shown on the contract drawings.

2.9 MISCELLANEOUS DEVICES

- A. Control power transformers with primary and secondary protection shall be provided, as indicated on the drawings, or as required for proper operation of the equipment.
- B. For outdoor (NEMA 3R) installations, each section of the switchboard shall be provided with a thermostatically controlled space heater. Power for the space heaters shall be obtained from a source as indicated on the drawings.

2.10 UTILITY METERING

- A. Where indicated on the drawings, furnish a barrier to separate the utility metering compartment complete with hinged sealable door. Bus work shall include provisions for mounting utility company current transformers and potential transformers or potential taps as required by the utility company. Provide service entrance label and provide necessary applicable service entrance features per NEC and local code requirements.

2.11 SURGE PROTECTIVE DEVICE

- A. SPD shall comply with ANSI/UL 1449 latest Edition or later listing by Underwriters Laboratories (UL).
- B. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.
- C. The SPD shall be of the same manufacturer as the switchboard.
- D. The SPD shall be factory installed integral to the switchboard by the original equipment manufacturer.
- E. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.
- F. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD.
- G. All monitoring and diagnostic features shall be visible from the front of the equipment.
- H. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable single-mode modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
- I. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.
- J. Electrical Noise Filter – Each Type 2 unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
- K. Type 2 units with filtering shall conform to UL 1283 5th Edition
- L. Type 1 units shall not contain filtering or have a UL 1283 5th Edition Listing.
- M. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.
- N. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:
 - 1. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
 - 2. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that

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reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.

3. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes
4. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
5. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
6. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

O. Electrical Requirements:

1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards. End of life mode to be open circuit. Unit with end of life short-circuit mode are not acceptable.
4. Unit shall operate without the need for an external overcurrent protection device (OCPD), and be listed by UL as such. Unit must not require external OCPD or replaceable internal OCPD for the UL Listing.
5. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

Configuration	Protection Modes			
	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A

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	Protection Modes			
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

6. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.
7. ANSI/UL 1449 latest Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 latest Edition VPR for the device shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

2.12 ENCLOSURES

- A. NEMA 1 Enclosure
- B. Outdoor NEMA 3R Enclosure
 1. Outdoor enclosure shall be non-walk-in and meet applicable NEMA 3R UL requirements.
 2. Enclosure shall have sloping roof downward toward rear.
 3. Enclosure shall have protections against rodents.
 4. The enclosure shall be provided with bolt-on rear covers for each section. All enclosure shall be front access only.
 5. Doors shall have provisions for padlocking.
 6. Ventilating openings shall be provided complete with replaceable fiber glass air filters.
 7. Where indicated on contract documents provide thermostatically controlled space heaters for each structure to prevent the accumulation of moisture.
 8. Power for space heaters, lights and receptacles shall be obtained from a source as indicated on the drawings.

2.13 NAMEPLATES

- A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background. Characters shall be 3/16-inch high, minimum. Nameplates shall give item designation and circuit number as well as frame ampere size and appropriate trip rating. Furnish master nameplate giving switchboard designation, voltage ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.

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- B. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's wiring diagrams.

2.14 FINISH

- A. All exterior and interior steel surfaces of the switchboard shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchboard shall be ANSI 61 light gray.

END OF SECTION

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SECTION 26 24 19

LOW-VOLTAGE MOTOR CONTROL

PART 1 - GENERAL

1.0 SCOPE

- A. This section includes MCC mounted starters and solid state (SSRV) motor starters and variable frequency drives (VFD) to be installed in the existing Eaton motor control center. Four SSRV's are to be replaced as indicated and two SSRV's are to be replaced with VFD's.

1.2 REFERENCES

- A. The following is a list of standards which shall be followed for this section:
 - 1. Institute of Electrical and Electronics Engineers (IEEE): C2, National Electrical Safety Code (NESC).
 - 2. National Electrical Contractors Association (NECA): 402, Standard for Installing and Maintaining Motor Control Centers.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1,000 volts maximum).
 - b. ICS 1, Industrial Control and Systems: General Requirements.
 - c. ICS 2, Controllers, Contactors, and Overload Relays Rated 600 Volts.
 - d. ICS 2.3, Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More Than 600V.
 - e. ICS 18, Motor Control Centers.
 - f. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 4. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. 98, Enclosed and Dead-Front Switches.
 - b. 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
 - c. 845, Motor Control Centers.

1.3 DEFINITIONS

- A. CT: Current Transformer.
- B. LCD: Liquid Crystal Display.
- C. N.C.: Normally Closed.

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- D. N.O.: Normally Open.
- E. THD: Total Harmonic Distortion.
- F. VT: Voltage Transformer.

1.4 SUBMITTALS

A. Action Submittals:

1. Descriptive information.
2. Itemized Bill of Material.
3. Dimensional drawings.
4. Front Panel Elevations.
5. Conduit entrance locations.
6. Bus data.
7. Protective Devices: Copies of time-current characteristics.
8. Anchoring instructions and details.
9. Typed Tabulation:
 - a. Motor name; tag (equipment) numbers as shown on Drawings.
 - b. Motor horsepower.
 - c. Nameplate full load current.
 - d. Measured load current and voltage.
 - e. Heater model number and relay setting.
 - f. Protective device trip settings.
 - g. Manufacturer's solid-state starter switch or dip switch or program settings.
 - h. Attach above typed, tabulated data to a copy of starter manufacturer's overload heater or setting selection tables for starters provided.
10. Control diagrams.
11. One-line diagrams.
12. Schematic (elementary) diagrams.
13. Outline diagrams.
14. Interconnection diagrams.

B. Informational Submittals:

1. Manufacturer's installation instructions.
2. Factory test reports, certified.

3. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.

1.5 QUALITY ASSURANCE

- A. Provide products manufactured within scope of Underwriters Laboratories that conform to UL Standards and have applied UL Listing Mark.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Shipping Splits: Established by Contractor to facilitate ingress of equipment to final installation location within building.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Like Items of Equipment: End product of one manufacturer and same manufacturer as low voltage switchboard and panelboards for standardization.
- B. Make adjustments necessary to wiring, conduit, disconnect devices, motor starters, branch circuit protection, and other affected material or equipment to accommodate motors actually provided under this Contract.
- C. Controllers: NEMA ICS 1, NEMA ICS 2, Class A.
- D. Control Transformer:
 1. Two winding, 120-volt secondary, primary voltage to suit.
 2. Two current-limiting fuses for primary circuit.
 3. One fuse in secondary circuit.
 4. Mount within starter unit.
- E. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- F. Lifting lugs on equipment and devices weighing over 100 pounds.
- G. Anchor Bolts: Type 316 stainless steel, sized seismically by a licensed structural engineer registered in the State where equipment is to reside, and as specified in Section 05 50 00, Metal Fabrications.
- H. Seismic Zone and Importance Factor shall be as specified in Section 01 61 00, Common Product Requirements.
- I. Operating Conditions:
 1. Ambient Temperature: Maximum 40 degrees C.
 2. Altitude: 1000 above sea level.
 3. Equipment to be fully rated.
- J. Enclosures: In accordance with NEMA 250.
- K. Equipment Finish:
 1. Electrocoating process applied over rust-inhibiting phosphate base coating.

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2. Exterior Color: Manufacturer's standard.

2.2 SEPARATELY MOUNTED MOTOR CONTROL

A. Manually Operated Starter, Fractional Horsepower:

1. Rating: 16 amperes continuous at 277 volts maximum.
2. Single-phase, non-reversing, full voltage with overload protection.
3. Toggle operated
4. Enclosure: As shown.
5. Neon Light: Red.
6. Handle guard/lock-off.
7. Auxiliary contact

B. Combination Full-Voltage, Magnetic Starter:

1. Rating: Horsepower rated at 600 volts, UL labeled for 22,000 amperes at 480 volts short circuit capacity with overload protection.
2. Three-phase, non-reversing, full voltage.
3. Control: As shown on Drawings.
4. Disconnect Type: Non-fused.
5. Enclosure: As shown on Drawings.
6. Pilot Lights: Red–OFF/STOPPED/VALVE CLOSED and Green–ON/RUNNING/VALVE OPEN.
7. Padlock operating handle, capable of up to three locks.

2.3 SOURCE QUALITY CONTROL

A. Factory Testing:

1. Applicable Standards: NEMA ICS 18, UL 845, and NEC Article 430, Part VIII.
2. Perform standard factory inspection and tests in accordance with NEMA requirements to verify components have been designed to Specification, assembled in accordance with applicable standards, and each unit functions in accordance with electrical diagrams.
3. Actual operation shall be performed wherever possible. Otherwise, inspect and perform continuity checks.
4. Verify component devices operated correctly in circuits as shown on diagrams or as called for in Specification. Control Circuits and Devices:
 - a. Energize circuit at rated voltage.
 - b. Operate control devices.
 - c. Perform continuity check.

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5. Instruments, Meters, Protective Relays, and Equipment:
 - a. Verify devices functioned by energizing potential to rated values with connection to devices made at outgoing terminal blocks.
 - b. Verify protective relays operated for functional checks and trips manually initiated to verify functioning of operation for indicator and associated circuits.
6. Perform dielectric tests on primary circuits and equipment, except potential transformers. Tests shall be made phase-to-phase and phase-to-around with 60-cycle test voltages applied for 1 second at 2,640 volts.
7. Verify equipment passed tests and inspection.
8. Provide standard factory inspection and test checklists, and final certified and signed test report.

2.4 REDUCED VOLTAGE SOFT STARTERS (SSRV)

- A. Three existing soft starters (P-01, P-02, P-03) in the motor control center shall be upgraded to include replacement of the soft starter, modification of the starter controls, removal of power factor capacitors, and replacement of the 24 vdc power supply.
- B. The soft starter shall match existing manufacturer with the most current version be Eaton 811+, or equal.
- C. Soft starters shall be rated normal duty (variable torque).
- D. Provide the following features: Door mounted digital interface and cable, Modbus TCP Ethernet IP communications, lugs with lug cover kits, mounting plates, Pump control feature, and extended ramp start feature.
- E. Refer to the Contract Drawings for control modifications.

2.5 VARIABLE FREQUENCY DRIVES (VFD)

- A. Two existing variable frequency drives (P-05 and P-06) in the motor control center shall be modified to include replacement of the motor circuit protector with a thermal magnetic breaker, modification of the starter controls, and addition of an Ethernet communications card to the existing Mitsubishi F800 series VFD's. The communications card shall be Mitsubishi A8NETH-2P.
- B. One existing SSRV (P-04) shall be retrofitted to a VFD. The power factor capacitor and associated controls shall be removed.
- C. The VFD shall be Mitsubishi FR-800-E series. The VFD shall be rated variable torque.
- D. Provide the following features: Door mounted digital interface and cable, DC link choke, lugs with lug cover kits, and mounting plates.
- E. Modify the back panel per Contract Document notes.
- F. Refer to the Contract Drawings for control modifications.

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PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install equipment in accordance with NEMA ICS 2.3, IEEE C2, NECA 402, Submittals, and manufacturer's written instructions and recommendations.
2. Secure equipment to mounting pads with anchor bolts of sufficient size and number adequate for specified seismic conditions.
3. Install equipment plumb and in longitudinal alignment with pad or wall.
4. Coordinate terminal connections with installation of secondary feeders.
5. Grout mounting channels into floor or mounting pads.
6. Retighten current-carrying bolted connections and enclosure support framing and panels to manufacturer's recommendations.
7. Motor Data: Provide typed, self-adhesive label attached inside each motor starter enclosure door displaying the following information:
 - a. Motor served by tag number and equipment name.
 - b. Nameplate horsepower.
 - c. Motor code letter.
 - d. Full load amperes.
 - e. Service factor.
 - f. Installed overload relay heater catalog number.

B. Circuit Breakers:

1. Field adjust trip settings of motor starter magnetic-trip-only circuit breakers.
2. Adjust to approximately 11 times motor rated current.
3. Determine motor rated current from motor nameplate following installation.

C. Overload Relay: Select and install overload relay heaters and switch settings after actual nameplate full-load current rating of motor has been determined.

3.2 MANUFACTURER'S SERVICES

- #### **A. Furnish manufacturer's representative in accordance with Section 01 43 33, Manufacturers' Field Services, for the following services at Job Site or classroom as designated by Owner, for minimum person-days listed below, travel time excluded:**
1. One person-days for installation assistance, and inspection of installation, functional and performance testing.
 2. One person-days for plant startup and for training of Owner's personnel.

END OF SECTION

LOW-VOLTAGE MOTOR CONTROL

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SECTION 26 27 00

MINI POWER CENTERS

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall furnish and install single-phase and three-phase general purpose individually mounted mini-power centers (MPC) of the two-winding type, self-cooled, as specified herein and as shown on the contract drawings. The MPC shall be sized by the generator supplier. The MPC shall be part of the Generator enclosure and provided by the generator supplier.

1.2 REFERENCES

- A. The mini-power center and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL, ANSI and NEMA.
- B. Section 26 32 13 – Standby Generator.

1.3 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 - 1. Dimension drawing weights
 - 2. Transformer ratings including:
 - a. kVA
 - b. Primary and secondary voltage
 - c. Taps
 - d. Primary and secondary continuous current
 - e. Insulation class and temperature rise
 - f. Sound level
 - 3. Component ratings including:
 - a. Voltage
 - b. Continuous current
 - c. Interrupting ratings
 - 4. Cable terminal sizes
 - 5. Product data sheets.

1.4 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:

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1. Final (as-built) drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
2. Connection diagrams
Installation information

1.5 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the secondary distribution equipment.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment.

1.6 REGULATORY REQUIREMENTS

- A. The assembly and all components shall be U.L. listed.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton, or approved equal.

2.2 RATINGS

- A. kVA and voltage ratings shall be selected by the generator supplier. Minimum rating is 10 Kva.
- B. Units shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.
- C. Transformer sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:
Up to 9 kVA 40 db
10 to 30 kVA 45 db

2.3 CONSTRUCTION

- A. Each mini-power center shall include a primary main breaker, an encapsulated dry-type transformer and a loadcenter with secondary main breaker.
- B. Primary main, secondary main and feeder breakers shall be enclosed with a padlockable hinged door.
- C. Mini-power centers shall be suitable for service entrance application and labeled as such.
- D. Insulation Systems
 - 1. Transformers shall be insulated with a 180 degrees C insulation system and rated at 115 degrees C temperature rise
 - 2. Required performance shall be obtained without exceeding the above-indicated temperature rise in a 40 degrees C maximum ambient, with a 30 degrees C average over 24 hours
 - 3. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635
- E. Core and Coil Assemblies
 - 1. Transformer core shall be constructed with high-grade, non-aging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade aluminum [copper optional] with continuous wound construction.
 - 2. The core and coil assembly shall be completely encapsulated in a proportioned mixture of resin and aggregate to provide a moisture proof, shock-resistant seal. The core and coil encapsulation system shall minimize the sound level.
 - 3. The core of the transformer shall be grounded to the enclosure
 - 4. Provide two (2) 5% FCBN taps

2.4 BUS

- A. Secondary bus shall be copper.

2.5 WIRING/TERMINATIONS

- A. All interconnecting wiring between the primary breaker and transformer, secondary main breaker and transformer and distribution section shall be factory installed.
- B. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring.

2.6 MAIN DEVICES

- A. Each mini-power center shall include a primary main breaker with an interrupting rating of 14 kA at 277/480 volts; and a secondary main breaker with an interrupting rating of 10kA at 120/240 volts, and panelboard.

2.7 FEEDER DEVICES

- A. The secondary distribution section shall accommodate one-inch bolt-on breakers with 10 kA interrupting capacity.

2.8 ENCLOSURE

- A. The enclosure shall be made of heavy-gauge steel and the maximum temperature of the enclosure shall not exceed 90 degrees C.
- B. The enclosure shall be totally enclosed, nonventilated, NEMA 3R, with lifting provisions.

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA.
 - 1. Ratio tests at the rated voltage connection and at all tap connections
 - 2. Polarity and phase-relation tests on the rated voltage connection
 - 3. Applied potential tests
 - 4. Induced potential test
 - 5. No-load and excitation current at rated voltage on the rated voltage connection

3.2 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

3.3 FIELD ADJUSTMENTS

- A. Adjust taps to deliver appropriate secondary voltage.

3.4 FIELD TESTING

- A. Measure primary and secondary voltages for proper tap settings.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 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. 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).
 3. 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.
 4. National Electrical Contractors Association (NECA): 1, Standard Practice of Good Workmanship in Electrical Contracting.
 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. WD 1, General Color Requirements for Wiring Devices.
 - c. WD 6, Wiring Devices – Dimensional Specifications.
 6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
 7. Underwriters Laboratories Inc. (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. 1436, Standard for Safety for Outlet Circuit Testers and Similar Indicating Devices.
 - e. 1449, Standard for Safety for Surge Protective Devices (SPD).

1.2 SUBMITTALS

- A. Action Submittals: Manufacturer’s product data for wiring devices.

PART 2 - PRODUCTS

2.1 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. Rivet-less 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: Provide the following features in comparable devices where indicated:
 - a. 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 horsepower for 120V ac, single-phase, two-pole.
 - b. 3 horsepower for 240V ac, single-phase, two-pole.
 - c. 15 horsepower for 480V ac, three-phase, three-pole.
6. Screw-type terminal.
7. Manufacturers and Products:
 - a. Cooper Arrow Hart.

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- b. Hubbell Bryant; HBL78 Series.
- c. Leviton.
- d. Or approved equal

2.2 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 (rivet-less 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: Provide the following features in comparable devices where indicated:
 - a. Listed weather-resistant per NEC 406.8.
- 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; GFTR20 Series.
 - b. Cooper Arrow Hart WRVGF20 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. Where indicated provide matching plug with cord-grip features for each special-purpose receptacle.

2.3 DEVICE PLATES

- A. Sectional type plate not permitted.
- B. Plastic:
 - 1. Material: Specification grade, 0.10-inch minimum thickness, noncombustible, thermosetting.
 - 2. Color: To match associated wiring device.
 - 3. Mounting Screw: Oval-head metal, color matched to plate.
- C. Metal:
 - 1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
 - 2. Finish: ASTM A167, Type 302/304, satin.
 - 3. Mounting Screw: Oval-head, finish matched to plate.
- D. Cast Metal:
 - 1. Material: Malleable ferrous metal, with gaskets].
 - 2. Screw: Oval-head stainless steel.
- E. Sheet Steel:
 - 1. Finish: Zinc electroplate.
 - 2. Screws: Oval-head stainless steel.
 - 3. Manufacturers:
 - a. Appleton.

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- b. Crouse-Hinds.
- c. Or approved equal
- F. Engraved:
 - 1. Character Height: 1/8-inch.
 - 2. Filler: White.
- G. Weatherproof:
 - 1. Receptacle, Weatherproof Type 1:
 - a. Gasketed, cast-aluminum, with individual cap over each receptacle opening.
 - b. Mounting Screw and Cap Spring: Stainless steel.
 - c. Manufacturers and Products:
 - 1) Crouse-Hinds; Type WLRD-1.
 - 2) Appleton; Type FSK-WRD.
 - 3) Or approved equal
 - 2. Receptacle, Weatherproof Type 2:
 - a. UL listed for wet location while in use.
 - b. Manufacturer and Product: TayMac; Type Multi-Mac. Or approved equal
 - 3. 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
- H. Raised Sheet Metal: 1/2-inch high zinc- or cadmium-plated steel designed for one-piece drawn type sheet steel box.
- I. Sheet Steel: Formed sheet steel or Feraloy designed for installation on cast-metal box.

2.4 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 Connected to Normal Power System:

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1. Office Areas: Ivory.
2. Other Areas: Ivory.

PART 3 - EXECUTION

3.1 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. Pig-tailing 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.

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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.

3.2 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.

3.3 RECEPTACLE INSTALLATION

A. Duplex Receptacle:

1. Install with grounding slot up, except where horizontal mounting is shown, in which case install with neutral slot up.
2. Ground receptacle to box with grounding wire only.
3. Weatherproof Receptacle:
 - a. Install in cast metal box.
 - b. Install such that hinge for protective cover is above receptacle opening.
4. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for “downstream” conventional receptacles.

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5. Special-Purpose Receptacle: Install in accordance with manufacturer's instructions.

3.4 DEVICE PLATE INSTALLATION

- A. Securely fasten to wiring device; ensure tight fit to box.
- B. Flush Mounted: Install with all four edges in continuous contact with finished wall surface without use of mat or similar material. Plaster fillings will not be acceptable.
- C. Surface Mounted: Plate shall not extend beyond sides of box, unless plate has no sharp corners or edges.
- D. Install with alignment tolerance to box of 1/16 inch.
- E. Engrave with designated title.
- F. Type (Unless Otherwise Shown):
 1. Office Areas: Nylon.
 2. Other Areas: Nylon.
 3. Exterior:
 - a. Switch: Weatherproof.
 - b. Receptacle in Damp Location: Weatherproof Type 1.
 - c. Receptacle in Wet Location: Weatherproof Type 2.
- G. Interior:
 1. Flush Mounted Box: Nylon.
 2. Surface Mounted, Metal Box:
 - a. General Purpose Areas: Sheet Steel.
 - b. Other Areas: Cast.
 3. Surface Mounted, Aluminum Box:
 - a. General Purpose Areas: Stamped.
 - b. Other Areas: Cast.
 4. Surface Mounted, Sheet Steel Box: Raised sheet steel.
 5. Surface Mounted, Nonmetallic Box: Manufacturer's standard.
 6. Receptacle Shown as Weatherproof on Drawings: Weatherproof Type 1.

3.5 IDENTIFICATION

- A. Use tape labels for identification of individual wall switches and receptacles in dry indoor locations.
 1. Degrease and clean device plate surface to receive tape labels.

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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.

3.6 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

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WIRING DEVICES

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SECTION 26 31 00

PHOTOVOLTAIC EQUIPMENT

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The CONTRACTOR shall be responsible for the installation of a solar Photovoltaic (PV) system on Clearwell 1 (Phase 2, these documents). PV System shall be complete and operable in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the applicable requirements of the National Electrical Code (NEC); provided, that where a local code or ordinance is in conflict with the NEC or UL, the provisions of said local code or ordinance shall take precedence.
- B. All systems must be installed in accordance with all applicable requirements of the City design guidelines, California Solar Initiative and the California Electrical Code (CEC), including but not limited to Article 690, "Solar Photovoltaic Systems" and California Electrical Code Article 705 - "Interconnected Electrical Power Production Sources."
- C. Codes:
 - 1. NEC 2014 National Electrical Code
 - 2. CEC 2016 California Electrical Code
- D. Commercial Standards:
 - 1. ANSI C57.12.00 General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
 - 2. IEEE Institute of Electrical and Electronic Engineers
 - 3. NFPA National Fire Protection Association
 - 4. UL Underwriters' Laboratories, Inc.
 - 5. NEMA National Electrical Manufacturer's Association

1.3 RELATED SECTIONS

- A. The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.
 - 1. Section 260502 Basic Electrical Requirements
 - 2. Section 260504 Basic Electrical Materials and Methods
 - 3. Section 260505 Conductors

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4. Section 260526 Grounding and Bonding for Electrical Systems
5. Section 260533 Raceway, Conduit and Boxes
6. Section 260570 Electrical Systems Analysis
7. Section 262413 Switchboards – Low Voltage

1.4 OPERATION AND MAINTENANCE

- A. The CONTRACTOR shall submit operation and maintenance information in accordance with Section 017823 - Operation and Maintenance Data. The submittal shall be supplemented by written text and shall include the following:
 1. Operating procedures.
 2. Maintenance procedures.
 3. Manufacturers parts list, illustrations, assemblies, and diagrams.
 4. Contractor shall provide 3 hard copy sets of O&M manuals. O&M Manual should include trouble shooting and safety procedures specific to the supplied equipment at the site.
 5. Contractor shall provide 1 set of As-Built drawings in City's current CADD standards.

1.5 CONTRACT SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings and performance specifications of all equipment in accordance with Section 013300 – Submittal Procedures.
- B. After review by the CONSTRUCTION MANAGER, the shop drawings of the solar PV system shall be submitted to the ENGINEER for approval before procurement and installation.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials: All materials and equipment furnished under this Section shall be new; they shall be in accordance with the requirements of the Institute of Electrical and Electronic Engineers, the National Electrical Manufacturer's Association, the National Fire Protection Association, and the National Electrical Code. Where available, all materials and equipment shall bear the Underwriters Laboratories label.
- B. Equipment: All equipment necessary for this ballasted roof mounted PV system shall be compatible.
- C. Enclosure Requirements: All outdoor equipment, fixtures, and wiring devices shall be of approved, weatherproof construction.
- D. Standard Products: Materials and equipment submitted for approval shall be the cataloged products of companies regularly engaged in the manufacture of such items, of the latest standard design that conforms to the specification requirements,

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and shall essentially duplicate material and equipment that has been in satisfactory use for several years.

- E. Identical Equipment: All equipment of the same type shall be identical and interchangeable.
- F. Equipment Ratings: All equipment shall be rated for the worst case service conditions regardless of rating factors or duty cycles.

2.2 PANELS

- A. Type: Solar panels shall produce a peak output of 1.2 MWac (for Clearwell 1 / Phase 2) and 1.0 MWac (for Clearwell 2 / Phase 1 by others) using the panel space on the roof as indicated by the contract drawings.
- B. Output: Panels shall develop a minimum of 90% rated output after 10 years, and 80% rated output after 25 years.
- C. Performance: 25-year linear performance guarantee, or better.
- D. Warranty: A minimum 10-year extended product workmanship warranty.
- E. Voltage Rating: Solar panels shall be rated for 1000V application minimum; 1500V rating also acceptable.
- F. UL 1703 certified product.

2.3 PANEL RACKING

- A. Type: A ballasted roof mounted racking system that is readily available on the market, compatible with the project panel, and meets the design loads and requirements per the contract drawings.
- B. The racking system must accommodate a tilt angle of 10 degrees and be made of high-grade stainless steel.
- C. The racking system adjustments shall be capable of compensating the slight roof pitch, as indicated on the contract drawings.
- D. Must have integrated grounding and wiring management.
- E. UL 2703 Class A system fire classification rating.
- F. Warranty: A minimum 15-year extended product workmanship warranty.

2.4 PANEL LAYOUT

- A. Solar PV system shall not interfere with access hatches minimum clearances and walkways.
- B. Access lanes located on the roof must be a minimum of eight-feet wide.
- C. Panel layout shall consider the accessibility for routine maintenance and cleaning. Contractor to verify solar panel layout with the City of San Diego prior to installation.

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- D. Panel layout shall consider shading from all roof structures. Contractor to confirm the shading of all installed roof top projections.

2.5 INVERTERS

- A. Type: Inverters shall be grid tie inverters, UL 1741SA compliant, and approved by SDG&E.
- B. Enclosure: Inverter housing shall have a minimum rating of NEMA 3R.
- C. Anchoring: Inverter shall be capable of being ballast mounted on 3rd Party mounting material. Manufacturer to provide recommended bolt size and bolt layout.
- D. Ratings: Inverter rating shall match the ratings on the construction drawings.
 - 1. Output Rating 62 kW
 - 2. Output Voltage 3 PH, 4W, 480VAC, 60 HZ
 - 3. Input Voltage 1000 V
 - 4. Minimum Efficiency 96.5%
 - 5. Maximum DC Ratio 1.50
 - 6. Minimum DC Ratio 1.20
- E. DC Input: Inverters shall match the configuration on the construction drawings, with 6 Maximum Power Point Trackers (MPPTs) and 2 string inputs per MPPT.
- F. Ground Fault Protection: Inverter shall have integrated ground fault protection. Ground fault protection shall trip inverter offline and provide a status contact for customer use.
- G. Control Power: Inverter shall not require an external control power source.
- H. SCADA: Inverter shall have the ability to communicate via serial or Ethernet and shall report current inverter status, alarms, input and output voltages and current and metering data.
- I. Environmental: Inverters shall be designed to operate at full capacity outdoors at the project site without any external cooling or heating.
- J. Warranty: Inverter shall have a minimum warranty of 15 years.
- K. Voltage Rating: All inverters shall be rated for 1000V applications.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. General: All electrical equipment shall be installed securely in place. Equipment shall be mounted parallel and perpendicular to the walls, floors, and ceilings. Installation to follow all manufacturer installation instructions, Code requirements described in Part 1.2 of this Section, all applicable Technical Specification Sections, and general industry best practices.

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- B. Anchors: All anchors and fasteners shall be types designed for the intended purpose and shall be capable of adequately, safely, and permanently securing the material in place. Generally, screws shall be used on wood surfaces, masonry anchors in concrete or brick, toggle bolts on hollow walls, machine screws, bolts, or welded studs on steel. Nails shall be used only for temporary attachment or support.
- C. Omissions or Conflicts: Omissions or conflicts on the Drawings or between Drawings and Specifications shall be brought to the attention of the CONSTRUCTION MANAGER for clarification before proceeding with the work.
- D. Preparation: The CONTRACTOR shall make all necessary provisions throughout the site to receive all equipment and store all electrical equipment in a clean, dry, and secure environment as construction progresses and shall furnish and install adequate backing, supports, inserts, and anchor bolts for the hanging and support of all electrical cabinets, enclosures, conduits, panel boards, and switches, and shall furnish and install sleeves through walls, floors, or foundations where electrical lines are required to penetrate.
- E. Construction Phasing: The solar PV system shall be installed after construction of the Clearwell that will support it has been completed and accepted by the City. The system should deliver energy to the meter as soon as possible, thereafter. After installation of the solar facility and during the construction of the subsequent clear well the GENERAL CONTRACTOR is responsible for maintaining the system performing at full capacity and with no damage until all construction is complete.
- F. Contractor to provide 10-year workmanship warranty of complete PV System, per CPUC standards, to protect against defects and undue degradation of electrical generation output.
- G. The contractor shall be responsible for all coordination with SDG&E and shall assist in the preparation and submittal of (1) NEM Interconnection Application and Agreement for the solar photovoltaic system, in accordance with Rule 21 from local electric utility service company. This shall be done at no cost or liability to the City.

3.2 COMMISSIONING -GENERAL

- A. Commissioning procedures and system testing will verify that the entire installation is complete and functions properly within acceptable parameters of the tests performed. This will serve as proof the entire facility functions as a complete unit per specifications. It must be proven that all equipment functions as specified per manufacturer's requirements and local AHJ or Utility ordinances.
 - 1. All work must be performed by qualified technicians and follow all manufacturer guidelines or AHJ/Utility requirements.
 - 2. Contractor shall provide documentation of all DC String open-circuit voltage (Voc), Polarity, and operating Current (Imp). Document should be organized and legible on company letterhead. Engineer to review all testing results and issue approval prior to system energization.

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3. Contractor shall provide documentation of all DC PV source circuits (or Strings) Open-circuit Voltage (Voc), Polarity, and Operating Current (Imp). Document should organized and legible on company letterhead. Engineer to review all testing results and issue approval prior to system energization.
4. Contractor shall provide documentation of Insulation Resistance tests, or “Megger” testing on all PV source circuits (or Strings), DC Combiner output circuits, Inverter output circuits, and PV Switchboard output circuits. Testing to include all phases and all parallel runs. Document should organized and legible on company letterhead. Engineer to review all testing results and issue approval prior to system energization.
5. (To Be Completed by 3rd Party Testing Agency) A System Acceptance Test shall be performed to determine if the full system is achieving the designed output and functioning properly. The test will include factors for irradiance values and back-of-module temperature measured at the time of the test. The adjusted expected output in kW should be within 90% of the measured output in kW to be considered acceptable. A minimum of (3) trials must be performed, at a time of day when irradiance on-site is measured at 800 W/m² or greater.
6. (To Be Completed by 3rd Party Testing Agency) A System Start-Up test shall be performed to determine if the inverters go through proper IEEE 1547 and UL 1741 processes during shut-down and start-up. The system will be turned off at the Utility Disconnect, verify all inverters shut-down and cease operation within 2 seconds. The system will be turned back on at the Utility Disconnect, and the inverters must show a 5 minute time delay before energization.

END OF SECTION

**SECTION 26 32 13
STANDBY GENERATOR**

PART 1 - GENERAL

1.1 GENERAL

A. It is the intent of these specifications to secure for the purchaser a generator set of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein. The equipment supplied and the installation shall meet the applicable requirements of the following codes and regulations:

1. California Administration Code (CAC)

CAC Title 24	State of California Administration Code, Title 24, Building Standards
CAC Title 19	State of California Administration Code, Title 19, Public Safety
2. Code of Federal Regulations (CFR)

CFR 1910	Occupational Safety and Health Standards
a. Electrical Generating Systems Association (EGSA)	
EGSA 100B	Performance Standard for Engine Cranking Batteries Used with Engine Generator Sets
EGSA 100C	Performance Standard for Battery Chargers for Engine Starting Batteries and Control Batteries
EGSA 100D	Performance Standard for Generator Overcurrent Protection 600 Volts and Below
EGSA 100E	Performance Standard for Governors on Engine Generator Sets
EGSA 100F	Performance Standard for Engine Protection Systems
EGSA 100G	Performance Standard for Generator Set Instrumentation, Control and Auxiliary Equipment
EGSA 100M	Performance Standard for Multiple Engine Generator Set Control Systems
EGSA 100S	Performance Standard for Transfer Switches for Use with Engine Generator Sets
EGSA 100T	Diesel Fuel Systems for Engine Generator Sets with Above Ground Steel Tanks

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- b. International Conference of Building Officials (ICBO)
 - ICBO UBC Uniform Building Code
- c. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
 - IEEE 115 Synchronous Machines
 - IEEE 126 Speed Governing of Internal Combustion Engine-Generator Units
 - IEEE 421.1 Definitions for Excitation Systems for Synchronous Machines
 - IEEE C37.2 Electrical Power System Device
- d. National Electrical Manufacturers Association (NEMA)
 - NEMA 250 Enclosures for Electrical Equipment (1000 volts Maximum)
 - NEMA AB 1 Molded Case Circuit Breakers and Molded Case Switches
 - NEMA MG 1 Motors and Generators
 - NEMA PB 2 Deadfront Distribution Switchboards
 - NEMA/ICS 1 Industrial Control and Systems
 - NEMA/ICS 2 Controllers, Contactors and Overload Relays, Rated not more than 2000 Volts AC or 750 Volts DC
 - NEMA/ICS 2-447 Standard for Automatic Transfer Switches
 - NEMA/ICS 6 Industrial Control and Systems Enclosures
- e. National Fire Protection Association (NFPA)
 - NFPA 20 Centrifugal Fire Pumps
 - NFPA 30 Flammable and Combustible Liquids Code
 - NFPA 37 Installation and Use of Stationary Engines and Gas Turbines
 - NFPA 70 National Electrical Code
 - NFPA 70B Electrical Equipment Maintenance
 - NFPA 99 Health Care Facilities
 - NFPA 101 Life Safety Code
 - NFPA 110 Emergency and Standby Power Systems
- f. Underwriters Laboratories Inc. (UL)
 - UL 142 Steel Above Ground Tanks
 - UL 429 Electrically Operated Valves

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UL 489	Molded-Case Circuit Breakers and Circuit-Breaker Enclosures
UL 1008	Automatic Transfer Switches
UL 1236	Battery Chargers for Charging Engine-Starter Batteries
UL 2200	Standard for Stationary Engine Generator Assemblies

g. Regional Codes and Regulations

County Noise Ordinance as determined by site location

Air Pollution Control City Rules and Regulations for San Diego Air Pollution Control District at time of permitting.

3. All equipment shall be new, of current domestic production of a national firm which manufactures the engine-generator set as a matched unit, and whose quality control program complies with ISO Standards and that is certified to ISO-9001. The manufacturer together with its authorized local representative, shall have full responsibility for the performance of the generator set and its accessories. Unit shall be designed for outdoor installation.
4. Supplier shall maintain a parts and service facility within 50 miles of the installation site, employ factory trained technicians, and offer 24-hour emergency service. Supplier shall be the authorized dealer of a manufacturer offering standard production equipment built and prototype tested in accordance with NFPA 110 and shall be authorized to administer the warranty for all components of the emergency generator system specified herein.
5. The engine generator shall be equipped with the necessary devices to meet current SDAPCD regulations for the operation of the submitted diesel generator. Documentation shall list current tier requirements and particulate filter. Contractor shall obtain a general permit registration number to submit application, pay for, and obtain a San Diego Air Pollution Control District (APCD) permit to construct and operate the standby generator for the first year of operation. The generator fuel fill system shall meet the requirements of the local fire department. The fuel tank vent (1.25" minimum) shall be routed outside of the enclosure 12' above the generator pad.
6. Contractor to obtain Hazardous Material Permit from San Diego Fire Department.
7. Emissions:
 - a. Air Emissions:

The Contractor shall be solely responsible for providing a system that complies with the latest BACT standards at the time of equipment purchase. At a

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minimum, the engines shall be a minimum Tier 2 Certified. Documentation shall list current Tier requirements and particulate filters (if required). Particulate filters shall be active type.

1.2 SUBMITTALS

- A. Submittals shall be provided in sufficient detail to demonstrate compliance with these specifications. As a minimum, the submittal shall be bound, provided with an index to cross-reference the submittal item and page location, marked to indicate the specific item to be provided, and include the following data.
1. Bill of Material, covering all equipment submitted.
 2. Qualifications of the engine-generator manufacturer and of the authorized distributor. ISO-9001 certification. 24-Hour emergency service capability.
 3. Manufacturer's published rating sheet. NFPA-110 prototype test verification. Altitude and temperature derating procedures. Frequency and voltage regulation. Cooling system capability. Full rated load pickup capability.
 4. Installation requirements: radiator airflow and backpressure capacity, combustion air requirement, fuel consumption, fuel circulation, heat rejection, exhaust flow, exhaust back-pressure calculations, battery requirements. Floor layout dimensional data with provision for cable entry and termination.
 5. Engine performance data. Configuration, cubic inch displacement, rated RPM, type of aspiration, voltage of electrical system, oil and coolant, exhaust volume and temperature.
 6. Exhaust emission data provided on the current application form for the air quality agency having jurisdiction. Exhaust and crankcase emission control equipment devices. Provide completed APCD forms.
 7. Battery set and battery charger.
 8. Generator performance data. Motor and load starting capability verification. Temperature rise and insulation classification. Short circuit sustaining capability. Over-voltage safety shutdown. Decrement curve specific voltage specified.
 9. Output circuit breaker size, manufacturer, model, and trip curve for 10 second short-circuit capability.
 10. Control panel features and performance. Meters and gauges. Safety alarm and shutdown devices. Cranking control. Indicator lamps and horn. Control switches. Rodent protection.
 11. Exhaust silencer attenuation rating.
 12. Jacket water heater system.

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13. Fuel system. Alarm and indicator devices. Dimensional data. Shutoff valves, fuel strainer, and flexible hose. Fuel purifier.
14. Fuel storage system. Compliance with UL-142. Alarm and indicator devices. Dimensional data. Fuel capacity and hours of operation possible. Seismic restraint devices and calculations for fuel tank.
15. Generator sizing report showing steps and voltage drops.
16. Seismic restraint devices. Agency pre-qualification. Dimensional data. Seismic restraint calculations including anchorage stamped and signed by a registered California civil or structural engineer.
17. Generator set enclosure. Material and construction details. Dimensional data. Sound attenuation data when specified. Compatibility with requirements of generator set at rated load and specified ambient conditions.
18. Completed APCD applications complete with emissions data.
19. Dimensional data.
20. Schematic and wiring diagrams for all major components
21. Interconnection diagram for all major components.
22. Testing procedure.
23. Warranty certificate and administration authorization.
24. Preventative maintenance contract. Pollution liability insurance and certificate.
25. Operations and Maintenance Manual:
 - a. Requirements set forth in Section 01 78 23
 - b. Spreadsheet of warranty end dates
 - c. Permit expiration dates
 - d. Manufacturer contact information
 - e. Training Material
26. Spill Prevention, Control, and Countermeasure (SPCC) Plan consistent with State and Federal Requirements

PART 2 - PRODUCTS

2.1 RATING

- A. Unit shall be minimally rated at 1250 KW, .8 PF, 1562 KVA for continuous standby operation during any utility power failure. Rating shall be verified by published specification sheets of its nationally recognized manufacturer. Generator set shall be capable of accepting rated load in one step in accordance with NFPA-110 Para. 3-5.3.1.

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- B. System voltage shall be 277 / 480, 3 phase, 4 wire, 60 Hertz, with full load current capacity of 1881 amps.
- C. Suppliers shall be Cummins KTA50, Caterpillar 3512 TA, or Kohler 1250REOZMD or KD1250-A.

2.2 ENGINE

- A. The engine shall be 4-cycle, direct connected to the generator by a semi-flexible coupling, and both shall be mounted on a common sub-base. The engine shall have sufficient power to produce the specified rating when operating at generator synchronous speed with all accessories required for normal operation including exhaust, fuel, cooling, and battery charging systems. Maximum engine speed shall be 1800 RPM. The engine shall have a pressure lubrication system and replaceable element oil filter. The engine oil drain shall be piped to the outside of the skid base and provided with a stainless-steel ball-valve to facilitate draining.
- B. The engine shall be equipped with a sub base fuel tank and fuel system suitable for operation on DF-2 diesel fuel with a sulfur content not to exceed 0.05 percent by weight. Fuel system shall include an engine driven transfer pump, replaceable filter, fuel purifier, and flexible fuel lines. Fuel system shall comply with the requirements of NFPA-37 and NFPA-110 Paragraph 5-9.
 - 1. Diesel fuel purifier system shall be the heavy-duty centrifugally driven type and shall be furnished in addition to the filtration system furnished by the engine manufacturer. The purifier system shall be designed to help prevent the formation of rust in the fuel. The unit shall be rated to remove particles of (7) microns and be capable of removing a minimum of 99.5 percent of all water and 95 percent of solid type contaminants in the fuel. The unit furnished shall be located in the fuel system as the first protective device after the fuel leaves the fuel tank. Unit furnished shall have an electric heater element to help prevent diesel fuel gelling in winter operation. The heater shall be rated at a maximum of 100 watts and be the 12-volt DC type to operate only when the engine is running. Power source for the heater shall be the engine's 24-volt system. The system furnished shall not require the replacement of any type of filter element or any other internal parts. System shall be RCI diesel fuel purifier, or equal.
 - 2. Provide flexible fuel lines rated for duty at 300 degrees Fahrenheit and 100 psi.
- C. The engine cooling system shall be designed to provide adequate cooling at rated load, within the specified enclosure, in ambient temperatures up to 104 degrees Fahrenheit. The system shall include a unit mounted radiator, blower fan, water pump, and thermostat. Cooling system shall meet the performance requirements of NFPA-110 Para. 5-8.1. Provide a low water level shutdown device.

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- D. The engine governor shall maintain frequency within a .25 percent band under steady state conditions and isochronous from no-load to full load. Regulation shall be as defined by IEEE Std 126-1959/83. Governor performance shall comply with EGSA 100E.
- E. Starting shall be by means of a solenoid operated positive engagement gear driven electric starter for operation on 12 or 24 volt D.C. Note the cycle-crank requirement specified within the generator control panel. Provide a primary and a secondary means of cranking termination in accordance with NFPA-110 Para. 3-5.4.2.
- F. Engine protective devices shall meet the performance requirements of EGSA 100F and shall include the following:
 - 1. Overcrank - lockout
 - 2. Low oil pressure - preliminary alarm
 - 3. Low oil pressure - shutdown
 - 4. High water temperature - preliminary alarm
 - 5. High water temperature - shutdown
 - 6. Low water temperature - alarm
 - 7. Low water level - shutdown
 - 8. Overspeed - shutdown
 - 9. Low fuel level - alarm
- G. Provide vibration isolators installed between the engine generator and base assembly, or between the base assembly and the foundation.
- H. Engine crankcase emissions shall be filtered to prevent oil mist from contaminating the engine space and to comply with Air Pollution Control District requirements for visible emissions. Filters shall be of the closed cycle type. Filter device shall consist of a replaceable filter element and a removable reservoir for collected fluids. Filter shall be sized for the allowable crankcase backpressure established by the engine manufacturer.

2.3 BATTERY SET

- A. A lead acid battery set shall be provided and installed on the generator base with seismic restraints. System voltage shall match that of the starter. Cold-cranking amperage capacity shall conform with the requirements of SAE Standard J-537 for zero degrees Fahrenheit. Performance of the battery system shall comply with EGSA 100B.

2.4 BATTERY CHARGER

- A. An automatic float/equalize type battery charger shall be provided, installed with vibration isolators, and wired on the generator set. Connections to the battery shall be solid wired (clip-on type clamps not acceptable). Input voltage shall be 120 volts AC. Charger shall be UL listed. Output capacity shall be a

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minimum of 10 amps. Battery charger shall meet the performance requirements of EGSA 100C, and shall include the characteristics required by NFPA-110 Para. 3-5.4.6. DC voltage regulation shall be within +/-1 percent from no load to full load and over an AC input line voltage variation of +/-10 percent.

- B. Features shall include the following:
1. Automatic "float-to-equalize" operation, with individual potentiometer adjustments.
 2. "Power on" lamp to indicate when charger is operating.
 3. DC voltmeter and DC ammeter, 5 percent full scale accuracy.
 4. Reverse polarity protection.
 5. AC input and DC output fuse protection.
 6. Automatic current limiting protection.
 7. Battery charger failure alarm contacts, set to close if AC power is lost to charger.
 8. Low and high battery voltage alarm contacts, set to close if battery voltage drops below 90 percent or rises above 110 percent of rated.
- C. Battery charger enclosure shall be NEMA 1 Construction and arranged for convection cooling.

2.5 GENERATOR

- A. The generator shall be 4-pole, revolving field, with rotating brushless or static exciter. It shall have a solid state voltage regulator capable of maintaining voltage within ± 2 percent at constant load from 0-100 percent of rating. Voltage regulator shall be of the volts-per-hertz type and NFPA-110 requirement for 100% load pickup shall be met. The regulator shall be sealed from the environment and isolated from the load to prevent tracking when connected to SCR loads. Voltage regulator shall meet the performance standards of EGSA 100R. Maximum alternator subtransient reactance shall not exceed 12% p.u. based on full generator rating.
- B. Generator shall be self-ventilated of drip-proof construction with amortisseur rotor winding and skewed for smooth voltage waveform. The insulation material shall meet the NEMA standard (MGI-22.40 and 16.40) for Class H and be vacuum impregnated with epoxy varnish to be fungus resistant per MIL I-24092. Temperature rise of the rotor and stator shall be limited to NEMA standard (MGI-22.40 and 22.85).
- C. On application of any load up to 100 percent of the rated load, the instantaneous voltage dip shall not exceed 20 percent and shall recover to + 2 percent rated voltage within one second. The generator shall be capable of sustaining at least 300% of rated current for at least 10 seconds under a 3 phase symmetrical short by inherent design or by the addition of an optional current

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boost system. The generator, having a single maintenance free bearing, shall be directly connected to the flywheel housing with a semiflexible coupling between the rotor and the flywheel.

- D. A resettable, line current sensing circuit breakers with inverse time versus current response shall be furnished and shall not automatically reset preventing restoration of voltage if maintenance is being performed. This breaker shall protect the generator from damage due to its own high current capability and shall not trip within the 10 seconds specified above to allow selective tripping of down-stream fuses or circuit breakers under a fault condition. Provide a 2000A ASLIG main breaker and a 1000A generator load bank breaker. Provide labels for breaker enclosures. Circuit breakers shall be installed in the generator terminal box and be easily operable when the operator is at the control panel. Circuit breakers shall include provision for a lock out device in the de-energized position to comply with NFPA 70E. Provide quantity of breakers indicated for multiple loads. Provide 100% rated breakers where indicated.
- E. Provide generator over-voltage protection for sensitive loads that will shut the unit down when voltage exceeds 115 percent of rated for longer than 1 second.
- F. Provide generator stator winding heater. Provide C ammeter to verify heater operability. Heater shall de-energize when generator is running. Provide generator stator winding temperature indication.

2.6 GENERATOR CONTROLLER

- A. A solid state Controller shall be vibration isolated above the generator. The microprocessor control board shall be moisture proof and capable of operation from -40c to 85c. Relays will only be acceptable in high current circuits. Generator set instrumentation; control and auxiliary equipment shall meet the performance standards of EGSA 100G. Provide a Ethernet communications adapter for the control panel (Monico or equal). The module shall communicate all status and alarms including analog fuel level, low fuel level, fuel leak, low battery voltage. Provide an input and output expansion module on the generator control panel.
- B. Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include:
 - 1. Fused DC circuits.
 - 2. Complete two-wire start/stop control which shall operate on closure of a remote contact.
 - 3. Speed sensing and a second independent starter motor disengagement systems shall protect against the starter engaging with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.

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4. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engage the starter.
 5. Cranking cyeler with 15-second ON and OFF cranking periods.
 6. Overcrank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.
 7. Engine cool down timer factory set at five minutes to permit unloaded running of the standby set after transfer of the load to normal.
 8. Three-position (Automatic - OFF - TEST) selector switch. In the test position, the engine shall start and run regardless of the position of the remote starting contacts. In the automatic position, the engine shall start when contacts in the remote control circuit close and stop five minutes after those contacts open. In the off position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an emergency. Reset of any fault lamp shall also be accomplished by putting the switch to the off position.
- C. An engine and generator instrument panel shall be installed on the unit with vibration isolators, and include the following:
1. Instruments
 - a. AC Voltmeter, 3.5 inch, 2% accuracy
 - b. AC Ammeter, 3.5 inch, 2% accuracy
 - c. VM/AM phase selector switch
 - d. Frequency meter, 3.5 inch, 0.5% accuracy, dial type
 - e. DC Voltmeter, 2 inch, 2% accuracy
 - f. Engine water temperature, 2 inch, 2% accuracy
 - g. Engine oil pressure, 2 inch, 2% accuracy
 - h. Running time meter
 2. Indicator Lamps And Alarm Contacts (Provide LED type lamps)
 - a. Overcrank (red)
 - b. High water temperature (red)
 - c. Low oil pressure (red)
 - d. Overspeed (red)
 - e. Anticipatory low oil pressure (yellow)
 - f. Anticipatory high water temperature (yellow)
 - g. Low water temperature (yellow)

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- h. Emergency stop (red)
 - i. "Not in auto" (flashing red)
 - j. System ready (green)
 - k. Battery charger fault (red)
 - l. Low battery volts (red)
 - m. Low fuel level (red)
3. Controls
- a. Lamp test switch
 - b. Voltage adjusting rheostat, + or - 5 percent range
 - c. Panel lamps (2)
 - d. Alarm horn, with silence switch, to meet the requirements of NFPA 110. Note: Silencing this horn after one fault, i.e. low fuel, shall not prevent it from sounding again should a different fault condition occur.
- D. Complete control panel shall be "rodent proofed" to prevent damage to components by small rodents.

2.7 EXHAUST SYSTEM

- A. A critical degree silencer shall be provided and installed inside the generator set enclosure. Supplier shall furnish back pressure calculations for the installation verifying that engine limitation is not exceeded. Silencer shall be arranged for horizontal mounting with bottom (side) inlet and end outlet. Provide a stainless steel bellows type flexible exhaust connector at the engine exhaust outlet. Provide a long radius type elbow to discharge exhaust gases vertically. Provide suitable raincap. A "Critical Degree" silencer is considered to be one capable of attenuating engine exhaust noise component to 85 dba at 10 feet in a free-field environment. Provide thermal protective wrapping.

2.8 JACKET WATER HEATER

- A. A jacket water heater, thermostatically controlled, shall be installed on the engine. Heater shall be 240 VAC input. Heater shall be mounted on the generator base rails and provided with flexible hoses to the engine. Flexible hoses shall be rated at 300 degrees F. and 100 PSI. Provision shall be made for isolation of the jacket water heater with 3/4 inch NPT ball-valves installed at the engine side of the flexible hoses. Provide a disconnect safety switch, or disconnect plug, to isolate the heating element from the electrical source for maintenance purposes.

2.9 FUEL STORAGE SYSTEM

- A. Provide a sub-base mounted fuel storage tank capable of supporting the generator set at rated load for a minimum of 24 hours. Provide access for

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electrical conduit from below. Tank shall be built and labeled in accordance with UL-142.

- B. Tank features shall include:
1. 2 inch filler neck with cam-loc connection and locking cap
 2. Engine supply and return openings and draw tubes
 3. 12 foot normal vents
 4. Emergency vents per UL for both primary and secondary containment with approved caps.
 5. Tank leak port
 6. Fuel level indicator gauge, direct reading type
 7. Low fuel level alarm switch, set at 4 remaining hours capacity
 8. Secondary containment, totally closed design, by double wall construction. Provide visual alarm and contact for "liquid in containment basin." Wire contact to alarm light in the generator control panel.
 9. Provide analog fuel transmitter wired to the control panel.
 10. Provide audible fuel tank overfill alarm (90%).

2.10 WEATHER PROTECTIVE ENCLOSURE

- A. Provide an aluminum, weather-protective and sound attenuated enclosure. Enclosure material shall be a minimum thickness of 14 gauge. Lockable latches shall be of stainless steel. Doors shall have a common keyed latch. Provide two (2) sets of keys. Enclosure and engine exhaust system shall be sound attenuated to limit noise level when operating at full load to a maximum of 75 dBA at 23 feet in any horizontal direction from the center of the unit. Attenuation shall include exhaust manifold and silencer blankets of the removable/reusable type. Intake and discharge of cooling air shall be through openings that are covered for weather protection. Provide acoustical material on internal walls and surfaces of the enclosure. External holes and openings in the enclosure shall be covered with galvanized or coated mesh to prevent entry of birds and rodents.
- B. Provide and install a power distribution panel (Basic Electrical Package option) within the generator enclosure. Provide a 480-120/240 volt, 1-phase mini-power center transformer panel (Section 26 27 00). Provide feeder circuit breakers and interconnecting wiring for the generator jacket water heater, battery charger, generator space heater, convenience outlet, trouble light, and spare. All distribution wiring shall be done with liquid tight flexible metallic conduit.
1. Engine jacket water heater
 2. Battery charger

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3. Convenience outlet
4. Trouble light
5. (1) fuel monitor panel
6. (1) spare

2.11 SEISMIC RESTRAINT

- A. The generator set shall be anchored directly to the concrete foundation by means of approved anchor bolts. A minimum of four (4) anchors shall be provided by the generator set supplier.
- B. Provide calculations stamped and signed by a civil or structural engineer registered in the State of California verifying compliance with California Administrative Code Title 24 and ASCE/SEI 7-10 for Risk Category IV. These calculations shall be a part of the submittal data provided.

2.12 GENERATOR SET MOUNTING

- A. Provide the equipment concrete foundations as shown on the Drawings, and as required. Each electric generating plant shall be equipped with vibration isolators as required and mounted on a welded structural steel base. Cross framing shall be used for additional stiffening. The entire welded steel base shall be mounted on concrete base with steel spring isolators that meet the following requirements:
 1. Minimum steel spring static deflection shall be 0.375-inches with a ratio of horizontal spring constant to vertical spring constant of at least 1:1.
 2. The spring diameter shall be no less than 0.8 times the compressed spring height at rated load. The difference between compressed spring height and solid spring height shall be at least 0.5 times the rated static deflection.
 3. The spring isolator shall include an adjusting bolt for leveling and attachment to the mounting base, and shall be mounted on 1/4-inch thick ribbed or waffle-pattern neoprene acoustical pad. The spring isolator shall be contained within a rigid housing that includes vertical stabilizers that shall restrain motion from seismic forces equal to 1/2 g in the lateral direction and 1 g in the vertical direction.
 4. The spring isolators shall be selected for uniform static deflections according to the weight distribution of the electric generating plant and disturbing starting forces.
5. Furnish submittals of the spring diameters, static deflections, compressed spring height, and solid spring height.
6. Submit design calculations for structural and seismic design for number, size and embedment of anchor bolts signed and stamped by a structural or civil engineer in

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the State of California. The minimum design seismic forces shall be those prescribed for Risk Category IV of ASCE/SEI 7-10.

PART 3 - EXECUTION

3.1 TESTING

- A. Design prototype test: Components of the emergency system, such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype test since the tests are potentially damaging. Rather, similar design prototypes and reliability preproduction models, which will not be sold, shall be used for these tests. Upon request, the following certified test records shall be made available:
1. Maximum power (kW).
 2. Maximum starting (kVA) at 30% instantaneous voltage dip.
 3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
 4. Governor speed regulation under steady-state and transient conditions.
 5. Voltage regulation and generator transient response.
 6. Fuel consumption at no load, 1/4, 1/2, 3/4, and full load.
 7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
 8. Three-phase line-to-line short circuit test.
 9. Alternator cooling air flow.
 10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
 11. Endurance testing.
- B. Final production tests: Each generator set shall be factory tested under varying loads with guards and exhaust system in place. Upon request, arrangements to witness this test will be made or a certified test record will be sent prior to shipment. Tests shall include:
1. Single-step load pickup.
 2. Transient and steady-state governing.
 3. Safety shutdown.
 4. Voltage regulation.
 5. Rated power.
 6. Maximum power.
- C. Site tests: An installation check, start-up and rated load test shall be performed by the manufacturer's local representative. The engineer, APCD, regular

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operators, and the maintenance staff shall be notified of the time and date of the site test. Coordinate test date with APCD inspection to allow APCD observation of full test load. The test shall include:

1. The initial startup of the engine-generator set shall be performed by a factory trained representative of the engine generator set manufacturer. He shall furnish and install the recommended engine lubricants and fill the cooling system with a 50% solution of ethylene glycol antifreeze in accordance with the engine manufacturer's recommendations. He shall be present during the load test specified, and at the conclusion of the test shall supply the owner's representative with five complete sets(s) of operation, maintenance, and parts manuals for all equipment. Under this section of the specification, he shall instruct the owner's personnel in the proper operating and maintenance procedures for all components of the standby power system.
2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. This shall include: engine heaters, battery charger, etc.
3. Start-up under test mode to check for exhaust leaks, path of exhaust gases, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.
4. Automatic start-up by means of simulated power outage to test remote automatic starting, transfer of load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper systems coordination. Engine temperature, oil pressure and battery charger level along with generator voltage, amperes, and frequency shall be monitored throughout the test:
5. Prior to connecting the generator to the system provide a load test utilizing the generator main breaker and contractor furnished resistive load bank, as follows:
 - a. 1/2 hour @ 1/2 load
 - b. 1/2 hour @ 3/4 load
 - c. 2 hours @ rated load
6. Measure and record the transient frequency and voltage dip, and recovery time to steady state conditions, for the single step application of rated load. Verify compliance with the governor and voltage regulator performance specified in paragraph 4.4 and 7.3. Recording instrument to be of the light beam or direct thermal array type (ink chart type not permitted).
7. Provide a certified copy of site test report showing compliance with specifications and approval of the installation for warranty purposes.

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3.2 WARRANTY

- A. The equipment supplied under this section shall be covered by a single warranty against defects in material and workmanship for a period of five (5) years or 3000 hours of operation. Warranty shall provide for free replacement or repair of parts for the 5 year (3000 hour) period, and free labor for the first two years. A warranty statement including these features shall be provided as part of the owner's manuals. Warranty shall be administered by the same company that supplied the equipment.

END OF SECTION

SECTION 26 35 26
LOW VOLTAGE ACTIVE HARMONIC FILTER SYSTEM
NEMA 1 ENCLOSED

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification defines the requirements for active harmonic filter systems in order to meet the latest version IEEE-519 electrical system requirements for harmonic current limits. The active harmonic filter shall maintain power factor between 0.95 and 0.999 lagging when operated within limits.

1.2 STANDARDS

- A. The active harmonic filter system shall be designed in accordance with the applicable sections of the following documents.
1. ANSI IEEE std 519-2014
 2. UL 508
 3. ARRA – American Recovery and Reinvestment Act
 4. Manufactured in the USA
 5. The products shall include third party approvals by cULus.

1.3 SYSTEM DESCRIPTION

- A. System Description
1. Voltage: 480 Volts, 60 Hz, 3 phase, 3 wire plus ground.
 2. Current Rating: 300 amperes.
 3. Current Transformers:
 - a. Two current transformers are required and mounted on phases A & C.
 - b. Current transformers are an integral part of the active harmonic filter. When current transformers are installed external to the active harmonic filter equipment, the contractor shall be responsible for the installation of manufacturer provided current transformers.
 - c. Current ratings of the current transformers shall be according to full load current of the circuit on which installed. Primary rating of 3000A with a secondary rating of 5A are acceptable.
 - d. Current transformers rated for 400 hertz shall be used.
 - e. The current transformers shall be placed as close as possible to the non-linear load to be conditioned, within manufacturer guidelines.

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B. Philosophy of Operation

1. The active harmonic filter shall electronically supply the non-fundamental current demanded by the non-linear load that results in a near sinusoidal current being drawn from the supply.

C. Performance Requirements

1. Response Time:

- a. In a steady state condition, the active harmonic filter shall have a response time of less than one (1) line cycle.
- b. In the event of a load change or transient condition, the response time shall be within three (3) line cycles.

2. Input Power:

- a. Voltage: 480 Volt, 3 phase, 3 wire plus ground
- b. Voltage Tolerance: +/- 10% of nominal
- c. Frequency: automatically adapted to 60Hz, +/- 3%
- d. Input Circuit Breaker: 65k AIC Rated

3. Output Performance

- a. Performance of the active harmonic filter shall be independent of the impedance of the power source. All performance levels shall be attained whether on the AC lines, backup generator, or output of UPS.
- b. Harmonic Correction:
 - 1) Limit the 2nd through 50th order harmonic current to <5% TDD at each installed location indicated herein. Levels for individual harmonic orders shall comply with respective levels established in ANSI/IEEE std 519-2014.
 - 2) Limit the THD (V) added to the electrical system immediately upstream of the active line conditioner location(s) to less than or equal to 5%. The active harmonic filter shall not correct for utility supplied voltage distortion levels.
- c. Reactive Current Compensation shall improve power factor to be to between 0.95 and 0.999 lagging.

1.4 ENVIRONMENTAL CONDITIONS

- A. The active harmonic filter shall be able to withstand the following environmental conditions without damage or degradation of operating characteristics or life.

1. Operating Ambient Temperature: 0^oC to 40^oC.

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2. Operating Ambient Temperature for selected open chassis units: -20⁰C to 50⁰C.
3. Storage Temperature: -40⁰C to 65⁰C.
4. Relative Humidity: 0 to 95%, non-condensing.
5. Altitude: Operating to 1000 meters (3300 ft).

PART 2 - PRODUCT

2.1 ENCLOSURE

- A. Each filter shall be provided in a UL Type 1 rated enclosure.
- B. All UL Type 1 enclosed units shall have means to prevent the door from being opened when the unit is energized. This can be achieved by either:
 1. A door-interlocked circuit breaker that provides power interruption when the door is opened. The circuit breaker shall be lockable in the power-off position. Units shall be disconnected from the power source by a disconnect device or circuit breaker contained in the power distribution center as defined by local and national codes for branch circuit protection. OR
 2. A mechanism that locks the door when the unit is energized. The unit may be fed using an external disconnect or breaker.
- C. Freestanding units shall include lifting provisions by forklift truck and lifting lugs. Wall mount units weighing more than 80 pounds shall be equipped with a means of lifting, such as lifting lugs.
- D. Door Mounted Digital HMI Operator Interface.
- E. All units shall be provided with a grounding lug. Grounding by the contractor is to be performed according to local and national standards.
- F. The paint shall be the manufacturer's standard type and color.
- G. All enclosed units shall have a door-interlocked disconnect for power interruption when the door is opened.

2.2 OPERATOR CONTROLS and INTERFACE

- A. The active harmonic filter shall require minimal field programming.
- B. The active harmonic filter shall contain a color touch screen display with the following features:
 1. A minimum display size of 5.6 inches, 65k colors, and LED backlight.
 2. Easily navigable screens, including Home, Status, Fault and Setup screens.
 3. Display voltage and current waveform data along with RMS metering data.

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4. A gauge-based indicator of active filter current usage, from 0 to 100% of capacity. Dual state indications of nominal operation and “at capacity” operation.
 5. An alarm history buffer saved in non-volatile. Buffer information shall persist between power outages, with a minimum of 128 event entries.
 6. Ability to set the end user Line/Load CT ratio of the active harmonic filter system.
 7. The Operator Interface shall show THD, Power Factor, RMS Current, RMS Voltage, and Fault History.
- C. The active harmonic filter shall have the ability to operate in three (3) modes: i) harmonic correction only mode, ii) power factor correction only mode, or iii) combination harmonic and power factor mode. All three control modes shall be configurable from the local operator color touch screen display.
- D. The active harmonic filter shall have a configurable relay-based run/stop command input in addition to the manual and auto run/stop commands. The active filter shall have a configurable relay-based fault output. Each contact shall be rated for 2.0 Amperes at 250 volts.
- E. The filter shall have a configurable network-based run/stop command input in addition to the manual and auto run/stop commands.
- F. The filter shall have the ability to load and save operational parameters in non-volatile persistent memory and the ability to revert to factory default parameter settings.
- G. The filter shall have the ability to communicate over a standard industrial Ethernet communications network such as Modbus TCP/IP.
- H. The unit shall automatically begin to correct harmonic currents after power up without the need for operator intervention.
- I. The unit shall have the ability to display trend history data for line voltage, line current, filter current, current THD, filter bus voltage, and filter heatsink temperature.

2.3 DESIGN

- A. All active harmonic filters shall be defined as power electronic devices which consist of power semiconductors and a DC bus that acts to inject current into the AC line that will cancel undesirable harmonic currents drawn by the load. A DC bus shall store power for power semiconductor switching. A digital microcontroller shall control the operation of the power converter.
- B. The active harmonic filter shall feature fully digital synchronous frame controls for selected harmonics to enhance drive load compatibility.
- C. The active harmonic filter shall feature a fully digital, broadband current regulator with progressive gains to eliminate system resonance tuning issues and simplify startup and commissioning.

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- D. The active harmonic filter shall feature single processor control of all power electronic devices per a single active filter to reduce fault response latency and harmonic correction loop times
- E. Each unit shall be designed with over-current and current limiting self-protection. Operation shall continue indefinitely at manufacturer defined safe operating levels without trip off or destruction of the active harmonic filter.
- F. All inductive elements in the power circuit of active harmonic filter shall be coreless, in order to maintain constant inductance and avoid saturation at high current levels
- G. Units shall detect heatsink temperature and fold back the current limit based on the temperature measurement.
- H. Two distinct levels of faults shall be employed: Critical and Non-critical levels
Non-critical level faults will provide automatic restart and a return to normal operation upon automatic fault clearance. Critical level faults stop the function of the unit and await operator action to restart.
 - 1. Faults such as AC line power loss shall be automatically restarted upon power restoration. Upon removal of these fault conditions, the active line conditioner shall restart without user action.
 - 2. All other faults shall be considered critical faults and stop the active harmonic filter. The run relay shall be disabled and the fault relay enabled. User shall be required to initiate a power reset (cycle power off and on) to restart the active harmonic filter.
- I. The logic of the active harmonic filter shall monitor the load current by utilizing two (2) current transformers (CTs) mounted on phases A and C to direct the function of the power electronic converter.
- J. Multiple active harmonic filters may be installed in parallel to inject current. The units will function independently. If one unit is stopped or faulted, the remaining units will continue to operate normally.
- K. Individual unit characteristics, including sample drawings, weight, and watts loss, can be found in the Installation, Operation, and Maintenance Manual.
- L. Manufacturers: TCI Harmonic Guard. Or approved equal

2.4 FACTORY TEST

- A. Each active filter shall undergo a functional test and a full load current burn-in test at its original manufacturing plant. Equipment including a harmonic producing load, current sense CTs, and an active filter under test shall be used for the following tests:
 - 1. A harmonic correction performance test to ensure harmonic correction and attenuation specifications are met. The unit shall be tested at greater than 80% of rated current at rated voltage and frequency.

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2. A full load current burn-in test to reach thermal steady state within the unit. The test duration shall be from 1 hour to 4 hours depending on the active filter amp rating. The filter shall operate at greater than 95% of rated current with at least 80% of the current comprising of harmonics.
- B. A factory test report shall be available when ordered with the active filter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The supplier shall verify that jobsite is ready to receive the active harmonic filter.
- B. The supplier shall verify that the jobsite environment can be maintained during and after installation within the service conditions required by the manufacturer.

3.2 INSTALLATION

- A. Installation shall follow all manufacturer requirements, instructions, and contract drawings, including:
1. Space surrounding the active harmonic filter to maintain adequate cooling.
 2. Conditioning of space surrounding the active harmonic filter enclosure to maintain the manufacturer's ambient temperature and humidity ranges.
 3. Accessibility of the active harmonic filter diagnostic lights and communication ports – these components shall always be free from obstructions.
- B. Interface
1. The supplier shall provide all required cables and connectors to interface with other equipment.
 2. The supplier shall ensure that communication connections and wiring are properly protected in accordance with manufacturer recommendations.

3.3 START-UP SERVICE

- A. At a minimum, the start-up service shall include:
1. Pre-power check:
 - a. Verify proper active filter installation and clearances
 - b. Inspection of the filter for damage and debris
 - c. Verify critical electrical and mechanical connections are tight
 - d. Tug test internal connections and verify wiring

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- e. Update hardware if appropriate
 - f. Verification of proper power connection at filter input terminals
 - g. Verification of proper CT installations and electrical connections
2. Active harmonic filter power-up and commissioning:
- a. Power the active harmonic filter and perform operational checks
 - b. Update software if appropriate
 - c. If applicable run the filter with VFD load and tune filter to system attributes
- B. Performance measurements shall be recorded
- C. Active harmonic filter parameter listing shall be provided
- D. Training on active filter operation shall be provided by manufacturer

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 26 36 23

AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install the low voltage automatic transfer switches having the ratings, features/accessories and enclosures as specified herein and as shown on the contract drawings. The transfer switch shall be part of the switchboard lineup (Refer to Section 26 24 13).

1.2 REFERENCES

- A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:
 - 1. UL 1008 – Transfer Switches
 - 2. UL 991 - Tests for Safety-Related Controls Employing Solid-State Devices
 - 3. NFPA 70 – National Electrical Code
 - 4. NFPA 99 – Essential Electrical Systems of Health Care Facilities
 - 5. NFPA 110 – Emergency and Standby Power Systems
 - 6. NEMA ICS 10 – AC Transfer Switch Equipment
 - 7. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems

1.3 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 - 1. Front view and plan view of the assembly
 - 2. Schematic diagram
 - 3. Conduit space locations within the assembly.
 - 4. Assembly ratings including:
 - a. Withstand and Closing rating
 - b. Voltage
 - c. Continuous current rating
 - d. Short-Time rating if applicable
 - e. Short-circuit rating if ordered with integral protection
 - 5. Cable terminal sizes
 - 6. Product Data Sheets.

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- B. Where applicable, the following additional information shall be submitted to the Engineer:
 - 1. Busway connection
 - 2. Connection details between close-coupled assemblies
 - a. Composite front view and plan view of close-coupled assemblies

1.4 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
 - 1. Final as-built drawings and information for items listed in section 1.04
 - 2. Wiring diagrams
 - 3. Certified production test reports
 - 4. Installation information
 - 5. Seismic certification as specified
- B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

1.5 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
 - 1. Provide Seismic tested equipment as follows:
 - a. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest International Building Code (IBC) and latest California Building Code (CBC).
 - b. The Project Structural Engineer will provide site specific ground motion criteria for use by the manufacturer to establish SDS values required.
 - c. The IP rating of the equipment shall be 1.5
 - d. The Structural Engineer for the Site will evaluate the SDS values published on the Manufacturer's website to ascertain that they are "equal to" or "greater than" those required for the Project Site.
 - e. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.

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- 1) The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
- 2) The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
- 3) The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.6 REGULATORY REQUIREMENTS

- A. Provide a certificate of compliance with UL 1008 for the transfer switches furnished under this section.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton
- B. ASCO
- C. Or approved equal

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others shall be submitted per Section 4-6 of the SSP.

2.2 CONSTRUCTION

- A. Switches shall be free standing construction utilizing fixed mounted power case switches or circuit breakers, Eaton type MAGNUM DS or approved equal.

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- B. Ratings shall be per the drawing. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating. Breakers shall be electrically operated.
- C. All breakers shall be provided with a true, two-step stored energy mechanism providing a maximum of three-cycle closing. All the energy required for closing the breakers shall be completely stored and held in readiness pending a release to close action. The power case switch or breaker shall have high-endurance characteristics being capable of no-load and full-load interruptions at rated current equal to or exceeding the UL endurance ratings for power circuit breakers without maintenance.
- D. Transfer switches shall be open delayed transition and operate with a time delay in the neutral position, adjustable from 0 to 120 seconds.
- E. The switching panel shall consist of completely enclosed contact assemblies and a separate control or transformer panel. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.
- F. Each transfer switch shall be positively interlocked both mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. Main contacts shall be mechanically locked in position in both normal and emergency positions. A neutral position shall not be possible under normal electrical operation unless a delayed transition accessory is required for switching highly inductive loads.
- G. Transfer switches shall be capable of being operated manually under full rated load conditions. Manual operation shall be accomplished by a permanently attached manual operator, or by integrally mounted pushbuttons. Removable manual operating handles and handles that may move in the event of an electrical operation during the manual operation, are not acceptable. Manual operators requiring source or load disconnection prior to manual operation are not acceptable.
- H. On transfer switches requiring a fourth pole for switching the neutral, the neutral shall be fully rated with equal withstand, closing and interrupting ratings to the power poles. Switched neutral poles which are add-on or overlap, or that are not capable of breaking full rated load current are not acceptable.
- I. The transfer switch shall have a multi-tap voltage selection plug for ease of voltage adjustment in the field.

2.3 BYPASS ISOLATION

- A. A manual bypass isolation switch shall provide isolation of the source and load power conductors to the ATS. The bypass transfer switch shall have current, voltage, and withstand ratings equal to the interconnected automatic transfer switch. Transfer to bypass shall be a manually initiated no-load break type transfer.

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- B. Positive mechanical interlocks shall be provided for bypass isolation switches to prevent cross connection of services.
- C. When provided, the automatic transfer switch and the bypass isolation switch sections shall be factory interconnected with copper bus.
- D. The bypass isolation transfer switches shall be provided with a draw-out mechanism to allow access for preventive maintenance, testing or inspection. The draw-out mechanism shall provide visual indicators as to the position of the switch/breaker during the draw-out operation.

2.4 MICROPROCESSOR LOGIC

- A. The transfer switch shall be equal to an Eaton ATC-900 type microprocessor-based controller. The controller shall be hardened against potential problems from transients and surges. Operation of the transfer switch and monitoring of both sources shall be managed by the controller.
- B. The automatic transfer switch controllers shall meet or exceed the following standards in addition to the basic switch standards:
 - 1. IEC 61000-4-2 - EMC Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
 - 2. IEC 61000-4-3 - EMC Testing and Measurement Techniques - Radio-frequency, Electromagnetic Field Immunity Test
 - 3. IEC 61000-4-4 - EMC Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test
 - 4. IEC 61000-4-5 - EMC Testing and Measurement Techniques - Surge Immunity Test
 - 5. IEC 61000-4-6 - EMC Testing and Measurement Techniques - Immunity to Conducted Disturbances, Induced by Radio-frequency Fields
 - 6. IEC 61000-4-11 - EMC Testing and Measurement Techniques - Voltage Dips, Short Interrupts and Voltage Variations Immunity Tests
 - 7. CISPR11, Class B - Industrial, Scientific and Medical Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement
 - 8. FCC Part 15, Subpart B, Class B

2.5 ENCLOSURE

- A. The transfer switch shall be provided within the NEMA 3R switchboard enclosure suitable for use in environments indicated in the drawings.
- B. The transfer switch lugs and cable access shall be front only. Provide auxiliary front lug sections for all cable terminations.

2.6 CONTROLLER DISPLAY AND KEYPAD

- A. The microprocessor-based controller display shall be UV resistant and include a 4.3 inch Color TFT (480x272), backlit display. The controller shall be capable of

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displaying transfer switch status, parameters, and diagnostic data. All set point parameters shall be password protected and programmable using the controller keypad, USB port, or remotely using serial port access. Limited abbreviations or codes shall be used for transfer switch functions.

- B. The microprocessor-based controller shall include a mimic bus display consisting of six (6) individual LED's (3mm) for indicating the following:
 - 1. Availability status of source 1
 - 2. Availability status of source 2
 - 3. Connection status of source 1
 - 4. Connection status of source 2
 - 5. Source 1 Preferred
 - 6. Source 2 Preferred

2.7 VOLTAGE AND FREQUENCY SENSING

- A. The controller shall have a voltage range of 0-790 volts (50/60 Hz) and an accuracy of +/- 1% of the reading and a frequency range of 40-70 Hz and an accuracy of +/- .3 Hz.
- B. Voltage and frequency dropout and pickup parameters are set as a percentage of the nominal voltage as indicated in the table below.

Setpoint	Sources	Dropout	Pickup
Undervoltage	Source1 and 2	70 – 97%	(DO + 2%) - 99%
Overvoltage	Source 1 and 2	105 – 110%	103% - (DO – 2%)
Underfrequency	Source 1 and 2	90 – 97%	(DO + 1Hz) – 99%
Overfrequency	Source 1 and 2	103 – 105%	101% - (DO – 1Hz)
Voltage Unbalance	Source 1 and 2	5 – 20%	(UNBAL DO% - 2) – 3%

- C. The normal and emergency sources shall include phase reversal protection. The preferred rotation is programmable as ABC or CBA.

2.8 TIME DELAYS

- A. A time delay shall be provided on transfer to source 2, adjustable from 0 to 166 minutes.
- B. A time delay shall be provided to override a momentary power outage or voltage fluctuation, adjustable from 0 to 120 seconds.
- C. A time delay shall be provided on retransfer from source 2 to source 1, adjustable from 0 to 166 minutes.
- D. A time delay shall be provided after retransfer that allows the generator to run unloaded prior to shutdown, adjustable form 0 to 166 minutes.
- E. A time delay shall be provided for engine failure to start, adjustable 0- 60 seconds.

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- F. A pre and or post transfer time delay output adjustable from 0-120 seconds. The contact shall be a form-c contact rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc.
- G. All delays shall be field adjustable from the microprocessor-based controller without the use of special tools.

2.9 ADDITIONAL FEATURES

- A. One Form C contact for closure of the source 1 generator start circuit for optional use with a dual generator system. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- B. One Form C contact for closure of the source 2 generator start circuit. The contacts shall be rated for 5-Amp at 250-Vac and 5-Amp at 30-Vdc.
- C. The controller shall include two independently programmable Engine Exercisers, selectable as disabled, 7, 14, or 28 day interval, or by calendar date. Run time shall be adjustable for 0-600 minutes, with or without load. Upon loss of source 2 power, the ATS shall automatically return to source 1. Transfer time delays shall also be independently programmable for test events.
- D. The controller shall include a keypad pushbutton to initiate a system test.
- E. The controller shall include 4 user configurable inputs. Each input provides 50 volts at 10ma and can be user configured to one of the following features:
 - 1. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
 - 2. Input to accept a remote contact which closes to initiate a transfer to source 2. This feature shall be failsafe and an automatic retransfer shall occur in the event that source 2 power is lost.
 - 3. Input to accept a remote contact which opens to inhibit transfer to source 2.
 - 4. Input to enable monitor mode to disable automatic operation of the transfer switch while continuing to display status. Monitor mode allows set point programming at the controller display.
 - 5. Input to enable lockout feature to disable automatic operations of the transfer switch following an overcurrent trip of an integral circuit breaker.
 - 6. Input to enable or disable manual retransfer to source 1.
 - 7. Input to initiate manual retransfer to source 1.
 - 8. Input to initiate a remote engine test. The test will run using the programmed engine test set points.
 - 9. Input to select source 1 or source 2 as the preferred source.
 - 10. Input to initiate a remote load test.
 - 11. Input to indicate the bypass transfer switch is closed on a source.

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12. Input to bypass time delays
- F. The controller shall include 4 user configurable outputs rated for 10-Amp at 250-Vac and 10-Amp at 30-Vdc. Each input can be user configured to one of the following features:
1. Source 1 connected
 2. Source 2 connected
 3. ATS in test
 4. ATS not in automatic mode (Monitor Mode)
 5. General Alarm indication for failure to transfer, mechanical fault, or electrical fault.
 6. Engine Test Aborted
 7. Engine cool down in process
 8. Engine start contact status
 9. Emergency inhibit on
 10. Load bank control – Output to disconnect a load bank during an engine run test if a transfer to a source 2 generator is required.
 11. Pre and/or post transfer signal - A pre and or post transfer time delay output adjustable from 0-120 seconds.
- G. One Form C auxiliary contact to indicate Source 1 position and one Form C contact to indicate source 2 position. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- H. One Form C contact for Source 1 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- I. One Form C contact for Source 2 Available. The contacts shall be rated for 10-Amp, 1/3-Horsepower at 250-Vac and 10-Amp at 30-Vdc.
- J. Data Logging
1. Historical Data Storage to include:
 - a. Engine Run Time
 - b. Source 1 Available time
 - c. Source 2 Available time
 - d. Source 1 Connected time
 - e. Source 2 Connected time
 - f. Source 1 Engine Run Time
 - g. Source 2 Engine Run Time
 - h. Load Energized Time

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- i. Number of Transfers
2. Event Summary shall include up to 100 date and time stamped events. All metered values are logged for each event. Event summaries include:
 - a. Transfer events
 - b. Alarms
 - c. Changes to the set points
 - d. Changes to the time/date
 - e. Resetting a historical counter
 - f. Engine Run test
3. Event Details shall include up to 350 date and time stamped events. All metered values are logged for each event. Event details include detailed sequence of operations of a transfer event.
4. Event recording shall capture 4 seconds of metered data, stored every 20 msec for certain events. The data is captured 2 seconds before and 2 seconds after the event. Oscillographic data for 10 events is stored and may be downloaded over USB. Events Include:
 - a. Source unavailability actions that initiate a transfer sequence (Undervoltage, Overvoltage, etc.)
 - b. Successful transfers (at the point of breaker/contactors closure)
 - c. Unsuccessful transfers (at the point of breaker/contactors failure to close or open)

2.10 OPTIONAL ACCESSORIES

- A. Communications Interface to be Ethernet TCP/IP.
- B. Integrated Load Metering – The controller shall include integral load metering. When included, metered values shall be viewable from the controller LCD display.

2.11 WITHSTAND AND CLOSING RATINGS

- A. The transfer switch shall have a 3 cycle short circuit withstand and closing rating of 100 KA at 480 volts.
- B. The transfer switch shall have a 30 cycle short time withstand and closing rating of 85 KA at 480 volts.

PART 3 - EXECUTION

3.1 EXAMINATION

3.2 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

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1. Insulation check to ensure the integrity of insulation and continuity of the entire system
 2. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards
 3. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances
 4. Electrical tests to verify the complete electrical operation of the switch and to set up time delays and voltage sensing settings of the logic
- B. The manufacturer shall provide a certified copy of factory test reports.
- C. Transfer switch shall include a label indicating order number, catalog number and date

3.3 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings
- B. All necessary hardware to secure the assembly in place shall be provided by the contractor

3.4 FIELD QUALITY CONTROL

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the contractor in installation and start-up of the equipment specified under this section for a period of 5 working days. The manufacturer's representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

3.5 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. The Contractor shall provide a copy of the manufacturer's representative's certification.

3.6 TRAINING

- A. Manufacturer's qualified representative] shall conduct a training session for up to five (5) owner's representatives for 2 normal workdays at a jobsite location determined by the owner. The training program shall consist of the instruction on the operation of the transfer switch and the major components within the assembly.

3.7 FIELD SERVICE ORGANIZATION

- A. The manufacturer of the ATS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.

END OF SECTION

AUTOMATIC TRANSFER SWITCHES

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SECTION 26 42 00

GALVANIC ANODE CATHODIC PROTECTION SYSTEM

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The Contractor shall provide all labor, materials, tools, and incidentals to install a cathodic protection system for the new 66-inch Cement Mortar Lined and Tape Coated/Mortar Coated (CML&TCMC). The cathodic protection system shall include all electrical connections, anodes, test stations, insulators, and all accessories required for a complete and operable system. 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 Miramar Reservoir Pump Station including all electrical connections, anodes, test stations, insulators, and all accessories required for a complete and operable system. REFERENCES
- 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.

1.2 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. Engineer: The City of San Diego's Resident Engineer or designated representative.
- E. City's Corrosion Engineer: The Engineer's appointed representative from the City's Corrosion Section.

1.3 CONTRACTOR QUALIFICATIONS

- A. All work must be conducted by qualified, experienced personnel working under continuous, competent supervision. Qualified Contractors must demonstrate experience 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.

1.4 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards:
 - 1. A497 – Steel Welded Wire Reinforcement

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2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
3. AWWA C217 - Wax Coating Systems for Underground Piping Systems
4. Green Book - Standard Specifications for Public Works Construction, 2021 edition
5. Mil-C-18480-B - Coating Compound, Bituminous, Solvent, Coal Tar Base
6. NACE SP0169 - Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems
7. NACE SP0286 - Electrical Isolation of Cathodically Protected Pipelines
8. NEMA LE - Cotton Phenolic Resin – Electrical Grade
9. NEMA CE - Canvas Phenolic Resin - General Purpose Grade
10. NEMA G10 – Glass Reinforced Epoxy
11. UL 514 - Metallic Outlet Boxes
12. Standard Specifications of Public Works Construction City Supplement (White Book) latest edition
13. Standard Drawings for Public Works Construction latest edition.

1.5 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

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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 the design drawings. These drawings shall be submitted to the 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' Certificates 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 non-welded 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.

1.6 PACKAGING AND SHIPPING

- A. The Contractor shall coil wires, secure and package anodes as required to prevent damage during shipment.

1.7 NOTIFICATION FOR TESTING AND INSPECTION

- A. The Contractor shall notify the Engineer at least seven days in advance of the installation of anodes, insulators, wiring, and test stations. The Engineer or the Owner's Representative shall witness all corrosion control installations at their discretion.

1.8 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 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

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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 have experience.

PART 2 - PRODUCTS

2.1 CONDUIT, FITTINGS, AND ACCESSORIES

- A. All below-grade wire shall be run in schedule 40 PVC conduit. All above-grade 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.

2.2 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 for CML&TC Steel Pipe: Two No. 2 AWG HMWPE
- C. Test Station Pipeline Leads: No. 8 AWG HMWPE.
- D. Galvanic Anode Leads: No. 12 AWG THWN (WHITE).

2.3 SHUNTS

- A. Galvanic Anode Test Stations: The shunt resistance shall be such that a 2-Amp current causes a voltage drop of 200-millivolts (i.e. 0.10-ohms). Shunts shall be flat manganin ribbon style as manufactured by Cott or approved equal. Attachment Screws: Stainless steel.

2.4 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.

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2.5 ANCILLARY MATERIALS

- A. Electrical Tape: Liner-less 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.

2.6 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: Red with black lettering as follows: "CAUTION CATHODIC PROTECTION CABLES BURIED BELOW."

2.7 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 pre-fabricated plastic cap filled with formable mastic compound on a base of elastomeric tape. Use Royston Handy Cap IP with integrated primer or approved equivalent.
- 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.

2.8 AT-GRADE TEST STATIONS

- A. At-Grade (Flush) Mounted:
- B. Test Box: Concrete box of dimensions as shown on the Drawings. Use Brooks 3RT, Christy G-05, or approved equal, with a cast iron lid. The cast iron lid shall be South Bay Foundry Part #B1160 and #B6199 or approved equal and shall be cast with the letters "City of San Diego Corrosion Test Station".
- C. Each CP Test Box shall include a 5 inch x 5 inch cross-laminated phenolic terminal board with a minimum thickness of 1/4-inch. The phenolic material shall

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be NEMA type CE or LE or phenolic grade xx. The terminal board shall contain individual electrical lugs for each wire entering the test station or junction box.

2.9 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. 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 saturate 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 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 equal.

2.10 STANDARD POTENTIAL MAGNESIUM ANODES

- A. CAPACITY. Standard potential magnesium anodes shall have a theoretical energy content of 1000 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 to 6.70 percent
 - 2. manganese 0.15 to 0.70 percent
 - 3. zinc 2.50 to 3.50 percent
 - 4. copper 0.02 percent max
 - 5. nickel 0.002 percent max
 - 6. iron 0.003 percent max
 - 7. silicon 0.10 percent max
 - 8. others, total 0.30 percent max

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9. magnesium remainder
- C. OPEN CIRCUIT POTENTIAL. The open circuit potential of all anodes, buried in the soil, shall be between 1.45 and 1.55 volts dc versus a copper-copper sulfate reference electrode.
- D. INGOT SIZE AND WEIGHT. Anodes shall be 32-pound pre-packaged, standard potential ingots with a trapezoidal cross section. Ingot length shall be 21.00 inches long. The total packaged weight shall be 70 lbs.
- 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 PRE-PACKAGED BACKFILL MATERIAL. The anodes shall be completely encased and centered within a permeable cloth bag in a special low resistivity backfill mix with the following composition:
1. Gypsum 75%
 2. Powdered bentonite 20%
 3. Anhydrous sodium sulfate 5%
- 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.

2.11 PIPE FLANGE ISOLATION KIT

- A. For purposes of this specification, the terms “Pipe Flange Isolation Kit”, “Insulating Flange”, “Insulating Joint”, and “Dielectric Flange” are used synonymously.
- B. The Contractor shall over drill flange holes where insulating kits are to be used per AWWA C207 to accommodate insulating sleeves.
- C. The Pipe flange isolation kit materials shall be designated by the manufacturer as suitable for service at the operating temperatures and pressures specified on the Plans.
- D. Flange isolation kits shall consist of a one piece, full-face, insulating gasket, an insulating sleeve for each bolt, insulating washers, and steel washers. For nominal pipe diameters up to and including 36-inches, provide one insulating washer and one steel washer on each side of the flange for each flange bolt.

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- E. Insulating Gasket: Insulating gasket retainers shall be full face, Type E, NEMA G-10 glass reinforced epoxy retainers with an Ethylene Propylene Diene Monomer (EPDM) rubber rectangular cross section O-ring seal. Minimum total gasket thickness shall not be less than 1/8-inch. The gasket shall have the same outside diameter as the pipe flange. For steel pipe the gasket's inside diameter shall be equal to the inside diameter of the pipe's steel cylinder. At valve to pipe connections where the inside diameters are not equal, the gasket's inside diameter shall be equal to the smaller of the two inside diameters. Dielectric strength shall be not less than 550-volts per mil, and compressive strength shall be not less than 50,000-psi. The manufacturer's name and date of manufacture shall be marked on both sides of the gasket with minimum two-inch tall block letters using a durable marking ink or paint. The gasket shall be installed within 12 months of its date of manufacture. Do not store insulated flange gaskets at jobsites under direct sunlight or at temperatures exceeding 110 degrees Fahrenheit. Use PSI Linebacker insulating gasket, or approved equal.
- F. Insulating Sleeves: Provide full length, one piece, NEMA G-10 glass reinforced epoxy insulating flange bolt sleeves. Dielectric strength shall be not less than 400-volts per mil. The length of the insulating sleeves shall provide an air gap between the end of the insulating sleeve and inside surface of the stud bolt nut with a tolerance of 1/32-inch minimum and 1/8-inch maximum. Insulating sleeve length must be adjusted for the actual thickness of the washers and insulating washer thickness.
- G. Insulating Washers: Insulating washers shall be NEMA G-10 glass reinforced epoxy with a minimum thickness of 1/8-inch. Dielectric strength shall not be less than 550-volts per mil, and compressive strength shall not be less than 50,000-psi. The insulating washer's inside diameter shall be sized to fit over the insulating sleeve's outside diameter.
- H. Steel Washers: Provide hardened steel washers that conform to ASTM F436 for insulated flanges greater than 36 inches in nominal diameter. Double steel washers (4 steel washers per flange bolt) are required for insulated flanges greater than 36 inches in nominal diameter. The inside and outside diameter of the steel washers shall match those of the insulating washers. The steel washers must be able to freely rotate around the insulating sleeve. Attention must be paid to the fit between the steel washers and the insulating sleeve in order to avoid the washers twisting and cracking the sleeves when the flange bolts are torqued.
- I. Provide four extra insulating sleeves and eight extra insulating washers for each insulating flange upon successful inspection of the insulating flange by the Engineer.
- J. Fill the internal groove between the two insulating flange faces with an elastomeric sealant compatible with the host pipe lining. The elastomeric sealant shall be a non-sag, polyurethane based, sealant that is NSF approved for potable water contact. The elastomeric sealant shall be Sikaflex IA or approved equal.

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PART 3 - EXECUTION

3.1 GENERAL

- A. Work not specifically described herein shall conform to NACE SP0169, NACE SP0286, the Standard Specifications for Public Works Construction (Greenbook – latest edition) and City Supplement White Book and Standard Drawings (latest edition).

3.2 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 re-pave in accordance with the Greenbook/Whitebook Standards.
- B. Warning Tape: Bury warning tape in the trench 12-inches below grade and above underground conductors and conduits. Align parallel to and within 2-inches of the centerline of the conduit run.

3.3 CONDUITS

- A. Securing Conduits: Secure conduits entering above-grade 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.

3.4 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-lb hammer while pulling firmly on the wire. All unsound welds shall be completely removed, the surface prepared again, and re-welded. All weld slag shall be removed from the weld before applying coating and weld cap.

B. Protective Coating:

1. 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 Section 2.11 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.

3.5 MAGNESIUM ANODES

A. INSPECTION

1. 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. PRE-PACKAGED ANODE INSPECTION

1. 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 ENGINEER at least seven (7) days in advance of installing the anodes.

C. LOCATION

1. Anodes are to be installed in augured holes as shown in the drawings. Anode positions can be adjusted slightly to avoid interference with existing structures. Alternate anode positions must be approved by the ENGINEER.

D. HANDLING

1. 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

1. Anodes shall be placed vertically at the bottom of a 12 feet deep augured hole, 12 inches in diameter (minimum).

F. SOAKING REQUIREMENTS, PRE-PACKAGED ANODES

1. 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

1. After the pre-packaged anodes are soaked, the hole is backfilled with stone free, native soil. No voids shall exist around the anode bags and the anode

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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.

3.6 AT-GRADE TEST STATIONS

A. LOCATION

1. 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 ENGINEER.

B. TEST BOX BOTTOM

1. Test boxes shall be set in native soil.

C. TEST LEAD ATTACHMENT

1. 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.

D. CONCRETE PAD

1. A 2-foot by 2-foot by 6-inch thick (2' X 2' X 6") reinforced concrete pad is required around each test station. Concrete pad shall extend 2-inches above grade and shall have a 2% slope.

3.7 EXTERNAL COATING

- A. All insulating couplings shall be covered with a 3-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

1. 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

1. 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.

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D. Outer Covering

1. A plastic outer cover shall be applied over the petrolatum-saturated tape. The plastic shall be a minimum of 50-guage (10-mils) and shall have two layers applied.

3.8 REBAR GROUND CABLE AT CONCRETE STRUCTURES

- A. Minimum size #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.

3.9 INSTALLATION OF FLANGE ISOLATION MATERIALS

- A. Provide a minimum of five days advance notice to the Engineer before assembling insulated pipe flanges to allow for coordination and observance of its installation. The Engineer shall inspect the condition of the gasket's O-ring immediately before the gasket is installed to ensure it is free of cracks, dry rot, cuts, or other defects.
- B. Install pipe flange insulating materials at the locations shown on the Plans. Install pipe flange insulating materials in accordance with the manufacturer's recommendations and NACE recommended practice SP0286, "Electrical Isolation of Cathodically Protected Pipelines. Particular attention shall be paid to properly aligning the flanges prior to inserting the insulating sleeves around flange bolts.
- C. Prevent moisture, soil, or other foreign matter from contacting any portion of the insulated flange prior to or during installation. If moisture, soil, or other foreign matter contacts any portion of the insulated flange, disassemble it, clean with a suitable solvent and dry prior to reassembling. Follow the manufacturer's recommendations regarding the torque pattern of the bolts and the amount of torque to be used when installing the flange insulating kit. Do not use conductive grease on the flange bolts or any other flange components. Note: the following products have been tested for electrical conductivity and approved for use: Huskey 2000 Lubricating Paste & Anti-Seize compound, Triflow aerosol lubricant with Teflon additive, or approved equal.
- D. All insulating flange kits that will be buried must be tested and approved by the City's Corrosion Engineer before burial. Failure to have written approval by the City before burial may require the contractor to re-excavate the insulating flange assembly for proper testing at the contractor's expense.

PART 4 - TESTING AND INSPECTION

4.1 GENERAL

- A. 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 at least 5 days in advance of all corrosion control/cathodic protection facility installations. The Engineer, City's Corrosion Engineer, or the Owner's Representative shall witness all testing and installations at their discretion. All test

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data shall be submitted to the City's Corrosion Engineer within seven (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 his/her expense.

4.2 TEST LEADS AND BOND WIRES

A. Responsibility:

1. The Contractor shall be responsible for testing and inspecting all test leads, bond wires, and exothermic welds.

B. Test Method:

1. All completed wire connections shall be tested by striking the weld with a 2-lb. Hammer while pulling firmly on the wire. Failed welds shall be completely removed, the surface re-prepared, and re-welded. Welds shall be spot tested by the Engineer. After backfilling, all test leads shall be tested using a standard ohmmeter.

C. Acceptance:

1. The resistance between each pair of test leads shall not exceed 120% of the total wire resistance as determined from published wire data.

4.3 ANODE LEAD WIRE INSPECTION

A. Responsibility:

1. 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:

1. Inspection shall be visual and by feel, or by using a Holiday Tester. The Engineer shall inspect and run his or her hand along the full length of each anode lead wire cable just prior to installation in the well.

C. Acceptance:

1. All anode lead wires shall be free of cuts, nicks, and abrasions. Cables with damage shall be rejected.

4.4 TEST LEAD TRENCHING AND BACKFILL

A. Responsibility:

1. The Engineer, at his or her discretion, shall inspect wire trenches and backfill material and methods.

B. Test Method:

1. The depth, trench bottom padding, and backfill material shall be visually inspected before backfilling.

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- C. Acceptance:
 - 1. Conformance with specifications.

4.5 CP TEST STATION WIRE INTEGRITY TESTING

- A. Testing of Completed Welds:
 - 1. Exothermically welded wire-to-pipeline connections shall be inspected by the Engineer prior to backfilling the pipeline. At the Engineer'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 re-weld any welds that break loose or show signs of separating, as determined by the Engineer.
- B. Wire Identification:
 - 1. The Engineer shall be given two day's 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 / 1000 feet
 - b. No. 4 AWG wire 0.258 Ohms / 1000 feet
 - c. No. 6 AWG wire 0.411 Ohms / 1000 feet
 - d. No. 8 AWG wire 0.653 Ohms / 1000 feet
 - e. No. 10 AWG wire 1.038 Ohms / 1000 feet
 - f. No. 12 AWG wire 1.650 Ohms / 1000 feet
 - g. No. 14 AWG wire 2.624 Ohms / 1000 feet

4.6 FLANGE ISOLATION KIT TESTING

- A. Each buried insulating flange shall be tested for its electrical isolation effectiveness by and acceptable to the City's Corrosion Engineer prior to burial. The insulating flange shall be tested for electrical isolation before the wax tape coating is applied. Testing shall be performed and deemed as acceptable as described in the above grade testing procedure.

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- B. Each above grade or insulating flange within a vault shall be tested for its electrical isolation effectiveness. This testing shall be performed by the Contractor's Cathodic Protection Technician and witnessed by the City's Corrosion Engineer. The Contractor shall provide written notice of this testing to the Engineer a minimum of two days in advance. If the insulated pipe flange will be buried, At the Engineer's option, the City of San Diego may repeat this testing during or immediately after the installation of the insulating flange. Replace or repair any insulated pipe flange that is determined to not meet the minimum electrical isolation requirements in this specification. The effectiveness of insulating flanges shall be determined using the following test techniques in the order shown until one of the criteria is achieved or as otherwise directed by the Engineer.
- C. Electrical Potential Difference Test: Electrically bond the pipe on the vault or unburied side of the insulating flange to an electrical ground with a maximum resistance to remote soil of 5-Ohms. If the pipe on both sides of the insulating flange is mechanically connected to a minimum 50-feet of buried pipe, then the pipe does not need to be bonded to an electrical ground for this test. Measure the CP Potential of the pipe on both sides of the insulating flange using a copper/copper sulfate reference electrode. If the difference in CP Potentials is greater than or equal to 500-millivolts, the insulating flange is providing adequate electrical isolation. This test must be performed with all cathodic protection systems and anodes disconnected from the pipeline. If this criterion is not met, perform the Nilsson 400 Meter Direct Resistance Test to verify the effectiveness of the insulating flange.
- D. Direct Resistance Test: Measure the electrical resistance across the insulated flange using a 97-Hertz square wave null balancing ohmmeter such as the Model 400 Nilsson Soil Resistance Meter and the four-wire resistance technique. A standard handheld digital multi-test meter's ohmmeter circuit (e.g. Fluke 97 or Beckman HD110) is not suitable for properly making these resistance measurements. Perform this test by connecting the meter's P1 and C1 terminals to one side of the insulating flange, using two wires, and then connecting the meter's P2 and C2 terminals to the other side of the insulating flange, using two additional wires. Use vise grips or temporary exothermic welds to make the wire connections to the flange or pipe. The criterion for a pipe filled with water is a minimum measurement of 5-Ohms. The criterion for a dry or a partially filled pipe is a minimum measurement of 100-Ohms. If none of the applicable criteria are met, perform the Inductive Ammeter Direct Resistance Test to verify the effectiveness of the insulating flange.
- E. Inductive Ammeter Direct Resistance Test: Connect two separate wires via two separate connections to the pipe on both sides of the insulating flange. Use vise grips or temporary exothermic welds to make the wire connections. Use two pairs of test wires, one for current flow, one for voltage measurement. Using the first set of test wires, apply a minimum 12-volt DC electrical current across the insulating flange. Using the second set of test wires, measure the voltage across the insulating flange developed by the DC current flow. Use an inductive ammeter

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hoop (e.g. Swain hoop) clamped around the pipe immediately adjacent to the insulating flange to measure the change in DC current flow in the pipe, through the insulated flange. Calculate the electrical resistance across the insulating flange in Ohms by dividing the change in DC Volts by the change in DC Amps (i.e. Ohm's Law). The criterion for a pipe filled with water is a minimum measurement of 5-Ohms. The criterion for a dry pipe is a minimum measurement of 100-Ohms. If either of the applicable criteria is not met, perform the NACE Insulating Flange Leakage Test, per NACE SP0286, to verify the effectiveness of the insulating flange.

- F. NACE Insulating Flange Leakage Test: This test procedure shall conform to the "Leakage Test" described in the NACE Standard SP0286, Section 8, "Field Testing and Maintenance", Figure 12. The test current used shall be between 3 and 5 DC Amps. The criterion for a pipe filled with water is a maximum "electrical leakage value" of 10-percent of the test current. The criterion for a dry pipe is a maximum "electrical leakage value" of 5-percent of the test current.
- G. Individual Flange Bolt Testing: For all insulated flanges to be buried and for all other insulating flanges that do not meet any of the other criteria, measure the electrical resistance of each flange bolt to both sides of the insulated flange using a Nilsson Model 400 Soil Resistance Meter and four-wire resistance technique. The measured resistance value for each flange through-bolt shall be a minimum of 1,000-Ohms, as measured from each bolt to both flanges. This criterion applies to the flange through-bolts and does not apply to valve cap bolts which are threaded on one side. Remove, inspect, and replace all dielectric flange bolt sleeves and washers that do not meet the minimum resistance criterion.
- H. If an insulated flange with threaded cap bolts passes the resistance tests for all the "through-bolts" yet fails the other previous tests, remove all the threaded cap bolts, inspect and replace all imperfect dielectric flange bolt sleeve and washer materials and retest.
- I. In order to make an accurate resistance measurement that passes any of these criteria it may be necessary to disable the pipe inside a vault, flow control facility, or pump station on one side of the insulated flange (or temporarily remove any electrically grounded appurtenances) so that the pipe is not grounded on one side of the insulated flange. This temporary change may eliminate an electrical path which interferes with making an accurate resistance measurement.
- J. 10 days advanced written notification is required to the PUD Corrosion Section (Telephone 619-527-5439) to witness the assembly and electrical isolation testing of the two 66 inch diameter insulated flanges where the new 66 inch steel pipe will connect to the existing 66 inch PCCP before the wax tape coating is applied. Following acceptance of the electrical isolation testing provide another advance notification for PUD Corrosion Section personnel to witness the installation of the critical "ELASTOMERIC SEALANT" specified to be applied inside the pipe at the insulated flanges, See Detail 3, Drawing CP-3 for more information.

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4.7 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 seven-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. shebolts
 - 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-Hertz 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.

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- 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 6 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 un-spliced lengths of minimum size #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:
 - a. 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:
 - a. Set up a temporary DC power source such as a truck battery, a minimum 300 Watt, 2 to 4 Ohm, power rheostat, a calibrated electrical shunt, and two minimum #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.

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3. Step 3:
 - a. 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:
 - a. 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 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 Engineer 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 two (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.

4.8 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, non-welded pipe joints, or other flanged mechanical joints have been installed. All testing shall be done by the CORROSION ENGINEER in the presence of the ENGINEER.
- 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 (3) 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 ENGINEER 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% to determine electrical continuity. The CONTRACTOR'S CORROSION ENGINEER shall submit, within seven (7) days of the completion of the testing, and in a report format, to the ENGINEER, all calculations of the theoretical resistance and measured pipe resistance for each section tested.

4.9 CATHODIC PROTECTION PERFORMANCE

- A. Responsibility:
 - 1. 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 – 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:
 - 1. 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 Engineer. 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 -0.850-VOLT CP Instant Off POTENTIAL - A negative voltage of at least -0.850-volt as measured between the buried pipeline and a copper sulfate reference

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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.

4.10 COMPLIANCE WITH SPECIFICATIONS

A. Deficiencies:

1. Any deficiencies or omission in materials or workmanship shall be rectified by the Contractor and at his expense. Deficiencies shall include, but not limited to: 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 non-functioning equipment.

END OF SECTION

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SECTION 26 50 00

LIGHTING

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. Illuminating Engineering Society of North America (IESNA).
 - a. HB-9, Lighting Handbook.
 - b. LM-79, IES Electrical and Photometric Measurements of Solid-State Lighting Products.
 - c. LM-80, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources.
 - d. RP (Recommended Practices) Series.
 - e. TM-21, Projecting Long Term Lumen Maintenance of LED Light Sources.
 2. Institute of Electrical and Electronics Engineers (IEEE): C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 3. National Electrical Manufacturers Association (NEMA):
 4. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
 5. ICS 6, Industrial Control and Systems: Enclosures.
 6. National Energy Policy Act.
 7. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC) – Softbound Version.
 8. Underwriters Laboratories, Inc. (UL):
 - a. 773, UL Standard for Safety Plug-In Locking Type Photo-controls for Use with Area Lighting - Fourth Edition; Reprint with Revisions Through and Including March 08, 2002.
 - b. 924, Emergency Lighting and Power Equipment.
 - c. 1598, UL Standard for Safety Luminaires.
 - d. 2108, UL Standard for Safety Low Voltage Lighting Systems - First Edition; Reprint with Revisions through and Including February 24, 2014.
 - e. 8750, UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products - First Edition; Reprint with Revisions Through and Including April 1, 2015.

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9. U.S. Environmental Protection Agency and U.S. Department of Energy:
Energy Star.

1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. General:

- 1) Provide catalog data sheets and pictures for all products listed below.
- 2) Proposed Luminaire Substitutions (Interior and Exterior): Provide an electronic photometric file in standard '.ies' file format per the Illumination Engineering Society of North America (IESNA) for any proposed luminaire substitution not identified on the project Luminaire Schedule. Obtain file from the luminaire manufacturer or approved independent photometric testing laboratory. Include the proposed substitute luminaire with all options identified on the project Luminaire Schedule.

b. Interior Luminaires:

- 1) Catalog data sheets with pictures.
- 2) Luminaire material, finish, dimensions, and metal gauge.
- 3) Lens material, pattern, and thickness.
- 4) Candle power distribution curves in two or more planes.
- 5) Candle power chart 0 degree to 90 degrees.
- 6) Lumen output chart.
- 7) Average maximum brightness data in foot lamberts.
- 8) Coefficients of utilization for zonal cavity calculations.
- 9) Mounting or suspension details.

c. Exterior Luminaires:

- 1) Catalog data sheets with pictures. Luminaire material, finish, dimensions, and metal gauge.
- 2) Lens material, pattern, and thickness. Filters.
- 3) IESNA lighting classification (BUG rating).
- 4) Isolux diagram. Lighting distribution data and lighting distribution classification type as defined in IESNA HB 9.
- 5) Fastening details to wall, pendant, or pole.
- 6) Ballast type, location, and method of fastening.

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- 7) Documentation for Energy Star qualifications for equipment provided under this section.
 - 8) Brackets and supports.
- d. Lamps:
- 1) Voltages.
 - 2) Watts.
 - 3) Correlated Color Temperature (CCT).
 - 4) Color Rendering Index (CRI).
 - 5) Published rated life (in hours). Provide number of hours per start and operating temperature for published rated life hours indicated.
 - 6) Published rated initial and mean lumens.
 - 7) Lumen maintenance curve.
 - 8) Lamp type (ANSI designation, dimensions, shape, and base).
- e. LED Source Systems:
- 1) General:
 - a) IESNA LM-80 test reports.
 - b) IESNA TM-21 ratings.
 - c) Operating temperature range. Data sheet (chart/graph) describing life as a function of temperature.
 - d) Warranty: Light engine and driver.
 - e) Rated life.
 - f) Surge protection.
 - g) Thermal control device, heat sink.
 - h) Enclosure and wiring information.
 - i) Operating voltage range.
 - 2) Electronic Module/Light Engine:
 - a) Correlated Color Temperature (CCT).
 - b) Color Rendering Index (CRI).
 - 3) Drivers:
 - a) Input Current Total Harmonic Distortion. Power factor.
 - b) Sound rating.

1.3 QUALITY ASSURANCE

A. Authority Having Jurisdiction (AHJ):

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1. Provide Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, provide material and equipment labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ to provide a basis for approval under NEC.
 2. Provide materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. in conformance with those standards and with an applied UL listing mark.
- B. Standard Products:
1. Provide materials and equipment of manufacturers regularly engaged in the production of products specified in this section and that are of equal material, design, and workmanship.
 2. Provide products that have been in satisfactory commercial or industrial use prior to Bid opening in similar applications under similar circumstances and of similar size. Provide products that have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.
 3. Material and Equipment Manufacturing Date: Do not use products manufactured more than 3 years prior to date of delivery to Site.
- C. Provide assembled fixture, complete with lamps, in accordance with California Code of Regulations Title 24 requirements.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Specific requirements relative to execution of the Work of this section are located in Luminaire Schedule on Drawings.
- B. Provide luminaires and components tested, listed, and labeled by UL, or other approved testing agency.
- C. Provide luminaires with Illumination Engineering Society of North America (IESNA) formatted photometric files, ".ies" format, certified by the luminaire manufacturer for use with lighting software.
- D. Luminaire Labels:
 1. External label per ANSIC136.15.
 2. Internal label per ANSI C136.22.
- E. Provide luminaires rated by the manufacturer to start and operate to their full lumen capacity for rated life of the luminaire at the minimum low and maximum high ambient temperatures as defined in the Contract Documents at their installation location.
- F. Feed-through type, or separate junction box.
- G. Wire Leads: Minimum 18 AWG.

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- H. Component Access: Accessible and replaceable without removing luminaire from ceiling.
- I. Soffit Installations (Interior or Exterior Damp Locations):
 - 1. UL Labeled: SUITABLE FOR DAMP LOCATIONS.
 - 2. Ballast: Removable, prewired.
- J. Exterior Installations:
 - 1. UL Labeled: SUITABLE FOR WET LOCATIONS.
 - 2. Ballast: Removable, prewired.
 - 3. When factory-installed photocells are provided, entire assembly shall have UL label.
- K. Illuminated Exit Signs:
 - 1. Body: As scheduled.
 - 2. Face: Stencil.
 - a. Letters:
 - 1) 6-inch high by 3/4-inch stroke.
 - 2) Color: As scheduled.
 - 3. Mounting: As scheduled.
 - 4. Directional Arrows: As indicated on Drawings.
- L. Emergency Lighting Units:
 - 1. Power Pack: Self-contained, 120/277-volt inverter/charger, sealed nickel cadmium battery, and indicator switch in accordance with UL 924.
 - 2. Lighted, push-to-test indicator.
 - 3. Capable of providing full illumination for 1-1/2 hours in emergency mode.
 - 4. Capable of full recharge in 24 hours, automatically upon resumption of normal line voltage.
 - 5. Capable of protecting against excess charging and discharging.

2.2 LAMPS

- A. General:
 - 1. Refer to Luminaire Schedule for specific lamp descriptions.
 - 2. Lamps shall pass the Federal TCLP test in force at the time of manufacture.
- B. Manufacturers:
 - 1. General Electric Co.
 - 2. Osram Sylvania.
 - 3. Phillips Lighting Company.

4. Venture.
5. Cree.
6. Or approved equal

2.3 LED SOURCE SYSTEMS

A. General:

1. Provide IESNA LM-80 test reports.
2. Provide Energy Star compliance for solid state luminaires.
3. Listed To: UL 8750 Standard for Safety for Light Emitting Diode (LED) Equipment for use in Lighting Products.
4. Provide RoHS compliant LED light source(s) and driver(s).
5. Rated operating temperature range as indicated on the Luminaire Schedule.
6. Warranty: 5 years minimum.

B. Electronic Module/Light Engine:

1. Mount all components to a single plate and factory prewired with quick-disconnect plugs.
2. Include a driver, thermal control device, thermal protector device, and surge protector device.
 - a. Provide surge protector tested in accordance with IEEE/ANSI C62.41.2 to Category C Low.
3. Provide LEDs mounted to a metal-core circuit board and aluminum heat sink for optimal thermal management and long life.
4. Light Engine Rating per TM-21: 100,000 at 25 degrees C, L70.
5. Correlated Color Temperature (CCT): As indicated on the Luminaire Schedule.
6. Color Rendering Index (CRI): Minimum of **80**.

C. Drivers:

1. Expected life of 100,000 hours at 25 degrees C.
2. Provide drivers mounted in an all metal can.
3. Operating Voltage Range: 50/60-Hz input voltage range as indicated on the Luminaire Schedule with sustained variations of plus or minus 10 percent voltage with no damage to the driver.
4. Input Current Total Harmonic Distortion: Less than 20 percent up to 50 percent of full load rating.
5. Power Factor: Greater than 0.90 for primary application up to 50 percent of full load rating.
6. Sound rating: Class A.

7. Comply with NEMA 410 for inrush current limits.

2.4 EQUIPMENT IDENTIFICATION

- A. Manufacturer's Nameplate: Provide each item of equipment with a nameplate bearing manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; nameplate of distributing agent will not be acceptable.
- B. Provide clear markings located to be readily visible to service personnel.

2.5 FACTORY FINISH

- A. Provide electrical equipment with factory-applied painting systems that, at minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 - EXECUTION

3.1 LUMINAIRES

- A. General:
 1. Install in accordance with manufacturer's recommendations.
 2. Provide proper hangers, pendants, and canopies as necessary for complete installation.
 3. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to building required to safely mount.
 4. Install plumb and level.
 5. Install each luminaire outlet box with galvanized stud
- B. Mounting:
 1. General:
 - a. Coordinate mounting, fastening, and environmental conditions with Section 26 05 02, Basic Electrical Requirements.
 - b. Refer to Fastener Schedule in Section 05 50 00, Metal Fabrications.
 2. Wall Mounted: Measure mounting heights from center of mounting plate to finished floor or finished grade, whichever is applicable.
- C. Finished Areas:
 1. Install symmetrically with tile pattern.
 2. Locate with centerlines either on centerline of tile or on joint between adjacent tile runs.
 3. Install recessed luminaires tight to finished surface such that no spill light will show between ceilings and sealing rings.
 4. Combustible Low-Density Cellulose Fiberboard: Provide spacers and mount luminaires 1-1/2 inches from ceiling surface or use fixtures suitable for mounting on low density ceilings.

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5. Junction Boxes:
 - a. Flush and Recessed Luminaires: Locate minimum 1-foot from luminaire.
 - b. In concealed locations, install junction boxes to be accessible by removing luminaire.
 6. Wiring and Conduit:
 - a. Provide wiring of temperature rating required by luminaire.
 - b. Provide flexible steel conduit.
 7. Provide plaster frames when required by ceiling construction.
 8. Independent Supports:
 - a. Provide each recessed fluorescent luminaire with two safety chains or two No. 12 soft-annealed galvanized steel wires of length needed to secure luminaire to building structure independent of ceiling structure.
 - b. Select chain or wire with tensile strength and method of fastening to structure adequate to support luminaire weight.
 - c. Fasten chain or wire to each end of luminaire.
- D. Building Exterior: Flush-mounted back box and concealed conduit, unless otherwise indicated.

3.2 LAMPS

- A. Provide in each fixture, number and type for which fixture is designed, unless otherwise noted.

3.3 FIELD FINISHES

- A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Paint as specified in Section 09 90 00, Painting and Coating.

3.4 FIELD QUALITY CONTROL

- A. Upon completion of installation, verify equipment is properly installed, connected, and adjusted. Conduct an operating test to show equipment operates in accordance with the requirements of this section.
- B. Coordinate lighting and controls installation and testing with commissioning as specified in Section 01 91 14, Equipment Testing and Facility Startup.

3.5 CLEANING

- A. Remove labels and markings, except UL listing mark.
- B. Wipe luminaires inside and out to remove construction dust.
- C. Clean luminaire plastic lenses with antistatic cleaners only.

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- D. Touch up painted surfaces of luminaires and poles with matching paint ordered from manufacturer.
- E. Replace defective lamps at time of Substantial Completion.

END OF SECTION

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SECTION 31 23 13

SUBGRADE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This work includes subgrade preparation for the generator pad foundation and flat-work (slab-on-grade) at the Miramar Reservoir pump station in accordance with the Plans and these specifications.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³)).
 - b. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft³ (2,700 kN-m/m³)).

1.3 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. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of topsoil prior to placement of fill, or base for foundations or slabs-on-grade.
- E. Proof-Rolling: Testing of subgrade by compactive effort to identify areas that will not support the future loading without excessive settlement.

1.4 SEQUENCING AND SCHEDULING

- A. Complete applicable Work specified in Section 31 23 16, Excavation, prior to subgrade preparation.

1.5 QUALITY ASSURANCE

- A. Notify Engineer 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

2.1 ENGINEERED FILL

- A. Existing on-site materials may be used as structural fill within the foundation zone and slab-on-grade areas provided screening of the on-site materials is performed to provide a suitable granular material free of oversized material, expansive clay, organic materials, construction debris, and other deleterious material. Oversized material greater than 3 inches shall not be used within the upper 2 feet of the foundation or slab-on-grade.
- B. Existing on-site soils placed as new structural fill shall be moisture conditioned between optimum and 3 percent above optimum moisture content and compacted to a minimum of 95 percent of the maximum dry density in accordance with ASTM D1557. The upper 12 inches of fill below the foundation and slab-on-grade subgrades shall consist of granular material with an expansion index (EI) of less than 20 and a minimum R-Value of 10. The existing fill soils intended to be re-used as structural fill shall be tested for compliance with the specified grain size, expansion potential, and modified proctor compaction requirements.
- C. Import materials used as structural fill shall consist of clean (less than 30 percent passing the No. 200 sieve), granular material with a maximum particle size of 3 inches, a low corrosion potential, a minimum R-value of 10, and a low EI (20 or less) as evaluated by California Building Code (CBC) Standard 18-2 (Expansion Index Test). Imported fill used in structural areas shall be moisture conditioned between optimum and 3 percent above optimum and compacted to a minimum of 95 percent relative compaction based on ASTM D1557.
- D. The optimum lift thickness for fill soils will be dependent on the area of fill placement and the type of compaction equipment utilized. However, new engineered fill shall generally be placed in uniform lifts not exceeding approximately 8 inches in loose thickness.

PART 3 - EXECUTION

3.1 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.

3.2 EXCAVATION

- A. All oversized material (greater than 3 or 6 inches in size, depending on location of use), debris (if encountered), expansive clay, and organic material shall be separated and disposed of offsite in accordance with all applicable regulations. The Contractor should anticipate screening or segregating the cobble from the fill and

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colluvium. Material generated from excavations will likely require screening of oversized material, blending with soil, or possibly disposal offsite.

- B. The base of the excavations should be clean and free of water and loose or disturbed material prior to placement of concrete. Should the bearing materials become disturbed, affected materials shall be removed prior to placing concrete.
- C. Generator Foundation
 - 1. Foundation subgrades shall be over-excavated to a depth of 24 inches below the bottom of the foundation or to the projection of the Miramar Reservoir Dam. The over-excavation shall extend 18 inches horizontally on all sides beyond the edge of the foundations.
- D. Slab-on-grade and Exterior Flatwork
 - 1. Subgrade soils below concrete slabs-on-grade shall be over excavated to a minimum depth of 6 inches below the rough building pad grade elevation.

3.3 BACKFILL

- A. Generator Pad Foundation
 - 1. Prior to backfilling, the open over-excavation shall be reviewed by the Engineer to evaluate the suitability for placement of additional fill or structural loads.
 - 2. Over-excavations shall be backfilled with the following:
 - a. Engineered Fill per section 2.1
 - b. Aggregate base (Caltrans Class 2, or equal) compacted to a minimum relative compaction of 95 percent per ASTM D1557.
 - 3. Immediately prior to placement of concrete, the foundation subgrade shall be evaluated and tested by the Engineer.
- B. Slab-On Grade
 - 1. The moisture content of the subgrade for foundation and slab support Shall be checked 24 hours before pouring concrete. Supporting soils shall be in a moist condition prior to the placement of concrete. If moisture contents are less than 2 percent above optimum per ASTM D 1557, the foundation material shall be sprayed with water 24 hours prior to pouring concrete to increase the moisture content until the moisture exceeds the above requirement for a depth of 6 inches beneath the foundation.
 - 2. Over-excavations shall be backfilled with the following:
 - a. Engineered Fill per section 2.1
 - b. Aggregate base (Caltrans Class 2, or equal) compacted to a minimum relative compaction of 95 percent per ASTM D1557.

3.4 COMPACTION

- A. Under Earthfill: Compact all fill to 95 percent relative compaction as determined in accordance with ASTM D1557 Method.

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- B. Under Pavement Structure, Floor Slabs On Grade, or Granular Fill Under Structures: Compact all fill to 95 percent relative compaction as determined in accordance with ASTM D1557 Method.

3.5 MOISTURE CONDITIONING

- A. Dry Subgrade: Add water, then mix to make moisture content uniform throughout and moisture content at optimum or 3 percent above optimum.
- B. Wet Subgrade: Aerate material by blading, discing, harrowing, or other methods, to hasten drying process.

3.6 TESTING

- A. Proof-roll subgrade with equipment specified in Article Compaction to detect soft or loose subgrade or unsuitable material, as determined by Engineer.
- B. Continuous testing of grading, trench backfill, and paving shall be conducted by Engineer's representative.

3.7 CORRECTION

- A. Soft or Loose Subgrade:
 - 1. Adjust moisture content within optimum or 3 percent above optimum and recompact, or
 - 2. Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified herein.

END OF SECTION

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SECTION 31 23 16

EXCAVATION

PART 1 - GENERAL

1.1 DEFINITIONS

- A. Common Excavation: Removal of material not classified as rock excavation.
- B. Rock Excavation: Not Used

1.2 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.
 - f. Reclamation of onsite spoil disposal areas.

1.3 QUALITY ASSURANCE

- A. Provide adequate survey control to avoid unauthorized over excavation.

1.4 WEATHER LIMITATIONS

- A. Material excavated when frozen or when air temperature is less than 32 degrees F shall not be used as fill or backfill until material completely thaws.
- B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.5 SEQUENCING AND SCHEDULING

- A. Demolition: Not Used.
- B. Clearing, Grubbing, and Stripping: Not Used.
- C. Dewatering: Not Used.
- D. Excavation Support: Install and maintain shoring system 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

3.1 GENERAL

- A. 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.
- B. Do not over-excavate without written authorization of Engineer.
- C. Use of explosives is prohibited.

3.2 UNCLASSIFIED EXCAVATION

- A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

3.3 CLASSIFIED EXCAVATION – NOT USED

3.4 TRENCH WIDTH

- A. Minimum Width of Trenches:
 - 1. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:
 - a. Less than 4-inch Outside Diameter or Width: 3 inches.
 - b. Greater than 4-inch Outside Diameter or Width: 6 inches minimum, 8 inches maximum greater than outside diameter or width of pipe, conduit, direct-buried cable, or duct bank.
 - 2. Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 3 inches greater than aggregate width of pipes, conduits, cables, duct banks, plus space between.
 - 3. Increase trench widths by thicknesses of sheeting.
- B. Maximum Trench Width: Unlimited, unless otherwise shown or specified, or unless excess width will cause damage to existing facilities, adjacent property, or completed Work.

3.5 PIPE BEDDING GROOVES FOR NONPERFORATED DRAIN LINES

- A. Semicircular, trapezoidal, or 90-degree-V.
- B. Excavated or plowed into trench bottom. Forming groove by compaction will not be acceptable.

3.6 EMBANKMENT AND CUT SLOPES

- A. 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.
- B. Remove stones and rock that exceed 3-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.

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- C. Round tops of cut slopes in soil to not less than a 6-foot radius, provided such rounding does not extend offsite or outside easements and rights-of-way, or adversely impacts existing facilities, adjacent property, or completed Work.

3.7 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 easements, rights-of-way, and 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.

3.8 DISPOSAL OF SPOIL

- A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.

END OF SECTION

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Attachment E - Technicals

EXCAVATION

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SECTION 31 23 23

FILL AND BACKFILL

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This work includes fill and backfill requirements for installation of a new 66-Inch Pipe at Miramar Reservoir pump station in accordance with these specifications, and in reasonably close conformity with the lines and grades shown on the Plans.

1.2 REFERENCES

- A. The following is a list of standards from the American Society for Testing and Materials (ASTM) which may be referenced in this section:
 1. C117, Standard Test Method for Materials Finer Than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
 2. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 3. D75, Standard Practice for Sampling Aggregates.
 4. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 5. D1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 6. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 7. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 8. D4254, Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 9. D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
 10. D6938, Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Relative Compaction: Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.
- B. Maximum Dry Density: The maximum density that is determined in accordance with ASTM D1557. For oversize material apply a correction to the maximum dry density in accordance with ASTM D4718, as determined by Engineer.
- C. Optimum Moisture Content: The water content at which the maximum dry density is determined in accordance with ASTM D1557.

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- D. 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.
- E. 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.
- 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. Earthwork: The excavation, hauling, and placing of soil, rock, gravel and material found below the ground.
- I. Geosynthetics: Geotextiles, geogrids, or geomembranes.
- J. Well-Graded: A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.
 - 1. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
 - 2. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
 - 3. Influence Area: 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 excavations or from designated borrow areas on or near site.
- L. Select Backfill Material: Materials available onsite that 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. Plans: The Drawings, profiles, cross sections, Standard Plans, Working Drawings, and Shop Drawings, or reproductions thereof, approved by the Engineer, which shows the location, character, dimensions, or details of the Work.

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- Q. Standard Specifications: When referenced in this section, shall mean the “White book”, Standard Specifications For Public Works Construction, 2021 Edition.

1.4 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Imported backfill mix design.
2. Samples:
 - a. Imported material taken at source.

B. Informational Submittals:

1. Manufacturer’s data sheets for compaction equipment.
2. Certified laboratory test results from independent testing agency for the material used in the backfill operations.

PART 2 - PRODUCTS

2.1 MATERIALS SHALL CONFORM TO THE REQUIREMENTS SHOWN ON THE PLANS AND SPECIFIED BELOW. DOCUMENT THE ORIGIN AND INTENDED USE OF ANY IMPORTED MATERIAL AT THE SITE.

A. BACKFILL

1. Excavated material may be used as backfill provided they are free from rocks larger than 3 inches, organic materials, expansive clays and deleterious debris.
2. Material containing more than 20 percent gravel, cobbles, or stones is unacceptable.
3. Material containing expansion index higher than 50 is unacceptable.
4. Provide imported material of equivalent quality, if required to accomplish Work.

B. GRANULAR FILL

1. 1-inch minus crushed gravel or crushed rock.
2. Free from dirt, clay balls, and organic material and meet all applicable Standard Specifications.
3. 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.

C. SAND

1. Free from clay, organic matter, or other deleterious material and meet all applicable Standard Specifications Standards.
2. Gradation as determined in accordance with ASTM C117 and ASTM C136:

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Sieve Size	Percent Passing by Weight
1/4-inch	100
No. 4	95 - 100
No. 200	0 - 8

D. SLURRY FILL

1. Slurry mix shall be a mixture of clean washed sand and Type II/V cement, containing at least 3 sacks of cement per cubic yard.
2. Slurry fill shall have a compressive strength of 100 to 200 psi when tested in general accordance with ASTM D3832.
3. Contractor shall submit a slurry mix design for approval by the engineer prior to backfilling.

E. WATER FOR MOISTURE CONDITIONING

1. Free of hazardous or toxic contaminants, or contaminants deleterious to proper compaction and meet all applicable Standard Specifications Standards.

F. BASE COURSE ROCK

1. The material must be free from organic matter and other deleterious substances and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. Aggregate shall consist of any combination of the following materials: broken stone, crushed gravel, and natural rough surface gravel and meet all applicable Standard Specifications Standards.

2.2 EXECUTION

A. Excavation:

1. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough compaction of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 6 inches on each side.
2. For deeper trenches (>4-feet) or for unstable material, the trench walls shall be shored and braced in accordance with OSHA requirements, or as shown on the plans. No excavation shall be permitted to remain open, when the Contractor is not working within the excavation, without continuous barricading around the open trench walls.
3. Any trenches located in a vehicle service road and other areas subject to vehicular movements shall be fully plated at all times outside active construction periods. When open trenches are present, barricades and flagmen shall be used to protect the trenches from incursion by construction and non-construction traffic.
4. The contractor shall comply with all current Federal, state and local rules and regulations governing the safety of men and materials during the excavation,

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installation and backfilling operations. Specifically, the contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough (90% relative) compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail. The trench bottom shall be shaped to full and uniformly support the bottom quadrant of the pipe.

B. Subgrade Stabilization:

1. Where a firm foundation is not encountered at the subgrade established, due to moist, soft or other unstable soil, the unstable soil shall be removed and replaced with acceptable material. The Engineer shall determine the depth of removal of material to have a stable subgrade. The subgrade and bedding material shall be compacted to provide adequate support for the pipe.

C. Bedding:

1. The pipe bedding shall conform to the class specified on the Plans. When no bedding class is specified or detailed on the Plans, the requirements for Class C bedding shall apply. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

D. Backfilling:

1. Pipes shall be inspected before any backfill is placed; all pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.
2. Material for backfill shall be fine, readily compatible soil, granular material selected from the excavation or approved source, and shall meet the backfill material specifications.
3. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.
4. 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.
5. During filling and backfilling, keep level of fill and backfill around each structure and buried tank even.
6. All backfill shall be compacted to a minimum of 90% relative compaction and within 3 percent of the optimum moisture content per ASTM D1557 however, for areas beneath slabs, pavements, curbs the upper 12 inches should be compacted to 95 percent relative compaction and within 3 percent of the optimum moisture content (ASTM D1557).

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7. It shall be the Contractor's responsibility to protect existing foundations, other existing pipes, electrical conduits and other underground utilities, and culverts from damage due to construction equipment operations. The contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.
- 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:
1. Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

2.3 CONTRACTOR QUALITY CONTROL

- A. The contractor shall develop a quality control program and shall perform all quality control tests and inspections necessary to control the production and construction process applicable to this specification. The program shall address all elements that affect the quality of the pipe installation.

2.4 QUALITY ASSURANCE AND ACCEPTANCE

- A. Quality assurance and acceptance shall be the responsibility of the owner. For products or workmanship specified by association, trade or Federal Standards comply with requirements of the standards, except when more rigid requirements are specified or are required by applicable codes. Laboratory testing will be performed by the owner representative to verify materials meet specifications.
1. Notify Engineer when:
 - a. Start of earthwork operations for project.
 - b. Excavation trenches are ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.
 - c. Site conditions differ from the anticipated ground conditions during excavation activities.
 - d. Soft or loose subgrade materials are encountered during earthwork operations for embankment or site fill placement at the site.
 - e. Fill material appears to be deviating from Specifications.

2.5 SITE TESTING

- A. Gradation:
1. One sample from each finished product or more often as determined by Engineer, if variation in gradation is occurring, or if material appears to depart from Specifications.

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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.
4. In-Place Density Tests: In-place density tests shall be conducted on all backfill materials in accordance with ASTM D6938. During placement of materials, one test shall be conducted per lift.

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 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 μ m (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.

1.2 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 and the City of San Diego Standard Specifications for Public Works Construction (“The WHITEBOOK”).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Samples: Submit for specified materials 20 days prior to delivery to Site.
- B. Informational Submittals:
 - 1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 20 days prior to delivery of materials to Project showing materials meeting the physical qualities specified.

PART 2 - PRODUCTS

2.1 BASE COURSE

- A. Class 2 Aggregate Base as specified in the Caltrans Standard Specifications.
- B. Clean, hard durable, pit run gravel or crushed stone graded from coarse to fine containing enough fines to bind material when compacted.

2.2 LEVELING COURSE AND GRAVEL SURFACING

- A. Class 2 Aggregate Base as specified in the Caltrans Standard Specifications.
- B. Physical Qualities: Same as for base course.

2.3 SOURCE QUALITY CONTROL

- A. Perform tests necessary to locate acceptable source of materials meeting specified requirements.
- B. Final approval of aggregate material will be based on test results of installed materials.
- C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

- A. As specified in Section 301 of the Standard Specifications.

AGGREGATE BASE COURSES

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- B. Obtain Engineer's acceptance of subgrade before placing base course or surfacing material.
- C. Do not place base course or surfacing materials on soft, muddy subgrade.

3.2 EQUIPMENT

- A. In accordance with Section 301 of the Standard Specifications.
- B. Compaction Equipment: Adequate in design and number to provide compaction and to obtain specified density for each layer.

3.3 HAULING AND SPREADING

- A. In accordance with Section 301 of the Standard Specifications.
- B. Hauling Materials:
 - 1. Do not haul over surfacing in process of construction.
 - 2. Loads: Of uniform capacity.
 - 3. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.
- C. Spreading Materials:
 - 1. Distribute material to provide required density, depth, grade, and dimensions with allowance for subsequent lifts.
 - 2. Produce even distribution of material upon roadway or prepared surface without segregation.
 - 3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.

3.4 CONSTRUCTION OF COURSES

- A. Construction of Courses: In accordance with Section 301 of the Standard Specifications.

3.5 ROLLING AND COMPACTION

- A. In accordance with Section 301 of the Standard Specifications except as modified hereinafter.
- B. Roll each layer of material until material does not creep under roller before succeeding layer is applied.
- C. Commence rolling at outer edges and continue toward center; do not roll center of road first.
- D. Apply water as needed to obtain specified densities.
- E. Place and compact each lift to required density before succeeding lift is placed.
- F. Remove floating or loose stone from surface of preceding course before placing leveling course.

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- G. Surface Defects: Remedy by loosening and rerolling. Reroll entire area, including surrounding surface, until thoroughly compacted.
- H. Finished surface shall be true to grade and crown before proceeding with surfacing.

3.6 SURFACE TOLERANCES

- A. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.
- B. Finished Surface of Base and any Leveling Course: Within plus or minus 0.04 foot of grade shown at any individual point.
- C. Gravel Surfacing: Within 0.04 foot from lower edge of 10-foot straightedge placed on finished surface, parallel to centerline.
- D. Overall Average: Within plus or minus 0.01 foot from crown and grade specified.

3.7 FIELD QUALITY CONTROL

- A. In-Place Density Tests:
 - 1. Provide Engineer at least 2 days advance notification prior to testing.
 - 2. Show proof that areas meet specified requirements before requesting that Engineer identify density test locations.
 - 3. Refer to Standard Specifications for minimum sampling and testing requirements for aggregate base course and surfacing.

3.8 CLEANING

- A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION

AGGREGATE BASE COURSES

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SECTION 33 05 16.13
PRECAST CONCRETE UTILITY STRUCTURE

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): HB-17, Standard Specifications for Highway Bridges, Division 1 Section 3, Division I Design-Loads (Part A, Part B, Part C).
 2. 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. C387/C387M, Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - d. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.
 - e. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
 - f. C858, Standard Specification for Underground Precast Concrete Utility Structures.
 - g. D4101, Standard Specification for Propylene Injection and Extrusion Materials.
 1. Occupational Safety and Health Administration (OSHA):
 - 1) 29 CFR 1910.27, Fixed Ladders.
 - 2) 29 CFR 1926.502, Fall Protection Systems Criteria and Practices.

1.2 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Detailed drawings showing complete information for fabrication including, but not limited to:
 - 1) Member dimensions and cross sections; location, size, and type of reinforcement, including additional reinforcement.
 - 2) Layout dimensions and identification of each precast unit.
 - 3) Welded connections indicated by AWS standard symbols.

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- 4) Details of connections, joints, accessories, and openings or inserts.
 - 5) Watertight joint details.
 - 6) Location and details of anchorage devices.
 - 7) Access door details.
 - 8) Details of ladder and pull-up extension.
 - 9) If applying slope after precasting, submit proposed procedure prior to application.
- b. Product Data:
- 1) Precast concrete items; show materials of construction by ASTM reference and grade.
 - 2) Joint sealants.
- B. Informational Submittals:
1. Manufacturer's data for lifting devices for handling and erection.
 2. Manufacturer's certification that vault design and manufacture comply with referenced ASTMs (for example, ASTM C857 and ASTM C858).
 3. Vault design calculation shall be signed by a civil or structural engineer registered in the State of California.
 4. Manufacturer's laboratory test reports.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store each unit in a manner that will prevent cracking, distortion, warping, straining and other physical damage, and in a manner to keep marking visible.
- B. Lift and support each unit only at designated lifting points and supporting points as shown on Shop Drawings.

PART 2 - PRODUCTS

2.1 VAULT MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
 1. Oldcastle Precast.
 2. Jensen Precast.
 3. Hanson Pipe and Precast.
 4. Or approved equal

2.2 PRECAST CONCRETE VAULTS

- A. Design Requirements:
 1. In the event of a conflict between or among standards, the more stringent standard shall govern.

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2. Comply with ASTM C858, except as modified herein.
 3. Reinforcing Steel:
 - a. Deformed Bars: ASTM A615/A615M, Grade 60.
 - b. Welded Wire Fabric: ASTM A497/A497M.
 4. Nominal Dimensions: As shown on Drawings.
 5. Construction: Rigid type and behave monolithically. Do not use panel-type vaults.
 6. Design Loads: As determined by ASTM C857, and by using Site-specific values below.
 - a. Unit Weight of Soil: 125 pcf
 - b. Active Earth Pressure Coefficient: 0.4
 - c. Groundwater Level: None
 - d. Live Loads: AASHTO HS20-44 truck loading plus impact.
 7. Design shall accommodate additional stresses or loads that may be imposed during factory precasting, transporting, erection, and placement.
 8. Blockouts for penetrations shall be as shown on Drawings.
 9. Sealant:
 - a. Nonswelling preformed joint sealants to provide a lasting, watertight bond.
 - b. Manufacturer and Product: Henry Company; RAM-NEK. Or approved equal
 10. Mortar: Comply with ASTM C387/C387M, Type S or use Type I grout as specified in Section 03 62 00, Grouting.
- B. Mark each member or element to indicate location in the structure, top surface, and date of fabrication.
- C. Vault Floor:
1. Slope of vault floor shall be as shown on Drawings.
 2. Slope may be applied after precasting, using mortar fill as specified in Section 03 30 00, Cast-in-Place Concrete, or Type I grout as specified in Section 03 62 00, Grouting.

2.3 LINING AND COATING

- A. Interior lining and exterior coating shall conform to Section 09 90 00, Painting and Coating.

2.4 ACCESSORIES

- A. Ladder:

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1. Provide vault with FRP ladder. Conform to requirements of Section 06 82 00, Fiberglass Reinforced Plastic Fabrications. Provide with safety climbing device and pull-up extension.
 2. Meet OSHA 29 CFR 1910.27 and OSHA 29 CFR 1926.502 requirements.
- B. Polypropylene Steps:
1. Fabricate from minimum 1/2-inch, Grade 60, steel bar meeting ASTM A615/A615M.
 2. Polypropylene Encasement: Conform to ASTM D4101.
 3. Minimum Width: 13 inches, center-to-center of legs.
 4. Embedment: 3-1/2 inches minimum and 4-1/2-inch minimum projection from face of concrete at point of embedment to center of step.
 5. Cast in vault sections by manufacturer.
 6. Load Test: Capable of withstanding ASTM C478 vertical and horizontal load tests.
- C. Sidewalk Doors and Hatches: HS-20 load rated, spring-assisted, lockable, galvanized steel access door, size as indicated on Drawings.
- D. Pipe Connections to Vault: Modular mechanical seal conforming to requirements of Section 40 27 01, Process Piping Specialties.

PART 3 - EXECUTION

3.1 GENERAL

- A. Possible Settlement: If subgrade is encountered that may require removal to prevent structure settlement, notify Engineer. Engineer will determine depth of over excavation and means of stabilizing subgrade prior to structure installation.
- B. Place 6-inch minimum thickness of imported crushed aggregate material on undisturbed earth or modified subgrade; thoroughly compact with a mechanical vibrating or power tamper. Meet requirements of Article Excavation and Backfill.

3.2 EXCAVATION AND BACKFILL

- A. Remove and keep water clear from excavation during construction.
- B. Excavation: As specified in Section 31 23 16, Excavation.
- C. Backfill: As specified in Section 31 23 23, Fill and Backfill

3.3 INSTALLATION

- A. Concrete Base:
1. Place on prepared subgrade.
 2. Properly locate, ensure firm bearing throughout, and plumb first section.
- B. Sections:

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1. Carefully inspect precast sections to be joined.
 2. Thoroughly clean ends of sections to be joined.
 3. Do not use sections with chips or cracks.
- C. Joints:
1. Fill joints between precast sections per manufacturer's recommendation.
 2. Joints shall be watertight to prevent entrance of groundwater.
 3. Dry pack interior of joints to provide smooth finish.
- D. Setting Precast Vault: Install vault to elevations shown on Drawings.
- E. Watertight construction below grade with no open cracks or spalls. Cracking and defective areas of concrete shall be repaired per requirements of Section 03 30 00, Cast-in-Place Concrete.

3.4 PIPE CONNECTION TO VAULT

- A. Install products in accordance with manufacturer's instructions. Grout pipe connections as shown on the Plans.

END OF SECTION

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SECTION 40 27 00

PROCESS PIPING -GENERAL

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section and any supplemental Data Sheets:
1. Air Force: A-A-58092, Tape, Antiseize, Polytetrafluorethylene.
 2. American Association of State Highway and Transportation Officials (AASHTO): HB-17, Standard Specifications for Highway Bridges.
 3. American Petroleum Institute (API): SPEC 5L, Specification for Line Pipe.
 4. American Society of Mechanical Engineers (ASME):
 - a. Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
 - b. B1.20.1, Pipe Threads, General Purpose (Inch).
 - c. B16.1, Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250.
 - d. B16.3, Malleable Iron Threaded Fittings Classes 150 and 300.
 - e. B16.5, Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard.
 - f. B16.9, Factory-Made Wrought Buttwelding Fittings.
 - g. B16.11, Forged Fittings, Socket-Welding and Threaded.
 - h. B16.15, Cast Copper Alloy Threaded Fittings Classes 125 and 250.
 - i. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.
 - j. B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - k. B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings Classes 150, 300, 600, 900, 1500, and 2500.
 - l. B16.25, Buttwelding Ends.
 - m. B16.42, Ductile Iron Pipe Flanges and Flanged Fittings Classes 150 and 300.
 - n. B31.1, Power Piping.
 - o. B31.3, Process Piping.
 - p. B31.9, Building Services Piping.

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- q. B36.10M, Welded and Seamless Wrought Steel Pipe.
- 5. American Society for Nondestructive Testing (ASNT): SNT-TC-1A, Recommended Practice for Personal Qualification and Certification in Nondestructive Testing.
- 6. American Water Works Association (AWWA):
 - a. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - b. C105/A21.5, Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - c. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
 - d. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C115/A21.15, Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - f. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast.
 - g. C153/A21.53, Ductile-Iron Compact Fittings.
 - h. C207, Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
 - i. C606, Grooved and Shouldered Joints.
 - j. C651, Disinfecting Water Mains
- 7. American Welding Society (AWS):
 - a. Brazing Handbook.
 - b. A5.8M/A5.8, Specification for Filler Metals for Brazing and Braze Welding.
 - c. D1.1/D1.1M, Structural Welding Code - Steel.
 - d. QC1, Standard for AWS Certification of Welding Inspectors.
- 8. ASTM International (ASTM):
 - a. A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
 - b. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A105/A105M, Standard Specification for Carbon Steel Forgings for Piping Applications.
 - d. A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
 - e. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - f. A135/A135M, Standard Specification for Electric-Resistance-Welder Steel Pipe.

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- g. A139/A139M, Standard Specification for Electro-Fusion (Arc)–Welded Steel Pipe (NPS 4 Inches and Over).
- h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- i. A181/A181M, Standard Specification for Carbon Steel Forgings, for General-Purpose Piping.
- j. A182/A182M, Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
- k. A183, Standard Specification for Carbon Steel Track Bolts and Nuts.
- l. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
- m. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- n. A197/A197M, Standard Specification for Cupola Malleable Iron.
- o. A216/A216M, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
- p. A234/A234M, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- q. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- r. A276, Standard Specification for Stainless Steel Bars and Shapes.
- s. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- t. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- u. A312/A312M, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- v. A320/A320M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
- w. A351/A351M, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
- x. A395/A395M, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
- y. A403/A403M, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.

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- z. A409/A409M, Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service.
- aa. A536, Standard Specification for Ductile Iron Castings.
- bb. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- cc. A587, Standard Specification for Electric-Resistance-Welded Low- Carbon Steel Pipe for the Chemical Industry.
- dd. A743/A743M, Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
- ee. A744/A744M, Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service.
- ff. A774/A774M, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
- gg. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
- hh. B32, Standard Specification for Solder Metal.
- ii. B43, Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
- jj. B61, Standard Specification for Steam or Valve Bronze Castings.
- kk. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- ll. B75/B75M, Standard Specification for Seamless Copper Tube. mm. B88, Standard Specification for Seamless Copper Water Tube.
- mm. B98/B98M, Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes.
- nn. B462, Standard Specification for Forged or Rolled UNS N06030, UNS N06022, UNS N06035, UNS N06200, UNS N06059, UNS N10362, UNS N06686, UNS N08020, UNS N08024, UNS N08026, UNS N08367, UNS N10276, UNS N10665, UNS N10675, UNS N10629, UNS N08031, UNS N06045, UNS N06025, and UNS R20033 Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High- Temperature Service.
- oo. B464, Standard Specification for Welded UNS N08020 Alloy Pipe.
- pp. B474, Standard Specification for Electric Fusion Welded Nickel and Nickel Alloy Pipe.
- qq. C582, Standard Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion-Resistant Equipment.
- rr. D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

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- ss. D413, Standard Test Methods for Rubber Property-Adhesion to Flexible Substrate.
- tt. D543, Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
- uu. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
- vv. D1330, Standard Specification for Rubber Sheet Gaskets.
- ww. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- xx. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- yy. D2000, Standard Classification System for Rubber Products in Automotive Applications.
- zz. D2310, Standard Classification for Machine-Made “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- aaa. D2464, Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- bbb. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- ccc. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- ddd. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- eee. D2837, Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
- fff. D2996, Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- ggg. D3222, Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials.
- hhh. D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- iii. D4101, Standard Specification for Polypropylene Injection and Extrusion Materials.
- jjj. D4894, Standard Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials.
- kkk. D4895, Standard Specification for Polytetrafluoroethylene (PTFE) Resin Produced from Dispersion.

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- lll. F423, Standard Specification for Polytetrafluoroethylene (PTFE) Plastic-Lined Ferrous Metal Pipe, Fittings, and Flanges.
 - mmm. F436, Standard Specification for Hardened Steel Washers.
 - nnn. F437, Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - ooo. F439, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - ppp. F441/F441M, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
 - qqq. F493, Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
 - rrr. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - sss. F656, Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- 9. FM Global (FM).
 - 10. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS): SP-43, Wrought and Fabricated Butt-Welding Fittings for Low- Pressure, Corrosion Resistant Applications.
 - 11. NSF International (NSF):
 - 12. ANSI 61: Drinking Water System Components - Health Effects.
 - 13. ANSI 372: Drinking Water System Components - Lead Content.
 - 14. National Electrical Manufacturers Association (NEMA): LI 1, Industrial Laminating Thermosetting Products.
 - 15. National Fire Protection Association (NFPA): 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.2 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. Building Service Piping: ASME B31.9, as applicable.
 - 3. ICC International Plumbing Code and local plumbing code.
 - 4. Buried Piping: H20-S16 traffic load with 1.5 impact factor, AASHTO HB-17, as applicable.
 - 5. Thrust Restraints:
 - a. Design for surge pressure: 50 PSI.

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- b. Allowable Soil Pressure: Not Used.

1.3 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. Dissimilar Buried Pipe Joints: Joint types and assembly drawings.
5. Pipe Corrosion Protection: Product data.
6. 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 torquing 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.

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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.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Independent Inspection and Testing Agency:
 - a. Experience 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 Engineer.

B. Quality Assurance: Special inspection to be provided by Owner and performed by 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Section 01 61 00, Common Product Requirements, and:

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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

2.1 GENERAL

- A. 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 is prohibited.

2.2 PIPING

- A. As specified on Piping Data Sheet(s) and Piping Schedule located at the end of this section as Supplement and on 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 applicable for potable/drinking water.

2.3 JOINTS

- A. 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.
- B. Threaded Joints: NPT taper pipe threads in accordance with ASME B1.20.1.

2.4 GASKET LUBRICANT

- A. Lubricant shall be supplied by pipe manufacturer and no substitute or “or-equal” will be allowed.

2.5 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: RaychemWPC 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 B31.9 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. Threaded 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 shall 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: Hardened steel, ASTM F436, 1/8 inch thick.

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- 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

2.6 THRUST TIES

- A. Steel Pipe: Joint harness as specified in Section 40 27 01, Process Piping Specialties.
- 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.

2.7 VENT AND DRAIN VALVES

- A. Pipeline 2-Inch Diameter and Smaller: 1/2-inch vent, 1-inch drain unless shown otherwise.
- B. Pipelines 2-1/2-Inch Diameter and Larger: 3/4-inch vent, 1-inch drain unless shown otherwise.

2.8 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, 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.

2.9 FINISHES

- A. Factory prepare, prime, and finish coat in accordance with Pipe Data Sheet(s) and Piping Schedule.

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- 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

3.1 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.

3.2 PREPARATION

- A. See Piping Schedule and Section 09 90 00, Painting and Coating, for additional requirements.
- B. Notify Engineer 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.

3.3 WELDING

- A. Perform in accordance with Section IX, ASME Boiler and Pressure Vessel Code and ASME B31.9 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. Clean stainless steel joints with stainless steel wire brushes or stainless steel wool prior to welding.
 - 3. 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.

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- 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:
 - 1. 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.
 - 2. Stainless Steel and Alloy Piping: If ambient is less than 32 degrees F, local preheating to a temperature warm to the hand is required.
- 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.

3.4 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. Raised-Face Flanges: Use flat-face flange when joining with flat-faced ductile or cast iron flange.
 - 6. Verify compatibility of mating flange to adapter flange gasket prior to selecting grooved adapter flanging.
 - 7. 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.

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8. Threaded flanged joints shall be shop fabricated and delivered to Site with flanges in-place and properly faced.
 9. Manufacturer: Same as pipe 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. Soldered Joints:
1. Use only solder specified for particular service.
 2. Cut pipe ends square and remove fins and burrs.
 3. After thoroughly cleaning pipe and fitting of oil and grease using solvent and emery cloth, apply noncorrosive flux to the male end only.
 4. Wipe excess solder from exterior of joint before hardened.
 5. Before soldering, remove stems and washers from solder joint valves.
- F. Pipe Connections at Concrete Structures: As specified in Article Piping Flexibility Provisions in Section 40 27 01, Process Piping Specialties.
- G. PVC and CPVC Piping:
1. Provide Schedule 80 nipple where necessary to connect to valve or fitting.
 2. Use strap wrench for tightening threaded plastic joints. Do not overtighten fittings.
 3. Do not thread PVC pipe.
- H. High-Density Polyethylene Piping:
1. Join pipes, fittings, and flange connections by means of thermal butt-fusion.
 2. Perform butt-fusion in accordance with pipe manufacturer's recommendations as to equipment and technique.
 3. Special Precautions at Flanges: Polyethylene pipe connected to heavy fittings, manholes, and rigid structures shall be supported in such a manner that no subsequent relative movement between polyethylene pipe at flanged joint and rigid structures is possible.

3.5 INSTALLATION—EXPOSED PIPING

- A. Piping Runs:

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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 shown on the Contract Drawings.
- 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
 3. including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 4. From Adjacent Work: Minimum 1 inch from nearest extremity of completed piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 5. Do not route piping in front of or to interfere with access ways, ladders, stairs, platforms, walkways, openings, doors, or windows.
 6. Headroom in front of openings, doors, and windows shall not be less than the top of the opening.
 7. Do not install piping containing liquids or liquid vapors in transformer vaults or electrical equipment rooms.
 8. 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.

3.6 INSTALLATION—BURIED PIPE

- A. Joints:
1. Dissimilar Buried Pipes:
 2. Provide flexible mechanical compression joints for pressure pipe.
 3. Provide concrete closure collar for gravity piping or as shown.

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4. 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, Fill and 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, CPVC, or HDPE 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: Maximum 2 inches.

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2. Deflection From Vertical Grade: Maximum 1/4 inch(es).
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.

3.7 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.

3.8 PIPE CORROSION PROTECTION

- A. 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.
 3. Submerged or Embedded: Shop coat with coal-tar epoxy as specified in Section 09 90 00, Painting and Coating. If in potable water service, use NSF/ANSI 61 approved epoxy.
- B. Copper Pipe:
 1. Exposed: As specified in Section 09 90 00, Painting and Coating.
 2. Buried: Tape wrap as specified in Section 09 90 00, Painting and Coating.
- C. PVC and CPVC 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.

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- 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: Coat with coal-tar epoxy as specified in Section 09 90 00, Painting and Coating.
 - b. Bolts, Nuts, and Similar Items: Coat with bituminous paint.
 - c. Flexible Couplings and Similar Items: Wax Tape Coating.
 - d. Buried Valves and Similar Elements on Wrapped Pipelines: Coat with bituminous paint and wrap entire valve in polyethylene encasement.
 - e. Cement-Coated Pipelines: Cement coat appurtenances same as pipe.
- E. Wax Tape Coating System: As specified in Section 26 42 00, Cathodic Protection System.
- 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.
 - c. 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 the 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.
 - 3. The internal groove between two insulating flange faces shall be filled with an elastomeric sealant as shown on the Drawings.
 - 4. Pipe Bonding for Buried Piping: As specified in Section 26 42 00, Cathodic Protection ,
 - 5. Cathodic Protection for Buried Piping: As specified in Section 26 42 00, Cathodic Protection, and as shown.

3.9 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 joint harness specified in Section 40 27 01, Process Piping Specialties.
 - 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.

3.10 SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

- A. Application and Installation: As specified in Section 40 27 01, Process Piping Specialties.

3.11 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.

3.12 DISINFECTION

- A. The "Whitebook", City of San Diego Standard Specifications.

3.13 FIELD FINISHING

- A. Notify Engineer 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 Sections 10 14 00, Signage and 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.

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4. Maintenance of records and preparation of reports in a timely manner.
 5. Notification to Engineer of unsatisfactory weld performance within 24 hours of weld test failure.
- C. Required Weld Examinations:
1. Perform examinations in accordance with Piping Code ASME B31.1.
 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 disinfection and 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 instrument 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:
- B. Pipe Schedule
- C. Data Sheets:

Number	Title
40 27 00.03	Carbon Steel Pipe and Fittings—General Service
40 27 00.08	Stainless Steel Pipe and Fittings—General Service

END OF SECTION

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PIPING SCHEDULE LEGEND

SERVICE

RW RAW WATER

W WATER

EXPOSURE

ALL ALL

BUR BURIED

EXP EXPOSED

SUB SUBMERGED

MATERIAL

CML CEMENT MORTAR LINED

FBE FUSION BONDED EPOXY

MC MORTAR COATED

PCCP PRESTRESSED CONCRETE CYLINDER PIPE

PE POLYURETHANE ENAMEL

PVC POLYVINYL CHLORIDE

SST STAINLESS STEEL

STL STEEL

TC TAPE COATED

WS FABRICATED WELDED STEEL

JOINT TYPE

FL FLANGED

THRD THREADED

W WELDED (INCLUDING SOLVENT AND FUSION)

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Piping Schedule							
Service Legend	Size(s) (In.) ¹	Exposure	Piping Material	Specification Section	Joint Type	Lining/ Coating ²	Remarks
W	66	BUR	STL	Greenbook/Whitebook Section 209-2	W	CML/TCMC	See Supplementary Special Provisions for additional requirements.
RW	20	EXP	STL	40 27 00.03	FLG	FBE/PE	See 09 90 00 for Color
RW (Instrumentation)	<1-1/2"	EXP	SST	40 27 00.08	THRD	None	
<p>¹ ">" Greater Than "<" Less Than "<=" Less Than or Equal To ">=" Greater Than or Equal To "All" All Sizes</p> <p>² Coating system number as specified in Section 09 90 00, Painting and Coating, and as specified in Section 26 42 00 Cathodic Protection System.</p>							

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SECTION 40 27 00.03 CARBON STEEL PIPE AND FITTINGS—GENERAL SERVICE		
Item	Size	Description
Pipe	All	Black carbon steel, ASTM A106/A106M, Grade B seamless or ASTM A53/A53M, Grade B seamless or ERW. Threaded, butt-welded, grooved end, and flanged joints.
	12” through 48”	AWWA C-200 (min pipe thickness 0.3125”).
Joints	2-1/2” & larger	Butt-welded or flanged at valves and equipment.
Fittings	2-1/2” & larger	Butt Welded: Wrought carbon steel butt-welding, ASTM A234/A234M, Grade WPB meeting the requirements of ASME B16.9; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise.
Branch Connections	2” & smaller	For threaded pipe: Threaded, straight, or reducing tees in conformance with Fittings specified above. For welded or grooved pipe, use threadolet.
	2-1/2” & larger	Butt-welding or grooved end tee in conformance with Fittings specified above.
Flanges	2-1/2” & larger	Butt-Welded Systems: Forged carbon steel, ASTM A105/A105M, ASME B16.5 Class 150 or Class 300 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. Cast Iron Mating Flange: AWWA C207, Class D or E, hub or ring type to mate with ASME B16.1, Class 125 cast-iron flange. AWWA C207 Class F hub type or ASTM A105/A105M, ASME B16.5 Class 300 to mate with ASME B16.1 Class 250 cast-iron flange.
Boltings	All	Flanges: Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and Grade 8M for nuts. All bolt heads and nuts shall be hexagonal, except where special shapes are required. Bolts shall be of such length that not less

CARBON STEEL PIPE AND FITTINGS—GENERAL SERVICE

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SECTION 40 27 00.03 CARBON STEEL PIPE AND FITTINGS—GENERAL SERVICE		
Item	Size	Description
		than 6.4mm (¼") or more than 12.7mm (½") shall project past the nut in tightened position.
Gaskets	All flanges	Water, Steam, and Air Services: 1/16-inch-thick, compressed inorganic fiber with nitrile binder, rated 400 degrees F. continuous. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.
Coating/Lining	Exposed piping	Fusion bonded epoxy coated per AWWA C-213 for interior, and epoxy primer and polyurethane coated with final color coat per Section 09 90 00 for exterior of pipe.

END OF SECTION

CARBON STEEL PIPE AND FITTINGS—GENERAL SERVICE

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SECTION 40 27 00.08 STAINLESS STEEL PIPE AND FITTINGS—GENERAL SERVICE		
Pipe	2-1/2" & smaller	Schedule 40S: ASTM A312/A312M, Type 316 seamless, pickled and passivated.
Tubing	All	ASTM A269, Type 316 stainless steel, seamless, fully annealed hydraulic tubing, 0.065-inch wall thickness minimum.
Joints	1-1/2" & smaller	Threaded or flanged at equipment as required or shown.
	2" & larger	Flanged at valves and equipment.
Tubing Joints	All	Flareless compression fittings
Fittings	1-1/2" & smaller	Threaded: Forged 1,000 CWP minimum, ASTM A182/A182M, Grade F316 or cast Class 150, ASTM A351/A351M, Grade CF8M/316.
	2" & 2-1/2"	Butt Welded: ASTM A403/A403M, Grade WP316L conforming to ASME B16.9 and MSS SP 43, annealed, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows, unless shown otherwise.
Tubing Fittings	All	Flareless Compression Type Forged: ASTM A182/A182M, Grade F316, Parker- Hannifin Ferulok, Flodar BA Series.
Branch Connections	1-1/2" & smaller	Tee or reducing tee in conformance with fittings above.
	2" & larger	Butt-welding tee or reducing tee in accordance with fittings above.
Tubing Branch Connections	All	Compression type tees or reducing tees in accordance with Tubing Fittings above.
Flanges	All	Forged Stainless Steel: ASTM A182/A182M, Grade F316L, ASME B16.5 Class 150 or Class 300, slip- on weld neck or raised face. Weld slip-on flanges inside and outside. Cast Carbon Steel: ASTM A216/A216M Grade WCA, drilled, ASME B16.5 Class 150 or Class 300

AINLESS STEEL PIPE AND FITTINGS – GENERAL SERVICE

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SECTION 40 27 00.08 STAINLESS STEEL PIPE AND FITTINGS—GENERAL SERVICE		
		Van Stone Type with stainless steel stub ends, ASTM A240 Type 316L “as-welded grade”, conforming to MSS SP 43, wall thickness same as pipe.
Unions	2" & smaller	Threaded Forged: ASTM A182/A182M, Grade F316, 2,000-pound or 3,000-pound WOG, integral ground seats, AAR design meeting the requirements of ASME B16.11, bore to match pipe.
Bolting	All	Forged Flanges: Type 316 stainless steel, ASTM A320/A320M Grade B8M hex head bolts, ASTM A194/A194M Grade 8M hex head nuts and ASTM F436/F436M Type 3 alloy washers at nuts and bolt heads. Achieve 40 percent to 60 percent of bolt minimum yield stress. Van Stone Flanges and anywhere mating flange on equipment is cast iron and gasket is flat ring: Carbon steel ASTM A307 Grade B 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	All Flanges	Flanged, Water, Hot Air, Fuel Gas and Sewage Services: 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. Blind flanges shall be gasketed covering entire inside face with gasket cemented to blind flange.
Thread Lubricant	2" & smaller	General Service: Nickel pigmented PTFE, designed for stainless steel pipe.

END OF SECTION

AINLESS STEEL PIPE AND FITTINGS – GENERAL SERVICE

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SECTION 40 27 01
PROCESS PIPING SPECIALTIES

PART 1 - GENERAL REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Mechanical Engineers (ASME):
 - a. B16.1, 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 Metric/Inch Standard.
 2. American Water Works Association (AWWA):
 - a. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
 - b. C153/A21.53, Ductile-Iron Compact Fittings for Water Service.
 - 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. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe.
 - f. Manual M11, Steel Pipe—A Guide for Design and Installation.
 3. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A276, Standard Specification for Stainless Steel Bars and Shapes.
 4. National Fire Protection Association (NFPA): 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 5. NSF International (NSF):
 - a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
 - b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

- A. Action Submittals:
1. Manufacturer's data on materials, construction, end connections, ratings, overall lengths, and live lengths (as applicable).
 2. Metal Bellows Field Finishing:
 - a. Manufacturer's recommended weld procedures for joining welded carbon steel piping to stainless steel bellows.

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- b. Welder qualifications for joining welded carbon steel piping to stainless steel bellows.
 - c. Product data for field-applied System No. 4, high temperature, epoxy lining and coating in accordance with Section 09 90 00, Painting and Coating.
- 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

2.1 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.
- C. 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.

2.2 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.

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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
- C. Transition Coupling for Steel Pipe:
1. Manufacturers and Products:
 - a. Dresser Piping Specialties; Style A 162.
 - b. Smith-Blair, Inc.; Style 413.
 - c. Or approved equal
- D. Flanged Coupling Adapter:
1. Anchor studs where required for thrust restraint.
 2. Manufacturers and Products:
 - a. Steel Pipe:
 - 1) Dresser Piping Specialties; Style 128.
 - 2) Smith-Blair, Inc.; Style 913.
 - 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.

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3. Manufacturer and Product: EBAA Iron Sales Co.; Mega-Flange. 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 products shall be Straub Couplings, Grip-L or Metal Grip, or approved equal.

2.3 PIPE SLEEVES

- A. Steel Pipe Sleeve:
1. Minimum Thickness: 3/16 inch.
 2. Seep Ring:
 - a. Center steel flange for water stoppage on sleeves in exterior or water-bearing walls, 3/16-inch minimum thickness.
 - b. Outside Diameter: Unless otherwise shown, 3 inches greater than pipe sleeve outside diameter.
 - c. Continuously fillet weld on each side all around.
 3. Factory Finish:
 - a. Galvanizing:
 - 1) Hot-dip applied, meeting requirements of ASTM A153/A153M.
 - 2) Electroplated zinc or cadmium plating is unacceptable.

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- b. Shop Lining and Coating: Factory prepare, prime, and finish coat in accordance with Section 09 90 00, Painting and Coating.
- B. 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: GPT, Link-Seal modular seals. Or approved equal

2.4 SLAB, FLOOR, WALL AND ROOF PENETRATIONS

- A. Steel or Stainless 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.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide accessibility to piping specialties for control and maintenance.

3.2 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.

3.3 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.

- 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.

3.4 OUTLET/TAPPING SADDLE

- A. Install in accordance with manufacturer's written instructions.

3.5 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. Remove pipe coating if necessary to present smooth surface.

4. Application:
 - a. Metallic Piping Systems: Flexible couplings, transition couplings, and flanged coupling adapters.
 - b. Concrete Encased Couplings: Flexible coupling.

3.6 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. Nonmetallic Piping: Teflon bellows connector.
 2. Copper Piping: Flexible metal hose connector.
 3. Compressor and Blower Discharge: Metal bellows connector.
 4. All Other Piping: Elastomer bellows connector.
- C. Limit Bolts and Control Rods: Tighten snug prior to applying pressure to system.

3.7 PIPE SLEEVES

- A. Application:
 1. As specified in Section 40 27 00, Process Piping—General.
 2. Above Grade in Non-submerged Areas: Hot-dip galvanized after fabrication.
 3. Below Grade 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 non-insulating type securely in formwork to prevent contact with reinforcing steel and tie-wires.
 2. Caulk joint with specified sealant in non-submerged applications and seal below grade and submerged applications with wall penetration seal.

3.8 SLAB, FLOOR, WALL AND ROOF PENETRATIONS

- A. Applications:
 1. Watertight and Below Ground 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:

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1. Isolate embedded metallic piping from concrete reinforcement using coated pipe penetrations as specified in Section 09 90 00, Painting and Coating.
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

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Gas Association (AGA): 3, Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids.
 2. American National Standards Institute (ANSI): Z21.15, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.
 3. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - b. B16.44, Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 psi.
 4. American Society of Sanitary Engineers (ASSE): 1011, Performance Requirements for Hose Connection Vacuum Breakers.
 5. American Water Works Association (AWWA):
 - a. C504, Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm).
 - b. C508, Swing-Check Valves for Waterworks Service.
 - c. C509, Resilient-Seated Gate Valves for Water Supply Service.
 - d. C511, Reduced-Pressure Principle Backflow Prevention Assembly.
 - e. C512, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
 - f. C515, Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
 - g. C541, Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.
 - h. C550, Protective Interior Coatings for Valves and Hydrants.
 - i. C800, Underground Service Line Valves and Fittings.
 6. ASTM International (ASTM):
 - a. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - b. A351/A351M, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.

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- c. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - d. A564/A564M, Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
 - e. B61, Standard Specification for Steam or Valve Bronze Castings.
 - f. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - g. B98/B98M, Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
 - h. B127, Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip.
 - i. B139/B139, Standard Specification for Phosphor Bronze Rod, Bar and Shapes.
 - j. B164, Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.
 - k. B194, Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar.
 - l. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.
 - m. D429, Standard Test Methods for Rubber Property-Adhesion to Rigid Substrates.
 - n. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- 7. Canadian Standards Association, Inc. (CSA): 9.1, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.
 - 8. FM Global (FM).
 - 9. Food and Drug Administration (FDA).
 - 10. International Association of Plumbing and Mechanical Officials (IAPMO).
 - 11. Manufacturers Standardization Society (MSS):
 - a. SP-80, Bronze Gate, Globe, Angle, and Check Valves.
 - b. SP-81, Stainless Steel, Bonnetless, Flanged Knife Gate Valves.
 - c. SP-85, Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.
 - d. SP-88, Diaphragm Valves.
 - e. SP-110, Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
 - 12. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

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13. NSF International (NSF):
 - a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
 - b. NSF/ANSI 372, Drinking Water System Components - Lead Content.
14. Underwriters Laboratories (UL).
15. USC Foundation for Cross-Connection Control and Hydraulic Research.

1.3 SUBMITTALS

- A. Action Submittals:
- B. Shop Drawings:
 1. Product data sheets for each make and model. Indicate valve Type Number, applicable Tag Number, and facility name/number or service where used.
 2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
 3. Certification for compliance to NSF/ANSI 61 for valves used for drinking water service.
- C. Informational Submittals:
 4. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for:
 5. Tests and inspection data.
 6. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
 7. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

PART 2 - PRODUCTS

2.1 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.

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- 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.
- I. 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.

2.2 MATERIALS

- A. Bronze and brass valve components and accessories that have surfaces in contact with water to be alloys containing less than 16 percent zinc and 2 percent aluminum.
 - 1. Approved alloys are of the following ASTM designations: B61, B62, B98/B98M (Alloy UNS No. C65100, C65500, or C66100), B139/B139M (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127.
 - 2. Stainless steel Alloy 18-8 may be substituted for bronze.
- B. Valve materials in contact with or intended for drinking water service to meet the following requirements:
 - 1. Materials to comply with requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements.
 - 2. Coatings materials to be formulated from materials deemed acceptable to NSF/ANSI 61.
 - 3. Supply certification product is certified as suitable for contact with drinking water by an accredited certification organization in accordance with NSF/ANSI 61. Provide certification for each valve type used for drinking water service.

2.3 FACTORY FINISHING

- A. General:
 - 1. Interior coatings for valves and hydrants shall be in accordance with AWWA C550, unless otherwise specified.
 - 2. Exterior coating for valves and hydrants shall be in accordance with Section 09 90 00, Painting and Coating.
 - 3. Material in contact with potable water shall conform to NSF/ANSI 61.
 - 4. Exposed safety isolation valves and lockout valves with handles, handwheels, or chain wheels shall be “safety yellow.”
- B. Where epoxy lining and coating are specified, factory finishing shall be as follows:

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1. In accordance with AWWA C550.
2. Either two-part liquid material or heat-activated (fusion) material except only heat-activated material if specified as “fusion” or “fusion bonded” epoxy.
3. Minimum 7-mil dry film thickness except where limited by valve operating tolerances.

2.4 VALVES

A. Check Valves:

1. Rubber-flapper swing check valves body and cover shall be constructed of ductile-iron (ASTM A536 Grade 65-45-12). The body shall be long pattern design (not wafer), with integrally cast-on end flanges. The flapper shall be Buna-N having an "O" ring seating edge and be internally reinforced with steel.
2. Flapper shall be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position during flow through the valve. Flapper shall be easily removed without need to remove valve from line. Check valves shall have full pipe size flow area. Seating surface shall be on a 45° angle requiring the flapper to travel only 35° from closed to full open position, for minimum head loss and non-slam closure.
3. Buna-N flapper shall be high-strength coated fabric, coated both sides with 70 DURO, which creates an elastic spring effect, molded internally, to assist the flapper to close against a slight head to prevent slamming.
4. An external, hold-open, backflow device shall be furnished to create backflow through the check valve.
5. Valve ends shall be flanged ductile-iron unless otherwise called for on the Approved Plans or directed by the Engineer.
6. Check valve shall be furnished with a factory installed NEMA 4 limit switch and a disc position indicator.
7. Manufacturers and products:
 - a. DeZurik/APCO, Model CRF 100
 - b. Valmatic, Swing-Flex
 - c. Or approved equal

B. Ball Valves:

1. 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,
 - b. 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.

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- c. Manufacturers and Products:
 - 1) Conbraco Apollo; 76F-100 Series.
 - 2) Nibco; T-585-S6-R-66-LL.
 - 3) Or approved equal

C. GATE VALVES

1. Gate valves (2-1/2" to 12") shall be resilient wedge gate valves (RWGV) constructed of ductile-iron in accordance with AWWA C509 and C515 except as modified herein.
2. RWGV's shall have smooth unobstructed waterways free from any sediment pockets.
3. RWGV's shall be leak-tight at their rated pressure.
4. RWGV's shall have a non-rising low-zinc bronze or stainless-steel stem, opened by turning left (counterclockwise).
5. Stem seals shall be the O-ring type incorporating a minimum of two rings as required by AWWA C509.
6. Low-friction torque-reduction thrust washers or bearings shall be provided on the stem collar.
7. Wedge (gate) shall be fully encapsulated with a bonded-in-place Ethylene Propylene Diene Monomer (EPDM) elastomeric covering. Minimum thickness of the rubber seating area shall be 6.35mm (1/4").
8. Valves for buried applications shall be provided with a 50mm (2") square operating nut, and valves located above ground or in structures shall be equipped with a hand wheel in accordance with AWWA C509 unless otherwise indicated on the Drawings.
9. All bolts and nuts used in the construction of RWGV's shall be Type 316 stainless steel.
10. Manufacturers: One of the following or equal:
 - a. Clow Valve
 - b. Mueller Co.
 - c. Nibco
 - d. Or approved equal

D. Self-Regulated Automatic Valves:

1. Air Release Valves:
 - a. Air release valves shall vent accumulating air while the system is in service and under pressure.
 - b. Inlet and outlet connections shall be 2-inch NPT.

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- c. Bodies shall be of ductile iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material ensuring water tightness with a minimum of maintenance.
- d. Maximum operating pressure: 150 psi or more.
- e. Manufacturers:
 - 1) Dezurik/APCO.
 - 2) Val-Matic
 - 3) GA Industries, Inc.
 - 4) Crispin
 - 5) PowerSeal
 - 6) Or approved equal

2.5 OPERATORS AND ACTUATORS (NOT USED)

2.6 ACCESSORIES (NOT USED)

PART 3 - EXECUTION

3.1 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. Threaded Ends:
 - 1. Clean threads by wire brushing or swabbing.
 - 2. Apply joint compound.
- C. 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. Ball 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.

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- 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.

3.2 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 air release valves as pipe is being filled to verify venting and seating is fully functional.
- D. Check valves shall be tested by the manufacturer as a complete assembly per AWWA C508.

3.3 MANUFACTURER'S SERVICES

- A. See Section 01 43 33, Manufacturers' Field Services, and Section 01 91 14, Testing, Integration, and Startup.

END OF SECTION

PROCESS VALVES AND OPERATORS

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SECTION 40 80 01
PROCESS PIPING LEAKAGE TESTING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Informational 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.
 - 2. Certifications of Calibration: Testing equipment.
 - 3. Certified Test Report.

PART 2 - PRODUCTS (NOT USED)

PART 3 - PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify Construction Manager in writing 10 days in advance of testing. Perform testing in presence of Engineer.
- B. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
- C. Test section may be filled with water and allowed to stand under low pressure prior to testing.

3.2 20-INCH PUMP DISCHARGE PIPE

- A. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.
- B. Isolate discharge piping by closing discharge butterfly valve. Pressure test piping between check valve and butterfly valve.
- C. 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.
- D. Test Pressure shall be 50 PSI.
- E. Maintain hydrostatic test pressure continuously for 60 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.

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- F. Examine joints and connections for leakage.
- G. Correct visible leakage and retest as specified.

3.3 66-INCH BURIED PIPE

- A. Air test all field weld prior to backfilling by applying 40 PSI of air into the annular space between fillet welds. The applied pressure shall hold for a period no less than 5 minutes. If pressure remains at 40 PSI, the welds are acceptable. If the pressure drops below 40 PSI, apply a soap solution to the welds and re-apply the pressure of 40 PSI. Mark and repair any leaks indicated by the escaping bubbles.

3.4 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 Engineer to represent that test has been satisfactorily completed.

END OF SECTION

SECTION 40 90 00

PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS) - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section of the specifications includes materials, testing, and installation of process instrumentation and control system as specified herein and indicated on the drawings.
- B. These specifications shall not be interpreted as permission or direction to violate any governing code or ordinance. Equipment, materials, and workmanship shall comply with the latest revisions of the following codes and standards:
 - 1. Instrumentation: Instrument Society of America (ISA).
 - 2. Wiring: California Electrical Code (CEC), ISA S5.3 and S5.4.
 - 3. Control Panels and Equipment: NEMA, UL, and ANSI.
 - 4. Control Logic: NFPA 79.
 - 5. Piping: ANSI B31.3 (instrumentation piping).

1.2 SCOPE OF WORK

- A. The work involves furnishing all hardware, installation, labor, material, equipment, and engineering in strict compliance with the contract documents for the Owner.
- B. Specific items include, but not limited to, the following:
 - 1. Field instruments.
 - 2. Control Panel modifications. The existing Control Panel drawings were prepared by Rockwell Electrical Inc (REI). and are included for reference as Appendix A of this section. The REI ACAD files are available for the PICS contractor to utilize and modify as required. Annotations shown in red indicate recent changes due to conversion from SSRV starters to VFD's.
 - 3. Control Panel expansion (Telefast System).
- C. Submittal drawings shall show interface between PLC and field instruments.

1.3 SUBMITTALS

- A. Detailed System Drawings and Data: The submittal shall consist of six sets of detailed drawings and data prepared and organized by the Contractor. All drawings, schematics, layouts, and diagrams shall be done on 11" x 17" sheets utilizing AutoCAD. Two sets of submittals will be returned to the Contractor.
 - 1. Submittals shall be submitted electronically by PMWeb or any Owner approved means of delivery.
 - 2. Provide manufacturers cut sheets and manuals for all hardware to be provided.

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3. Provide ISA type instrumentation data sheets for each component, together with a technical product brochure or bulletin. The data sheets, as a minimum, shall show:
 - a. Instrument tag designation.
 - b. Component name.
 - c. Manufacturer's model number.
 - d. Calibrated range.
 - e. Instrument location.
 - f. Input and output characteristics.
 - g. Scale range and units (if any) and multiplier (if any).
 - h. Requirements for electric supply.
 - i. Vendor/ distributor
4. Group the data sheets together in the submittal by type. Provide individual data sheets for each instrument with one brochure or bulletin to cover all identical uses of that component.
5. The detailed construction drawing submittal shall include, as a minimum, the following types of drawings and diagrams required for the construction of this project:
 - a. Legend, Symbols, and Index.
 - b. Power Distribution Diagrams.
 - c. Instrument Control Panel Layouts/Construction Drawings/Details.
 - d. Internal Panel Wiring Diagrams.
 - e. Digital I/O Module Wiring Diagrams.
 - f. Analog I/O Module Wiring Diagrams.
 - g. Detailed Loop Interconnection Wiring Diagrams (per ISA S5.3 and S5.4) for the entire system showing all control equipment, instrumentation, electrical equipment, components, wiring, routing, J-boxes, terminations, wire tags, and wire colors. The diagrams shall show the detailed interconnection of all electrical equipment, instrumentation, panels, enclosures, components and the like provided under this contract.
 - h. Detailed Ladder Diagrams in a format similar to NFPA 79 (for discrete wiring) to meet the following minimum requirements:
 - i. Where the internal wiring diagrams of subassemblies are furnished on separate sheets, they shall be shown as a rectangle in the schematic diagram with all external points identified and cross-referenced to the separate sheets of the control circuit. Coils and contacts internal to the

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subassemblies shall be shown in the rectangle connected to their terminal points.

- j. A cross-referencing system shall be used in conjunction with each relay coil so that associated contacts may be readily located on the diagram. Where a relay contact appears on a sheet separate from the one on which the coil is shown, the purpose of the contact shall be described on the same sheet. Spare contacts shall be shown.
 - k. Limit, pressure, float, flow, temperature sensitive, and similar switch symbols shall be shown on the schematic (ladder) diagram with all utilities turned off (electric power, air, gas, oil, water, lubrication, etc.) and with the equipment at its normal starting position. If the equipment is shown in a specific position, the position shall be identified.
 - l. Contacts of multiple contact devices, e.g., selector switches, shall be shown on the line of the schematic diagram where they are connected in a circuit. A mechanical connection between the multiple contacts shall be indicated by a dotted line or arrow. This does not apply to control relays, starters, or contactors. Additional charts or diagrams may be used to indicate the position of multiple contact devices such as drum, cam, and selector switches.
 - m. The purpose or function of all switches shall be shown adjacent to the symbols. The purpose or function of controls such as relays, starters, contactors, solenoids, subassemblies, and timers on the diagram shall be shown adjacent to their respective symbols. The number of positions of the solenoid valve shall be shown adjacent to the valve solenoid symbol.
 - n. Arrangement and construction drawings for consoles, control panels, and for other special panels for field installation. These drawings shall include dimensions, location of all components, identification of all components, bill of materials, detailed schematics of all internal wiring, preparation and finish data, nameplates, and the like. These drawings also shall include enough other details to define the style and overall appearance of the assembly; include a finish sample for all panel surfaces.
 - o. Installation, mounting, and anchoring details for all field instruments and panel mounted components.
 - p. An instrument list including all instruments provided under this project
 - q. An I/O List for each PLC in the project.
- B. Complete detailed bills of material: Detailed bill of material for all components shall be provided including complete manufacturers name and model number, quantity to be provided, and cross references to data sheet sections.
- C. Operation, Maintenance, and Repair Manuals:
- 1. The Operation and Maintenance (O&M) manuals shall be submitted and approved prior to the testing of the project systems. The O&M manuals shall

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- be used to assist with commissioning and any red-lines made during testing shall be revised and resubmitted as the final set of six (6) O&M manuals.
2. The organization of the initial submittal required above shall be compatible to eventual inclusion as one volume of the operation, maintenance, and repair manuals.
 3. Operation manuals shall be prepared and submitted to the Owner's Representative for preliminary review in six copies. When the Owner's Representative is satisfied that these are complete and properly prepared, six final sets shall be delivered to the Owner's Representative.
 4. The complete operation manual shall contain all the information included in the preliminary equipment submittal, the detailed installation submittal, and the additional information required herein, all bound in hard-cover binders and arranged for convenient use including tab sheets, all indexed and cross referenced with a separate index for each item, and all final as-built drawings with the AutoCAD electronic files.
 5. The operation manuals shall contain: (1) calibration and maintenance instructions, (2) trouble-shooting instructions, and (3) instructions for ordering replacement parts.

1.4 QUALIFICATIONS AND RESPONSIBILITY OF CONTRACTOR

- A. The Contractor shall furnish and install all proposed hardware as shown on the drawings and as specified herein. The PLC system installation and wiring connections to peripheral equipment and instruments shall be the responsibility of the system supplier using qualified personnel possessing the necessary equipment and having experience in making similar installations. Evidence of such qualification, as well as notification of the system supplier assuming unit responsibility, shall be furnished to the Owner in writing prior to commencement of the work. The qualification evidence shall include the following:
 1. The system supplier shall have experience with the installation of industrial control systems similar in type to those to be installed in this project.
 2. A list of completed similar installations including name and address of owner, name of project, and date of completion.
 3. The name and qualifications of supervisory personnel to be directly responsible for the installation of the control system.
- B. Under this section, the Contractor shall furnish the following:
 1. Special tools and test equipment required by the supplier.
 2. Control Panel
 3. Installation, integration and testing.
 4. Documentation.
 5. Warranty (one year from the issuance of Notice of Completion).
 6. Shipping and receiving.

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- C. All calibration and final checkout of the process instrumentation and control system shall be witnessed by the Owner's Representative to determine if the system complies with the contract documents.
- D. The Contractor shall be responsible for coordinating and interfacing with equipment supplied under these contract documents which are an integral part of the system. Interfacing shall be incorporated in the detailed systems drawings and data section of the contract documents.
- E. The system supplier shall be experienced in the design, programming, and service of this type of equipment. In the event of a dispute as to the acceptability of the system supplier, the Owner's Representative shall make the final determination.

1.5 GUARANTEE

- A. The Contractor shall repair or replace defective components, rectify malfunctions, correct faulty workmanship, all at no additional cost to the Owner during the guarantee.
- B. To fulfill this obligation, he shall utilize technical service personnel designated by the Contractor who was originally assigned project responsibility. Services shall be performed within five calendar days after notification by the Owner's Representative.

PART 2 - MATERIALS

2.1 DESIGNATIONS OF COMPONENTS

- A. In these specifications and on the plans, all systems, and other elements are represented schematically and are designated by numbers, as derived from criteria in Instrument Society of America Standards. The nomenclature and numbers designated herein and on the plans shall be employed exclusively throughout shop drawings, data sheets, and the like. Any other symbols, designations, and nomenclature unique to a manufacturer's standard methods shall not replace those prescribed above, as used herein, and on the plans.

2.2 INSTRUMENT TAGGING

- A. Attach a stainless-steel tag to the instrument at the factory. Permanently mark the stainless-steel tag with the instrument tag number. The manufacturer's standard metal nameplate as a minimum shall denote model number, serial number, operating electrical voltage and amperage (when applicable), and date of manufacture.

2.3 INSTRUMENT SYSTEM POWER

- A. Power provided for the instrument system at the facility shall be 120-volt a-c, single phase, 60 Hz.
- B. Where d-c power supplies are not furnished integral with any one instrument system loop, then provide separate solid-state power supplies.

2.4 MATCHING STYLE, APPEARANCE, AND TYPE

- A. All display instruments of each type shall represent the same outward appearance, having the same physical size and shape and the same size and style of numbers and pointers.

PART 3 - EXECUTION

3.1 UNIFORMITY OF COMPONENTS

- A. Components which perform the same or similar functions shall, to the greatest degree possible, be of the same or similar type, the same manufacture, the same grade of construction, the same size, and the same appearance.

3.2 PLC PROGRAMMING

- A. PLC code writer shall provide and coordinate a minimum one (1) workshop with client to demonstrate the project application functionality.
- B. PLC Program shall be standard IEC 61131-3 in Unity Pro XL. The Custom PLC control application shall be written in Derived Function Block (DFB). The City will provide a current PLC control application as reference.
- C. PLC project or control application shall be segmented in to multiple program sections. Each section shall be proportional and consistent with each process.
- D. PLC Programming, testing, commissioning, trouble-shooting and start-up shall be the responsibility of the Contractor.
- E. Coordinate with the City of San Diego for Sequence of Operations of pumps. Required modes of operation are based on process and user input but not limited to the following - Pressure control, Flow control, Level Control, TOU Control, Manual Override control, etc. The existing Modicon Quantum PLC can be downloaded and made available to show the existing control scenario resident in the PLC. Additional I/O will be required as indicated on the P&ID's.

3.3 MOUNTING OF EQUIPMENT AND ACCESSORIES

- A. Mount equipment in accordance with the installation detail drawings as prepared by the Contractor and reviewed by the Engineer. Mount equipment so that they are rigidly supported, level and plumb, and in such a manner as to provide accessibility; protection from damage; isolation from heat, shock, and vibration; and freedom from interference with other equipment, piping, and electrical work. Do not install consoles, cabinets, and panels until heavy construction work adjacent to computer and telemetry equipment has been completed to the extent that there shall be no damage to the equipment.
- B. Locate devices, including accessories, where they shall be accessible from grade, except as shown otherwise.
- C. Mount local equipment in cabinets or existing panels as specified. Mount associated I/O terminals on a common panel or rack; mounting panels and rack shall be baked enamel.

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- D. Coordinate the installation of the electrical service to components related to the system to assure a compatible and functionally correct system. All accessories shall be coordinated and installation supervised by the Contractor.

3.4 CALIBRATION

- A. Each instrument requiring factory calibration shall be furnished with calibration data. The calibration data shall be factory certified.
- B. Calibrate systems after installation in conformance with the component manufacturer's instructions. This shall provide that those components having adjustable features are set carefully for the specific conditions and applications of this installation and that the components and/or systems are within the specified limits of accuracy. Defective elements which cannot achieve proper calibration or accuracy, either individually or within a system, shall be replaced. Accomplish this calibration work by a technical field representative of the single instrument supplier. He shall certify in writing to the Engineer that all calibrations have been made and that all systems are ready to operate.

END OF SECTION

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SECTION 40 91 00
INSTRUMENTATION AND CONTROL COMPONENTS

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. The work of this Section includes the general specification and requirements for the instrumentation and control work under this and other applicable Specifications. The work also includes providing instrumentation and all related wiring as shown in these Contract Documents.
- B. The contractor shall be responsible for the procurement, installation, testing, training, and documentation for instrumentation and control systems provided under this Contract.
- C. The contractor shall be responsible for the generation of panel wiring diagrams and loop drawings which depict the interconnection between instruments, panels, and MCCs.
- D. The wiring diagrams shall be forwarded to the construction manager, for Engineer's review and approval. The contractor shall generate a complete loop drawing for each measuring or control loop. The loop drawing shall include a minimum of 3 sheets as required in paragraph 1.5 B.2.
- E. All control system field tests including loop tests, plant commissioning, and plant startup, shall be a responsibility of the contractor. The contractor shall be responsible for providing all personnel and equipment (current drivers, jumpers, read out devices, oscilloscopes, voltage-resistance meters, etc.) required to perform the loop test simulations. All devices used shall be traceable to the National Institute of Standards and Technology (NIST).
- F. The contractor shall perform field engineering design as required for mounting and supporting all field mounted components. The contractor shall develop any additional schematic and interconnection diagrams which may be required for complete and operable instrumentation.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the work of this specifications. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this work.
 - 1. Section 09900 Painting and Coating
 - 2. Section 01 43 33 Manufacturer's Field Services
 - 3. Section 402700 Process Piping, as applicable
 - 4. Division 26 Electrical, as applicable

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1.3 CODES

- A. 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

1.4 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

- | | | |
|----|------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1 | ANSI/ASME B 16.5 | Pipe Flanges and Flanged Fittings |
| 2 | API RP-550 | Manual on Installation of Refinery Instruments and Control Systems, Part 1 - Process Instrumentation and Control Sections 1 Through 13 |
| 3 | ASTM A 105 | Specification for Forgings, Carbon Steel for Piping Components |
| 4 | ASTM A 193 | Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service |
| 5 | ASTM A 194 | Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service |
| 6 | ASTM A 283 | Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars |
| 7 | ISA-RP60.6 | Nameplates, Labels, and Tags for Control Centers |
| 8 | ISA-RP12.6 | Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations |
| 9 | ISA-S5.1 | Instrument Symbols and Identification |
| 10 | ISA-S5.4 | Instrument Loop Diagrams |
| 11 | ISA-S20 | Specification Forms for Process Measurement and Control Instrumentation; Primary Elements and Control Valves |
| 12 | ANSI - B16.1 | Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 |

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13	ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
14	ASTM B 61	Specification for Steam or Valve Bronze Castings
15	ANSI/AWWA	Ductile-Iron and Gray-Iron Fittings.

1.5 SHOP DRAWINGS AND SAMPLES

A. Pre-submittal Conference:

1. The contractor shall arrange and conduct a Pre-submittal Conference within 60 days after Notice to Proceed. The purpose of the Pre-submittal Conference is to review and approve the manner in which the contractor intends to carry out his responsibilities for shop drawing submittal on the work to be provided under this Section. The contractor, construction manager, and PUD shall attend. The contractor, construction manager, and PUD may invite additional parties at their discretion.
2. The contractor shall allot 8 hours for the Conference.
3. The contractor shall prepare the following for discussion at the Conference:
 - a. List of equipment and materials for the instrumentation systems, including proposed manufacturer names and model numbers.
 - b. List of proposed clarifications to the indicated requirements plus a brief written explanation of each exception. Review and acceptance of proposed clarifications will be according to Division 1.
 - c. One complete example of each type of submittal proposed.
 - d. A flow chart showing the steps the contractor will take in preparing and coordinating each submittal to the construction manager.
 - e. A schedule for the WORK provided under this Section, covering the time period beginning with the conference and ending after startup and training. Dates for the beginning and ending of submittal preparation, submittal review, design, fabrication, programming, factory testing, delivery to the site, installation, field testing, and training shall be scheduled. The schedule shall be subdivided into major items or groups of items which are on the same schedule.
4. The contractor shall furnish 3 copies of all the items above to the construction manager.

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5. The contractor shall take formal minutes of the Conference, including all events, questions, and resolutions. Prior to adjournment, all parties must concur with the accuracy of the minutes and sign accordingly.
- B. Shop Drawings:
1. General:
 - a. Preparation of shop drawings shall not commence until adjournment of the Pre-submittal Conference.
 - b. In the Contract Documents, all systems, meters, instruments, and other elements are represented by symbology derived from the latest version of ANSI/ISA S5.1. The 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 the Contract Documents.
 - c. During the period of shop drawing preparation, the contractor shall maintain a direct, informal liaison with the construction manager for exchange of technical information. As a result of the exchange, certain minor refinements and revisions to the indicated systems may be authorized informally by the construction manager but these shall not alter the work or cause increase or decrease in the Contract Price. During informal exchanges, no statement by the construction manager shall be construed as approval of any component or method or exception to or variation 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 the content of the drawing.
 - e. Shop drawing copies shall be submitted as standard size 3-ring, loose- leaf, vinyl plastic binders suitable for bookshelf storage. Maximum binder size shall be 2 inches. Shop drawing shall also be submitted electronically, in addition to physical copies.
 - f. A complete index shall be placed at the front of each binder.
 - g. 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.

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- h. Shop drawings shall be submitted as a single package at one time within 90 days of the commencement data stated in the Notice to Proceed.
 - i. All shop drawings shall be produced in using CAD formats. Each shop drawing submittal shall include the requisite number of hard copies and one (1) Microstation electronic copy. Upon completion of this project, the Contractor shall submit four (4) electronic copies of all current shop drawings.
2. Loop diagrams conforming to ISA 5.4 to verify the interfaces with all instrumentation and devices being provided or installed under the project. The loop diagrams shall also define all interfaces with equipment provided by area Contractors. The following three-sheet format is required:
- a. Sheet 1: 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

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- 19) Interconnect Drawing File Name
- b. Sheet 2: Provide loop drawing meeting the Requirements of ANSI/ISA S5.4, except that intermediate terminal junction boxes may be omitted and 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).
 - c. Sheet 3: Provide point-to-point conduit and wiring diagram, showing instrument, wire and cable numbers, intermediate terminal junction boxes, and PLC terminations. Wire identification numbers will reflect the field instrument tag number, and not the PLC I/O number.
 - d. PLC 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 Signal/Motor Run
ZL	In Computer Status
ZSO	Device Open
ZSC	Device Closed
YL	Motor run
HS	In Computer Switch

- 3. Technical brochures, bulletins and data sheets containing:
 - a. Fully completed ISA S20 data sheets
 - b. Component functional descriptions
 - c. Locations or assembly at which component is to be installed
 - d. Materials of a component's parts which will be in contact with process fluids or gases
- 4. Schematic and wiring diagrams for control circuits shall be submitted in two stages. Initially, schematic control diagrams shall show complete details on the circuit interrelationships of all devices within and outside each Control Panel. Subsequent to acceptance of all schematic control diagrams, by the CONSTRUCTION MANAGER, piping and wiring diagrams shall be submitted. The diagrams shall consist of component

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layout drawings to scale, showing numbered terminals on components together with the unique number of the wire to be connected to each terminal. 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

5. Installation, mounting, and anchoring details for all components and assemblies to be field mounted, including conduit connection or entry details.
6. Complete control panel layouts, all drawn to a 1-1/2 inch=1 foot scale showing:
 - a. 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.
 - b. All cutout locations fully dimensioned. All outside panel dimensions shall be shown.
 - c. Locations of back-of-panel stiffeners.
 - d. 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.
 - e. Nameplate engraving list.
 - f. 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

1.6 OPERATIONS AND MAINTENANCE MANUAL

- A. Information included in the manual shall comply with the requirements of Division 1 with the following exceptions:
 1. Two copies of the manual shall be submitted after acceptance of all submittals. One set will be returned to the contractor with comments.
 2. Final copies of the manual, after revision, shall be submitted to the construction manager 15 days prior to startup.
- B. The following shall be included in the manual in accordance with Division 1:
 1. Installation, connection, operating, troubleshooting, maintenance, and overhaul instructions from the manufacturer.

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2. Exploded or details views of all instruments, assemblies, and accessory components.
 - a. Parts lists and ordering instructions.
 - b. Wiring diagrams.
 - c. Loop diagrams as specified in Section 1.5.
 - d. A list of spare parts for 1 year operation recommended by the manufacturers of all analog equipment.

1.7 AS-BUILT DRAWINGS

- A. As-built drawings shall be prepared in accordance with Division 1 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 Divisions 40, and 26 of this Contract.
 2. One set of original drawings and two copies of each as-built drawing under this Section shall be submitted to the construction manager after completion of field checkout but before placing the systems in service for the owner's use.
 3. Drawings shall also be submitted in electronically in Microstation and pdf format.

1.8 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 Paragraph 3.4.

1.9 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.

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- 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:** The instrumentation and control system shall be installed near a water 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:
 - 1. **Temperature Range:** 0 through 50 degrees C (32 through 122 degrees F)
 - 2. **Thermal Shock:** 0.55 degrees C per minute (1.0 degrees F per minute)
 - 3. **Relative Humidity:** 20 through 95 percent (non-condensing)
- C. **Control Room Situated Equipment:** All components of the instrumentation and control system shall be rated to operate in an environment where the ambient temperature is 15 through 35 degrees C (59 through 95 degrees F) and the relative humidity is 20 to 95 percent (non-condensing).
- D. **Noise Tolerance:** The instrumentation and control system components shall not exceed a db level of 55 when monitored 3-feet away from the devices. If upon testing it is found that this limit is exceeded at the option of the CONSTRUCTION MANAGER and at no additional cost to the OWNER, devices shall be replaced in order to achieve a maximum level of 55 db or sound absorption materials shall be added.

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 and loop number).
- 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.

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- 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 (4-20 mA)	O1FIT022(A)-1(+)
(C)	120 volt AC control	05P320(C)-2
(D)	24v dc digital status or control	55LSH201(D)-1(+)
(P)	Power (120 volt, 480 v, 5 kv, 15 kv etc.)	01MCC6101(P)-2

PART 2 - PRODUCTS

2.1 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 the shop drawings unless otherwise indicated.
- B. 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 to 20 milliamperes DC except as noted.
- C. 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 ± 0.5 percent of full scale and a minimum repeatability of ± 0.25 percent of full scale unless otherwise indicated. Instruments which do not conform to or improve upon these criteria are not acceptable.
- D. Each control loop shall be individually fused.
- E. 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.

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4. Wiring shall be kept clear of spare space to give maximum space for future additions.
- F. 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. Smaller panels shall be sized to adequately dissipate heat generated by equipment mounted in or on the panel.
 5. 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.
 6. Construction:
 - a. Wire for 120-volt circuits shall be No. 12 AWG stranded with Type THHN/THWN-2 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. 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.
 7. Power Supply Wiring:
 - a. Unless otherwise indicated, all instruments, all alarm systems, and all motor controls shall operate on 24 VDC circuits.
 - b. The CONTRACTOR shall furnish terminal box connections for the main power supply entry as indicated.

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- 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 fuseholder, 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.
8. 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.
9. Signal Wiring:
- a. Computer and Non-Computer 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 THHN/THWN-2 insulation. Color code for instrument signal wiring shall be:
 - 1) Positive - Black (+)
 - 2) Signal Ground Negative - White (-)
 - 3) Equipment Ground - Green

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- 4) Ungrounded - Red
 - 5) Energized by voltage source 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.
10. 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.
- G. Nameplates:
1. 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).
 2. 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 NOT be used for attaching nameplates. Nameplates shall be mounted using stainless steel machine screws. Nameplates shall be fabricated from black face white-center laminated engraving plastic. 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.
- H. Factory Inspection:
1. Panels shall be inspected for compliance with requirements at the factory before shipment to the site. The contractor shall notify the construction manager 2 weeks in advance of the testing date. A representative of the construction manager will visit the factory to make the inspection.
 2. CONTRACTOR shall perform the following tests prior to arrival of the CONSTRUCTION MANAGER:
 - a. All air lines adequately tested for leaks.
 - b. All alarm circuits rung out to determine their operability.

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- 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 construction manager 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 construction manager, the contractor shall reimburse the owner for the cost of the extra time required for the inspector's services and travel expenses.
- I. Shipment:
 1. 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

2.2 GENERAL INSTRUMENTATION ENCLOSURE COMPONENTS

- A. **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.
- B. **General Purpose Relays:** General purpose relays in the Control Panels shall be plug-in type with contacts rated 10 amperes at 24 volts DC; 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.
- C. **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.
- D. **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.

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2.3 PRESSURE MEASURING SYSTEMS

- A. **Electronic Pressure Transmitters:** Electronic pressure transmitters shall be two wire devices with continuously adjustable span, zero and damping adjustments, integral indicators scaled in engineering units, solid state circuitry and 4-20 mA outputs. Accuracy shall be plus or minus 0.25 percent of calibrated span. Process wetted and body materials shall be 316 SS. Process connections shall be ½-inch NPT.

The following electronic pressure transmitter systems shall be provided:

Tag No.	P&ID	Service	Range	NEMA Rating
PIT-0020	I-3	Suction Pressure	0-50 psi	4X
PIT-0030	I-3	Discharge Pressure	0-300 psi	4X

- B. **Local Pressure Measuring Systems:** Pressure gauges shall be installed on suction and discharge connections to pumps; on discharge connections from blowers and compressors; at each side of pressure reducing valves; and where otherwise indicated. Vacuum gauges and compound gauges, where indicated, shall be installed on vacuum pumps. Gauges shall have Type 316 stainless steel movement and stainless steel or alloy case. Except as otherwise indicated, gauges shall have a 3-1/2-inch dial, 1/4- inch threaded connection, a Type 316 stainless steel snubber adapter, and a shut-off valve. Gauges shall be calibrated to read with an accuracy of ± 1 percent to 150 percent of the indicated pressure. Gauges shall be vibration and shock resistant. Gauges on liquid service should have cases filled with a suitable liquid. Gauges attached to systems containing chemical solutions, corrosive fluids, sludge, sewage, or other liquids containing solids, shall be equipped with diaphragm seals, or equal protective pressure or vacuum sensing devices, and comply with the following:

The following pressure gauges shall be provided

Tag No.	Service	P&ID	Range
PI-020	P-01 SUCTION HDR PRESS	I-3	30-inches Mg -15 PSI
PI-0110	P-01 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0210	P-02 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0310	P-03 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0410	P-04 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0510	P-05 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0610	P-06 SUCTION PRESS	I-3	30-inches Mg -15 PSI
PI-0110A	P-01 DISCHARGE PRESS	I-3	0-60 PSI
PI-0210A	P-02 DISCHARGE	I-3	0-30 PSI

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Tag No.	Service	P&ID	Range
	PRESS		
PI-0310A	P-03 DISCHARGE PRESS	I-3	0-30 PSI
PI-0410A	P-04 DISCHARGE PRESS	I-3	0-30 PSI
PI-0510A	P-05 DISCHARGE PRESS	I-3	0-30 PSI
PI-0610A	P-06 DISCHARGE PRESS	I-3	0-30 PSI

C. Diaphragm Seals for Pressure Measuring Systems: Diaphragm seals shall consist of bottom housing, lower ring, and diaphragm capsule, fill screw, flushing connection, and a top housing. The diaphragm seal shall attach to the inlet connection of a pressure instrument to isolate its measuring element from the process fluid. The space between the diaphragm and the instrument’s pressure element shall be solidly filled with a suitable liquid. Displacement of the liquid fill in the pressure element through the movement of the diaphragm shall transmit process pressure changes directly to a gauge, transmitter, switch or any other pressure instrument. The diaphragm seal shall have a removable bottom housing to permit the servicing of the need to refill. All exposed surfaces, housings, and diaphragm shall be constructed of 316 stainless steel.

2.4 PRESSURE DETECTION SWITCHES

A. Diaphragm Piston Pressure Switches: Pressure switches shall consist of a pressure transducer and a precision switch. Pressure transducer shall be the diaphragm piston type with wetted materials as recommended by the switch manufacturer. Piston shall be backed by a cylinder disc to permit 10 times over range pressure without affecting calibration. Range spring and piston shall be isolated from process fluids by the diaphragm. Switch shall be provided with two 3/4inch conduit connections. The pressure transducer shall be selected so that setpoint falls between 30 and 70 percent of maximum range. Approximate setpoint and, if applicable, reset point shall be indicated on calibrated scales. Repeatability and sensitivity shall be 1.0 percent of operating range or better. Unless otherwise specified, switches shall be non-adjustable deadband type. Trip setpoints shall be field determined.

The following pressure switches shall be provided:

Tag No.	P&ID	Service	Range	NEMA Rating	Diaphragm Seals Required
PSL-0110	I-3	P-01 SUCTION PRESS	0-30 PSI	4X SS	Yes
PSH-	I-3	P-01	0-30 PSI	4X SS	Yes

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Tag No.	P&ID	Service	Range	NEMA Rating	Diaphragm Seals Required
0110		DISCHARGE PRESS			
PSL-0210	I-3	P-02 SUCTION PRESS	30-inches Mg -15 PSI	4X SS	Yes
PSH-0210	I-3	P-02 DISCHARGE PRESS	0-30 PSI	4X SS	Yes
PSL-0310	I-3	P-03 SUCTION PRESS	30-inches Mg -15 PSI	4X SS	Yes
PSH-0310	I-3	P-03 DISCHARGE PRESS	0-30 PSI	4X SS	Yes
PSL-0410	I-3	P-04 SUCTION PRESS	30-inches Mg -15 PSI	4X SS	Yes
PSH-0410	I-3	P-04 DISCHARGE PRESS	0-30 PSI	4X SS	Yes
PSL-0510	I-3	P-05 SUCTION PRESS	30-inches Mg -15 PSI	4X SS	Yes
PSH-0510	I-3	P-05 DISCHARGE PRESS	0-30 PSI	4X SS	Yes
PSL-0610	I-3	P-06 SUCTION PRESS	30-inches Mg -15 PSI	4X SS	Yes
PSH-0610	I-3	P-06 DISCHARGE PRESS	0-30 PSI	4X SS	Yes

2.5 PROGRAMMABLE LOGIC CONTROLLER (PLC):

- A. The contractor shall furnish, install, program, test, calibrate, fully configure and place into operation Programmable Logic Controllers (PLCs) and appurtenances as specified herein. The PLC shall be Modicon M-580 to replace the existing Modicon Quantum series.

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- B. The contractor shall furnish all necessary interconnecting cables, Telefast modules, all accessories, and all appurtenances as indicated herein or as required for proper operation of the system. All major components of the system shall be of the same manufacturer. All equipment shall be capable of tolerating and capable of riding through a power interruption of 8 milliseconds or less without interruption of normal operation.
- C. Design: The PLC shall be furnished with I/O (input/output) modules suitable for the interface with the new and existing field devices. The I/O's shall be 4-20 mA signals for analog inputs and analog outputs and shall be 24 VDC for discrete inputs and discrete outputs. The PLC shall provide internal fault analysis with a fail-safe mode and a dry contact output for remote location alarming, and a local indicator on the PLC frame in the event of a fault in the PLC.
- Memory: The PLC shall be supplied with sufficient memory to implement the specified control function plus a reserve capacity of 20 percent of the total provided. This reserve capacity shall be totally free from any system use. The memory shall be programmed in a multi-node configuration with multiple series or parallel contacts, counters, timers, and arithmetic functions.
- D. Controller: The controller program shall be standard IEC 61131-3 in Unity M580. The Custom PLC control application shall be written in Derived Function Block DFB. A SAMPLE ONLY, not to be used program, shall be provided as a reference. The PLC shall be easily reprogrammed with a portable programming unit or laptop computer. The PLC system shall be programmed by the vendor to perform the specified control and monitoring functions. Two documented copies of the operating program shall be furnished which shall allow direct, step-by-step, reloading of the system program. Copies of this program shall be furnished in the format used in the contract diagrams for conventional relay control systems. These diagrams shall reflect equipment name designations used in the PLC as well as the contract diagram equipment name designations (i.e., timer "Q" in the Contract drawing may become timer OL in PLC program).
- E. Power Supply: The PLC power supply shall operate 24 VDC.
- F. Telefast sub-base Wiring System: Provide telefast sub-base wiring system and associated plug-in cable sets. Telefast System shall be installed in a new enclosure per Contract Drawings. Digital input Telefast module shall convert the existing 120 VAC field signals to 24 VDC for communication with the PLC input module. Digital Input Telefast shall be 16 point ABE7S16E2 fixed solid state relays with removable terminal block. Telefast sub-base wiring shall be used for all digital and analog I/O.
- G. Input/Output Modules: All I/O housings and I/O modules shall be of rugged construction with modules in place. Sufficient input and sufficient output modules shall be provided with the PLC to implement the specified control functions plus a reserve capacity of 25 percent of the total provided.

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1. 32-point Discrete Input Modules: Defined as contact closure inputs from devices external to the programmable logic controller module. Input modules shall operate at 24VDC. Input modules shall be shielded from short time constant noise and 60-Hz pickup. Individual inputs shall be optically isolated for low energy common mode transients to 1500 volts peak from user's wiring or other I/O Modules. The modules shall have LED lights to indicate a discrete input.
 2. 32-point Discrete Output Modules: Defined as contact closure outputs for ON/OFF operation of devices external to the programmable logic controller module. Output modules shall operate at 24VDC. The output modules shall be fused with blown fuse indicator lights. The output modules shall be optically isolated from inductively generated, normal mode and low energy, common mode transients to 1500 volt peak. All output modules shall have LED lights to indicate output has been cycled ON by the controller.
 3. 8-point Analog Input Modules: Defined as analog inputs for 4 to 20 mA dc signals, where an analog to digital conversion is performed and the digital result is entered into the processor. New inputs shall be provided for every scan.
 4. 4-point Analog Output Modules: Defined as analog output for 4 20 mA dc signals, where a digital to analog conversion is performed and the analog result is produced as an output. New outputs shall be produced on every scan.
- H. Programming Unit: All programming shall be accomplished with a laptop computer. The programmer shall be capable of being directly plugged into the PLC system without the requirements of additional hardware. All programming, all monitoring, all searching, and all editing shall be accomplished with the programmer. These function shall be capable of being done both "on line" while the processor is scanning or "off line" while the processor is not scanning. The programmer shall display multiple series and parallel contacts, coils, timers, counters, and calculation functions. The programmer shall also be able to monitor the status of all inputs, all outputs, all timers, all counters, and all coils. It shall have the capability to disable/force all inputs, all outputs, and all coils to simulate system operation. It shall also indicate "power flow" through all elements and include a search function to locate any element and it's program location. The processor status information, such as error indication and amount of memory remaining, shall be shown on the laptop. The programmer shall be of rugged construction and be portable, allowing it to be used in an industrial environment without special protection. The contractor shall provide one new laptop computer with the latest windows professional operating system, development software, utility software and all pertinent licenses to program the PLC and other supplied hardware. The submittal shall be complete with manuals to the owner to enable future system support. The laptop shall be turned over to the owner at start-up. The laptop

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shall be Dell Inspiron 15 5000 or approved equal. Provide 15” display with 20 GB of RAM and 1 TB hard drive.

- I. PLC Control System Software: This Section covers the furnishing of standard and customized software, fully installed and fully configured in the control systems specified herein. It is the intent of this specification to have the PLC System Supplier furnish his latest generation, standard, field proven, fully debugged and supported software package for this application with a minimum of additions or changes. Customized or specially written software shall be furnished if required to meet all of the functional requirements specified herein. Any custom applications software required shall be fully integrated into the basic software and shall not require unique command structures. Software specified herein is described in broad, functional categories. The System Supplier shall furnish a complete software package including the functional requirements specified herein along with whatever additional software is required by the supplier for proper and efficient operation of the PLC Control System. No attempt has been made to list all software or list all characteristics of software required by the System Supplier to meet the functional requirements specified herein. All software shall be licensed to the Owner.
1. General: The software package shall provide a system capable of controlling system level activities and a higher level process control language allowing the operator to monitor and control the process through an interactive human interface. The software environment shall support a multi-programming atmosphere allowing concurrent execution of more than one program in a background/foreground mode or multi-tasking mode.
 2. Throughout the execution of all software modules, the operator shall be presented with all of the command or operation choices available at that point in the program using sufficient verbiage or symbols to make the choices self-explanatory and unambiguous. Question and answer or fill-in-the-blank requests shall only be permitted where file names, tag names, or other unique text or numerical information is required.
 3. System-level software shall include a real time operating system, a calendar/time program, a file management program and a system of diagnostic routines in addition to any compilers, editors, loaders, or assemblers required to support the process control software language.
 4. All programs shall be self-configuring, such that they obtain the size and configuration of the system from parameters contained in the various files created during system generation. No parameters related to the hardware configuration shall be hard coded into any of the software.
 5. System Level Software: System-level software shall include a complete and unmodified operating system furnished by the System Supplier that provides system-level functions as specified herein. Operating system software shall function automatically without operator intervention, except as required to establish file names and similar information.

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6. Operating System Software: The real-time operating system software shall be the standard uncorrupted product of the host computer and shall provide the following minimum functions:
 - a. Respond to demands from a program request or to demands from an operator.
 - b. Dynamic allocation of the resources available in the system. These resources shall include main memory usage, computation time, peripheral usage, and I/O channel usage.
 - c. Allotment of system resources on the basis of task priority levels such that a logical allocation of resources and suitable response times are assured.
 - d. Queuing of requests in order of priority if one or more requested resources are unavailable.
 - e. Resolution of contending requests for the same resource in accordance with priority.
 - f. Service requests for execution of one program by another.
 - g. Transfer data between programs as requested.
 - h. Management of all information transfers to and from peripheral devices.
 - i. Control and recovery from all program fault conditions.
 - j. Diagnose and report real-time hardware device errors.
7. Program execution shall be scheduled on a priority basis. A multilevel priority interrupt structure is required. A program interrupted by a higher priority program shall be entered into a list of pending programs. Its execution shall be resumed once it becomes the currently highest priority program. Initiation of programs shall, as a minimum, be activated in the following ways:
 - a. In response to external interrupts.
 - b. At a scheduled time of the day.
 - c. On an elapsed time interval basis.
 - d. On request by another program.
 - e. On request from the data access panel.
8. The system shall allow periodic programs to be scheduled. The allocation of resources to a time scheduled program shall be based on its relative priority and the availability of computer system resources.
9. Start-up and Restart: Software shall be provided which initializes and brings a computer or any microprocessor based hardware unit from an inactive condition to a state of operational readiness. Initialization shall include determination of computer system status prior to start-up of

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initializing operating system software and initializing application software. Initialization shall also include the loading of all memory resident software, initialization of timers, counters, and queues, and initialization of all dynamic database values.

10. Shutdown: The software shall provide an orderly shutdown capability for shutdowns resulting from equipment failure, including computer processor failure, primary power failure, or a manually entered shutdown command. When the loss of primary power is sensed, a high-priority hardware interrupt shall initiate software for an immediate, orderly shutdown. When a shutdown occurs in response to a command or malfunction, the software shall control the affected hardware quickly and automatically to a secure state.
11. Diagnostics: Diagnostic programs shall be furnished with the software package to detect and isolate hardware problems and assist maintenance personnel in discovering the causes for system failures. The system manufacturer's standard diagnostic routines shall be used as much as possible. Diagnostic software and test programs shall be furnished for each significant component in the system. Diagnostic routines shall test for power supply, central processing unit, memory, and I/O bus failures as a minimum.
 - a. Calendar/Time Program: The calendar/time program shall update the second, minute, hour, day, month and year in the operating system and transfer accurate time and date information to all system level and application software. Variations in the number of days in each month and in leap years shall be handled automatically by the program. The operator shall be able to set or correct the time and date from the data access panel, only at the highest security level.
12. Algorithms: System software shall support the implementation of algorithms for the determinations of control actions and special calculations involving analog and discrete inputs. These algorithms shall be capable of outputting positional or incremental control outputs or providing the product of calculations. The algorithms shall include alarm checks where appropriate. As a minimum, the following types of algorithms shall be provided.
 - a. A calculator algorithm which performs functions such as summing several variables, raising to a power, roots, dividing, multiplying, and subtracting.
 - b. A switch algorithm which reads the current value from its input address and stored it as the value of its output address. Two types of switches shall be accommodated, 2 outputs with one input and one output with 2 inputs.

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- c. A 3 mode Proportional-integral-Derivative (PID) controller algorithm, with each of the 3 modes independently adjustable. The algorithm shall support both direct and reverse acting modes.
- d. Algorithms for lead, lag, dead time, and ratiion compensators.
- e. Algorithms to perform integration and totalization of analog process variables.

Algorithms that drive the setpoint of a controller shall include provisions for bumpless transfer, which shall be implemented by use of a bias value.

Algorithms shall be implemented and modified in the system at any time through the use of interactive software modules in a manner consistent with other interactive modules and shall not required any direct source of code changes.

13. Alarm Processing

- a. Alarm processing software shall be provided to recognize and report alarm events and conditions to Central SCADA in an organized, unambiguous, clear, and convenient manner. Alarms shall be classified into at least 2 priority levels and at least 2 independent classes.
 - 1) Alarm processing software shall generate alarms for the following conditions:
 - 2) Discrete input or output change of state is defined as an alarm in the control software.
 - 3) Analog value exceeding alarm limits defined in the control software.
 - 4) Analog rate of change exceeding limits defined in the control software.
 - 5) Failure of the PLC processor, mass memory device, process input/output hardware, or other major hardware component.

Alarms shall be generated in each case above at the time of occurrence and at the time the condition returns to normal.

- J. Testing: The construction manager shall witness testing of the units. Solid-state logic systems shall be tested as complete assemblies. Testing of individual components or modules shall not be acceptable.
- K. Factory Test: Provide factory testing of the PLC and telefast system with program loaded. Provide factory test report showing satisfactory operation prior to shipping to the field for installation.

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- L. Training: A manufacturer's representative shall supply two 8-hour days of on-site training for the OWNER'S personnel. The training shall include but not be restricted to, operation of programming unit, trouble shooting of system hardware and software, and program development.
- M. Thirty Day Acceptance Test: After start up has been completed, the System shall undergo a 30-day acceptance test. The System must run continuously for 30 consecutive days. During this period, all System functions shall be exercised. Any System interruption and accompanying component, subsystem, or program failure shall be logged for cause of failure, as well as time of occurrence and duration of each failure. A failure shall cause termination of the 30-day acceptance test. When the cause of a failure has been corrected, a new 30-day acceptance test shall be started.

Each time the contractor's technician is required to respond to a System malfunction, he must complete a report which shall include details concerning the nature of the complaint or malfunction and the resulting repair action required and taken.

- N. Operation and Maintenance Manuals: Refer to Section 01 78 23 – Operations and Maintenance Data.

This shall include a complete description of the recommended operating procedures, maintenance procedures, and spare/replacement parts list for equipment items with catalog data, diagrams, and drawings or cuts describing the equipment. Each set shall include full size assembly and wiring diagrams; drawings showing "as-build" conditions shall be furnished to the owner.

2.6 ETHERNET SWITCH

- A. Provide an industrial ruggedized 16 port 24 VDC ethernet switch. Provide Cisco IE-2000-16PTC-G-NX, or approved equal. Provide 1GB Ruggedized SD memory card, DIN rail kit, and IE200 e-license.

PART 3 - EXECUTION

3.1 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.

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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 construction manager. 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. Further, it is the general intent that all 4-20 mA signal circuits, process equipment control wiring, signal wiring to field instruments, and Control Panel input and output wiring, be provided under Division 26 and be terminated and identified under Division 13.
- 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 the drawings. Exact locations and routing of wiring and cables shall be governed by structural conditions, physical interferences, and locations of electrical terminations on equipment.

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- 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.

3.2 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.

3.3 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 construction manager. Complete records of all tests shall be made and delivered to the construction manager. Each form shall be signed by the construction manager or the construction manager 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 megometer 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

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cable shield in a multi channel cable, between each wire and ground, and between each shield and ground. Values of resistance less than 1 megohms shall be unacceptable.

3.4 **INSTALLATION, CALIBRATION, TESTING, PRECOMMISSIONING, STARTUP AND INSTRUCTION**

- A. Installation and Connection: The contractor shall install and connect all field-mounted components and assemblies under the following criteria:
1. Process sensing lines and air signal tubing shall be installed to the installation of conduit indicated under Division 26. 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.
 2. 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.
 3. 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.
 4. Thermocouple or RTD 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.
 5. All power and all signal wires shall be terminated with spade type lugs.
 6. All connectors shall be, as a minimum, water tight.
 7. 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.
 8. 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

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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 construction manager. These test forms shall verify compliance with all. A report shall be delivered to the construction manager for each instrument, certifying that the instrument has been calibrated in the presence of the construction manager or the construction manager'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 (control system supplier) to ensure that a single total loop check is conducted. 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 designated operators 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 construction manager at no additional cost to the owner.
1. At least 15 days before installation testing begins, the contractor shall submit to the construction manager 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.

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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. 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 construction manager or the construction manager representative as a witness, with test data entered, shall be submitted together with a clear and unequivocal statement that all instrumentation has been success fully calibrated, fully inspected, and fully tested.
- D. System Pre-commissioning: The contractor shall responsible for demonstrating the operability of all systems provided under this specification. The CSP will assist and coordinate the operability assessment with the contractor. Pre-commissioning shall commence after acceptance of all wire, all calibrating and loop tests, and all inspections have been conducted. Pre-commissioning 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 construction manager for approval a Pre-Commissioning 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 pre-commissioning 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

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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 setpoint 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. Individual component accuracy tolerances shall be as indicated in the Contract Documents or as specified by published manufacturer accuracy specifications whenever not indicated.
 4. The contractor shall submit an instrumentation and control system pre-commissioning 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 pre-commissioning testing. The construction manager must accept the instrumentation and control system pre-commissioning testing before the thirty day operational testing may begin. Final acceptance of the control system shall coincide with final acceptance of the work.
- E. 30-Day Operational Testing: Refer to Section 01 43 33 – Manufacturer’s Field Services.
- F. 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 pre-commissioning in subparagraph D.
 2. The training shall be performed by qualified representatives of the instrument manufacturers and shall be specific to each instrument model provided. Instructors shall have training experience.
 3. Each training class shall be a minimum of 8 hours in duration and shall cover Operational Theory, Maintenance, Trouble Shooting/Repair, and Calibration of the instrument.
 4. Each training shall be recorded.

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5. Proposed training material, including resumes for the proposed instructors and a detailed outline of each lesson shall be submitted to the construction manager at least 30 days in advance of when the lesson is to be given. The construction manager shall review the submitted data for suitability and provide comments which shall be incorporated into the course.
6. Within 10 days after the completion of each lesson the contractor shall present to the construction manager the following:
 - b. A list of all OWNER personnel that attended the lesson.
 - c. An evaluation of OWNER personnel knowledge through written testing or equivalent.
 - d. A copy of text utilized during the lesson with all notes, diagrams, and comments.
 - e. A copy of the training recording.

3.5 INSTRUMENT SUMMARY

- A. General: The Instrument Summary (IS) contained herein itemizes the instrumentation devices, including control panels, to be furnished under this contract.
- B. Each column on the IS 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. Description: A process-oriented functional description which defines the measured/monitored/controlled parameter and the associated process/process equipment.
 3. P&ID Drawing Number: The Process and Instrumentation drawing upon which the device appears.

END SECTION

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SECTION 40 92 00

PUMP STATION FUNCTIONAL CONTROL DESCRIPTION

PART 1 - GENERAL

1.1 SCOPE

- A. This Section describes the control strategy for the Miramar Reservoir Pump Station (MRPS) after the rehabilitation specified as part of this Project.
- B. The rehabilitated pump station will consist of a total of six (6) pumps. Pumps 1, 2, and 3 will be constant-speed, and Pumps 4, 5, and 6 will be VFD driven.

1.2 SUMMARY

- A. Operation of the MRPS pumps are generally manually operated based on the flow rate required by the Miramar Water Treatment Plant (MWTP) as identified by the Plant's operations staff.
 - 1. The MWTP is fed through a common pipeline from the Miramar Reservoir using the MRPS, and from a San Diego County Water Authority (CWA) connection.
 - 2. The MWTP establishes the total Plant influent flow rate required, which includes flows from the MRPS and CWA.
 - 3. The MWTP requests a certain flow rate from the CWA and the remaining flow needed to make up the total Plant flow required is provided by the MRPS by a manually selected pumps.
 - 4. Flow from CWA varies, so the flow from the VFD driven MRPS pumps adjust automatically to maintain a consistent target total Plant influent flow.
 - 5. The local PLC will be programmed to sequence the pumps on after a power outage and regain of power. The pumps will be staged on in a maximum of six steps if a call signal is present.

1.3 MONITORING

- 1. Discharge header flow (Tag FI-0010): Range 0 - 120 MGD
- 2. Inlet Header Pressure (Tag PI-0020): Range 0 - 40 PSI
- 3. Discharge Header Pressure (Tag PI-0030): Range 0 - 60 PSI
- 4. CWA Flow from pipelines:
 - a. 5A (Tag MLPS_SD_5A)
 - b. 5B (Tag MLPS_SD_5B)
 - c. 5C (Tag MLPS_SD_5C)

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

5. Check valve of each pump: CLOSE Status
6. Pump Motors: RUN Status
7. Pump Motors: Trouble (VFD fail for VFD's) Status
8. Pump Motors: High Temperature
9. Pump Discharge Pressure: High Pressure Alarm
10. Pump Suction Pressure: Low Pressure Alarm
11. Pump VFD (Pumps 4, 5 and 6 only): Speed Setpoint
12. Pump VFD (Pumps 4, 5 and 6 only): Speed Feedback
13. Pump mode of control selected: AUTO/ LOCAL
14. Software Alarm for each pump: Failed to Start or Failed to Stop
15. Emergency Generator: Run and Fail Status
16. Power Supply Failure
17. Station Intrusion
18. Automatic Transfer switch in NORMAL position
19. Automatic Transfer Switch in EMERGENCY position
20. Station and RTU intrusion
21. Active Harmonic Filter Run and Fail

In addition to the above hard wired I/O. The RTU Ethernet switch has Ethernet (Modbus TCP) communication with all six pump starters (VFD and soft starters), UPS, Active Harmonic Filter (AHF), Automatic Power Transfer Switch (Power Monitor), and Generator control panel. Provide a matrix for each Ethernet communication item that lists points to be monitored by the PLC and/or SCADA. Minimum monitoring shall be individual pump Kw from each pump starter and Station Kw from the transfer switch (ATS).

PART 2 - FUNCTIONAL CONTROL DESCRIPTION

A. CONTROL:

1. HAND, OFF and AUTO (HOA) control modes for each of the raw water pumps at Motor Control Center (MCC). Operator selects mode of operation at motor control panel.
2. When the HOA is switched to AUTO, the pump can be remotely operated from Wonderware Workstation (HMI). When control is switched to HAND, the pump is locally started and stopped from the MCC using the START/STOP pushbuttons. When the control is switched to OFF, the motor will stop running

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3. START push button at motor control panel. Operator can manually start the pump's motor from running with the START button when control switch is selected to HAND
4. RESET push button at motor control panel to clear alarm. Operator clears the field alarms by pressing the RESET button on motor control panel.
5. The MCC has hard safety logic to protect and shutdown the pump in case of motor high temperature, low suction pressure, and high discharge pressure. Cause of the shutdown will be shown through Local (MCC door) indicating lights and Wonderware Workstation (HMI).
6. VFD Control Keypad and speed potentiometer is provided for:
 - a. Pump 4
 - b. Pump 5
 - c. Pump 6

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B. ALARMS:

TAGS	DESCRIPTION	SCALE	HIGH ALARM SETPOINT	LOW ALARM SETPOINT	COMMENT
FI-0010	MRPS Raw Water Discharge Header Flow	0 – 120 MGD	110 MGD	10 MGD (Active if one or more pumps are operating)	Alarm setpoint is programmed in PLC using the analog input from flow meter FI_0010. When alarm condition exists “High Flow” or Low Flow” will be displayed on Wonderware control system in “Miramar Lake Pump Station” screen (FIGURE 2) at the bottom of the Discharge box. The High Flow and Low Flow alarm is also displayed on “Plant Influent & Settled Water Overview (FIGURE 1) on the right side of the discharge readout display box.
PI-0020	Raw Water Inlet Header Pressure	0 – 40 PSI	35 PSI	5 PSI	Alarm setpoint is programmed in PLC using the analog input from the pressure transmitter PI_0020. When alarm condition exists “High Pressure” or Low Pressure” for raw water inlet pressure will be displayed on Wonderware control system in “Miramar Lake Pump Station” screen (FIGURE 2) at the top of the Discharge box. The “High Pressure” or “Low Pressure” alarm is also displayed on “Plant Influent & Settled Water Overview (FIGURE 1) on the right side of the discharge readout display box.
PI-0030	Raw Water Discharge Header Pressure	0 – 60 PSI	55 PSI	3 PSI	Alarm setpoint is programmed in PLC using the analog input from the pressure transmitter PI_0030. When alarm condition exists “High Pressure” or Low Pressure” for discharge header pressure will be displayed on Wonderware control system in “Miramar Lake Pump Station” screen (FIGURE 2) at the bottom of the inlet pressure display box. The “High Pressure” or “Low Pressure” alarm is also displayed on “Plant Influent & Settled Water Overview (FIGURE 1) on the right side of the Inlet readout display box.
TSH-0110	High Temperature		Motor supplier default		

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

1. Each pump has the field conditions such as Check Valve Closed, High Discharge Pressure, Motor Alarm and Motor High Temperature for alarm shutdown. If these alarms are active, the pump would require a reset from the pump’s MCC before issuing another start or stop from the HMI.

C. CONTROL STRATEGY NARRATIVE:

1. All of the pumps can be run at the same time to meet the flow demand. The operator determines the number of pumps needed to run to get the desired influent flow. Each of the lake pump has a maximum flow capacity of approximately 15 MGD.
 - a. For example:
 - 1) The MWTP influent flow required is 75 MGD. If influent flow from CWA is 50 MGD, then 25 MGD is needed from MRPS. This situation will require two lake pumps to run that is a combination of one pump with soft start controller (15 MGD) and 1 pump with VFD controller to put out 10 MGD.
 - b. The following is a recommended schedule of MRPS pump operations:

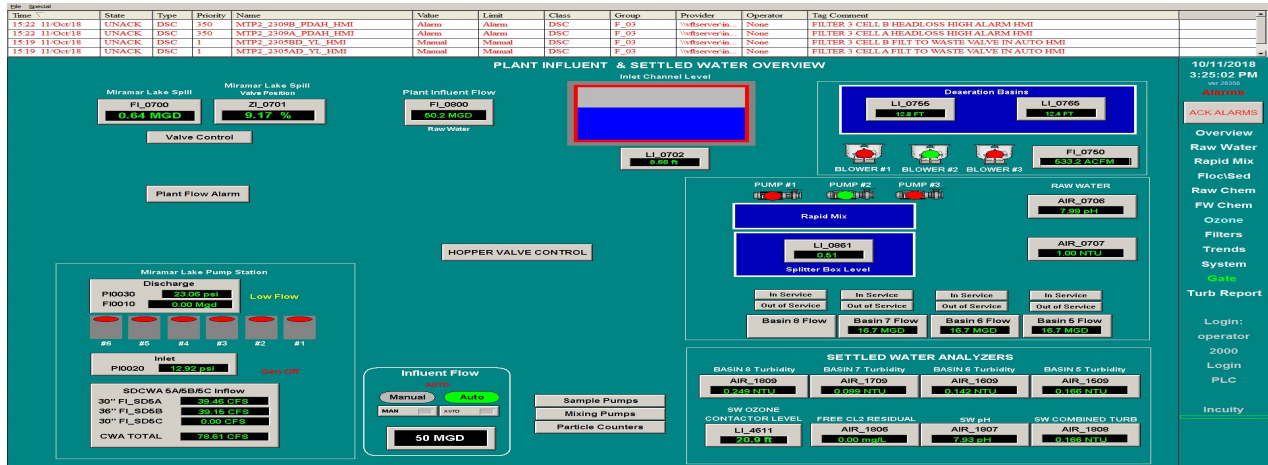
MRPS Flow Range	Number of Pumps	
MGD	VFD Pumps	C/S Pumps
0 to 18	1	0
18 to 36	1	1
36 to 54	1	2
54 to 70	1	3
70 to 86	2	3
Above 86	3	3

2. MRPS and Miramar lake outflow control are found in the “Plant Influent and Settled Water Overview” screen on Wonderware application. See FIGURE 1- Influent and Settled Water Overview. The plant influent overview screen takes into account all processes upstream of the filters, which includes the flow of raw water from MRPS and CWA lines through the flocculation/ sedimentation basins 5,6,7 and 8. Individual process area screens can be selected for viewing via pick boxes. Pump running statuses are displayed continuously. Select flow rates as well as other monitored condition appear here.

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FIGURE 1: “PLANT INFLUENT AND SETTLED WATER OVERVIEW” SCREEN



- Each pump has its own statuses and pick box next to the pump symbol on both HMI screens shown on FIGURE 1 and FIGURE 2. The legend pushbutton will display the key to the statuses and pick box activation will enable the pump control popup. The pumps will only start or stop manually from the popup if the remote indication is shown. (In other words, there is no automatic sequencing from the PLC to start and stop the pumps.)

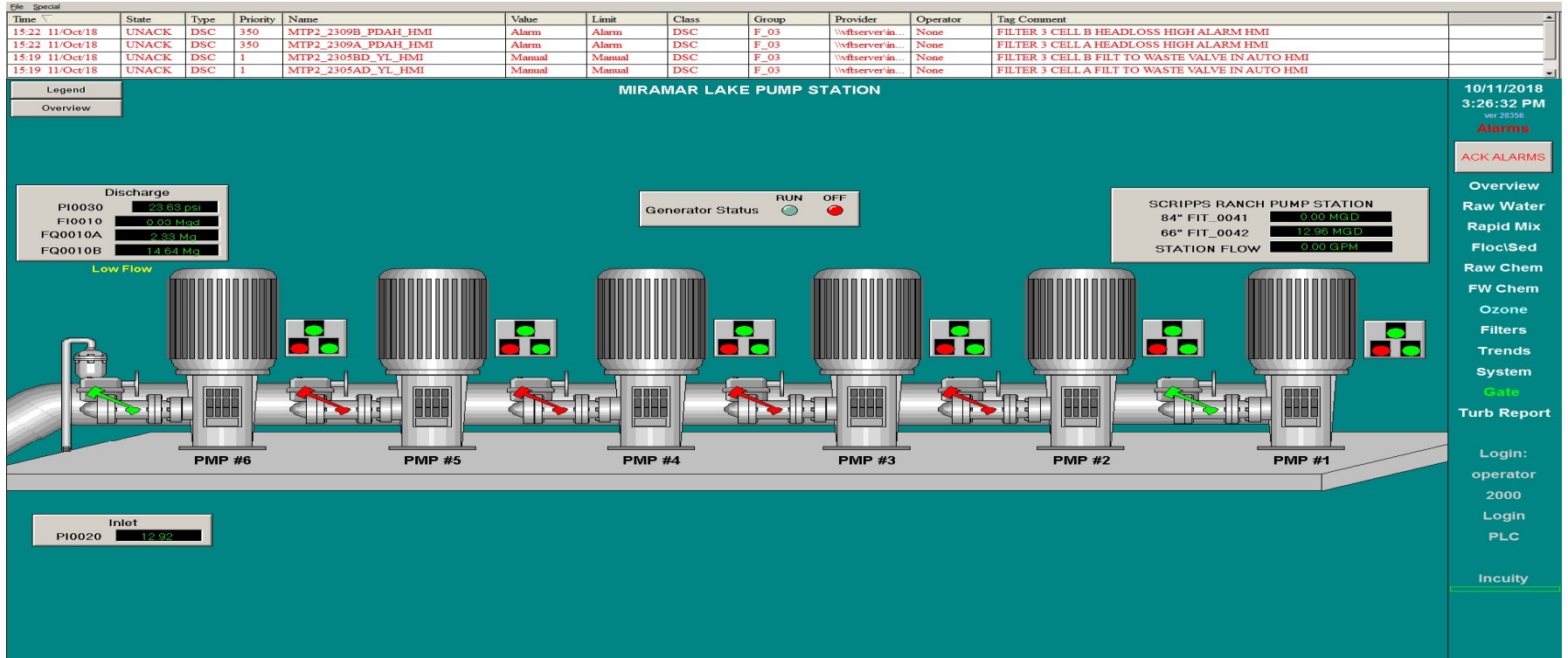
PUMP STATION FUNCTIONAL CONTROL DESCRIPTION

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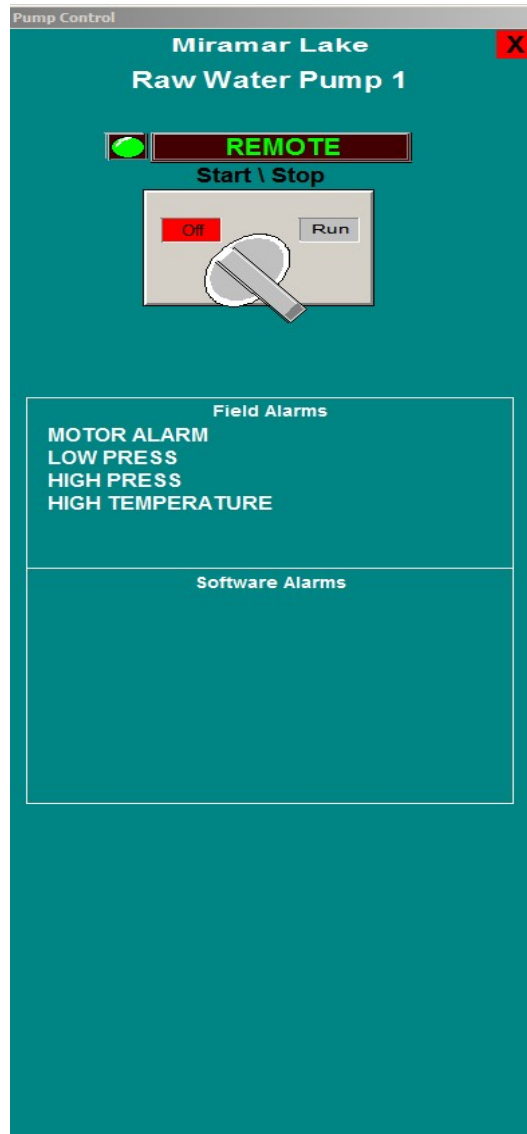
FIGURE 2: “MIRAMAR LAKE PUMP STATION” SCREEN



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**FIGURE 3: PUMP CONTROL POPUP FOR MIRAMAR RESERVOIR PUMPS 1, 2, & 3
(PUMP 1 SHOWN)**

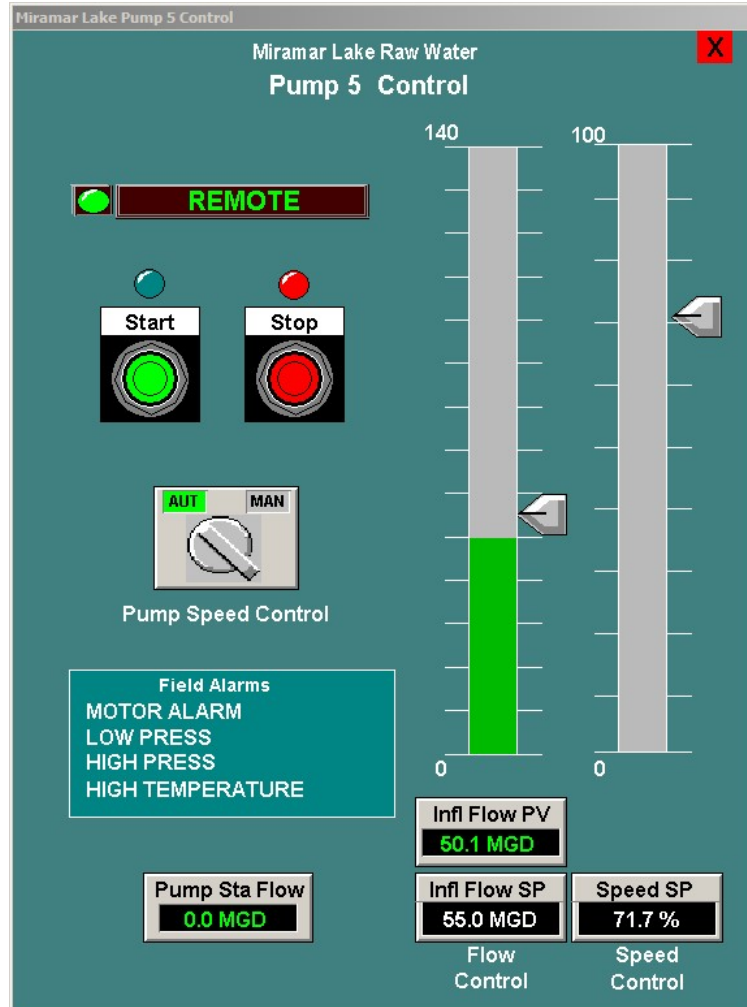


4. The popup shown on FIGURE 3 will appear when the pick box is selected either from FIGURE 1 or FIGURE 2 for MRPS Pumps 1, 2, and 3.
 - a. The field alarms are also shown on this popup screen. A field alarm is active when it is displayed in blinking red. The software alarm is also monitored on this popup screen. Software alarm could be a “fail-to-start” or “fail-to-stop”. The software alarm is active when it is displayed in blinking red. If any of the above mentioned alarms are active; a reset is required

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by pressing the RESET pushbutton from the pump's motor control panel before issuing a start command from the HMI.

FIGURE 4: PUMP CONTROL POPUP FOR MIRAMAR LAKE PUMPS 4, 5 & 6



5. The popup shown on FIGURE 4 will appear when the pick box is selected either from FIGURE 1 or FIGURE 2 for lake pumps 4, 5 and 6.
 - a. The field alarms are also shown on this popup screen. The field alarm is active when it is displayed in blinking red. The software alarm is also monitored on this popup screen. Software alarm could be a “fail-to-start” or “fail-to-stop”. The software alarm is active when it is displayed in blinking red. If any of the above mentioned alarm is active; a reset is required by pressing the RESET pushbutton from the pump's motor control panel before issuing a start command from the HMI.

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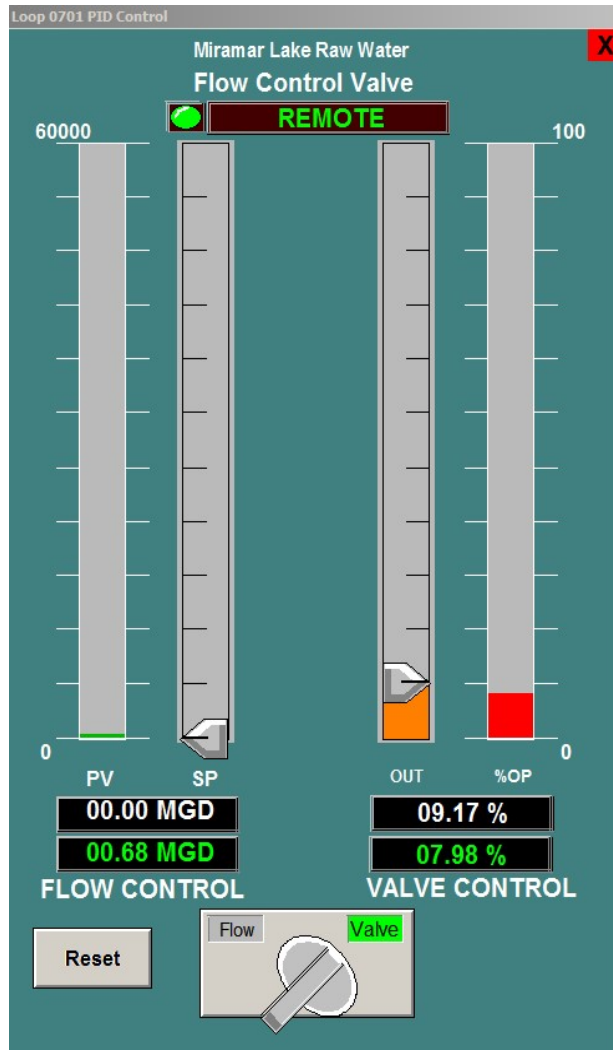
6. The pump control popup for pumps 4, 5 and 6 features manual and auto control of the VFD. The “Remote” status of the pump should be active to start and stop it from the HMI. Remote status is activated when the HOA switch on the pump’s mcc is selected to AUTO. The auto/manual selector switch on the HMI allows PID control. In AUTO control mode, the speed of the pump is set automatically by the PLC according to the influent flow setpoint in MGD. Both the pump’s speed feedback position and the influent flow setpoint are displayed on a vertical slider bar and numerical readout. If more than one VFD pump is operating, the speed of all VFD pumps shall be the same. In MANUAL control mode, the operator has to set the speed setpoint of the VFD. The influent flow setpoint or pump’s speed setpoint can be entered by either using the slider control or by just typing the number from the keyboard.
7. The VFD can be locally operated on the motor control panel by switching the HOA selector switch to HAND. Pushing the START button on the control panel will run the VFD to a speed set on the potentiometer or the speed setpoint on VFD control keypad. The VFD can be stopped by turning the HOA switch to OFF position or pressing the stop button on the VFD control keypad.

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FIGURE 5: MIRAMAR LAKE OUTFLOW CONTROL VALVE POPUP



8. The flow control valve popup for Miramar Lake Outflow features manual and auto valve control. The auto/manual selector switch allow PID control in auto according to the flow setpoint in gpm or manual control by entering the desired position of the valve. Both the valve feedback position and the actual flow rate are displayed on a vertical slider bar and numerical readout. The position and the auto flow setpoint can be entered by either using the slider control or by just typing the number from the keyboard.
9. Miramar Reservoir outflow is controlled by the flow control valve. Valve control in auto or PID Mode is halted whenever there is a high-high level in the settled water ozone contactor inlet channel or the pre-ozone contactor influent box. Once the high-high level condition has cleared the PID can be re-enabled by pressing the reset button on the control pump.

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10. Miramar Lake Outflow Control Valve is operated during the following condition.
 - a. Raising the level of Miramar lake with water from CWA pipelines 5A, 5B and 5C while meeting the distribution's flow demand.
 - b. When both VFD's are out of service while running other soft start controlled lake pumps are running and exceeding the flow demand.
 - c. Sudden decrease in flow demand requires spilling excess water ordered from CWA when none of the lake pumps are running.
11. After a power outage or transfer switch operation the pumps will be sequence on one at a time.

END OF SECTION

SECTION 43 01 20

VERTICAL TURBINE PUMP REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall furnish all tools, equipment, materials, consumables and supplies and shall perform all labor required to complete the WORK to fulfill the intent of the requirements outlined in the Specifications and Drawings.
- B. The WORK of this specification herein includes:
1. Removal of six (6) existing 200 horsepower vertical turbine pump assemblies, which each include a pump bowl/column assembly, discharge head, and motors (hereafter referred to as a Pump Assembly);
 2. Transportation of all Pump Assemblies to a Pump Repair Facility which shall be responsible for the pump and motor rehabilitation.
 3. Rehabilitation of all Pump Assemblies to restore performance and mechanical condition to new/original factory standard performance.
 4. Factory testing of all Pump Assemblies after rehabilitation;
 5. Re-installation of all Pump Assemblies; and
 6. Start-up and in-situ testing of all Pump Assemblies.

1.2 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Bearing Manufacturers Association (ABMA):
 - a. 9, Load Ratings and Fatigue Life for Ball Bearings.
 - b. 11, Load Ratings and Fatigue Life for Roller Bearings.
 2. American Petroleum Institute (API):
 - c. 610, Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries.
 - d. 670, Machinery Protection Systems.
 3. ASTM International (ASTM):
 - e. A36/A36M, Standard Specification for Carbon Structural Steel.
 - f. A536, Standard Specification for Ductile Iron Castings.
 - g. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.
 4. Hydraulic Institute Standards (HIS):

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- h. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
- i. 14.6, Rotodynamic Pumps for Hydraulic Performance Acceptance Tests.
- 5. National Electrical Manufacturer's Association (NEMA): MG 1, Motors and Generators.
- 6. NSF International (NSF):
 - j. NSF/ANSI 61, Drinking Water System Components - Health Effects.
 - k. NSF/ANSI 372, Drinking Water System Components - Lead Content.
- 7. Specifications:
 - 1. Section 01 33 00: SUBMITTAL PROCEDURES
 - m. Section 43 01 40: Inspection Assistance and Repair of Pump Columns

1.3 GENERAL REQUIREMENTS

- A. Refurbishment of the pumps sets cannot begin until replacement of the section of 66-inch diameter Miramar Pipeline has been completed.
- B. Refurbishment of the pumping units shall be performed in three steps: Each step shall be the complete refurbishment of two of the six units including reinstallation, startup and acceptance. The second step can begin after acceptance that the first set of pumps are operational. The third step can begin after acceptance that the second set of pumps are operational. During each step the in-place pumping units shall be available for normal operation.
- C. Only one of the two existing VFD-driven pumps shall be rehabilitated at a time, while the other remains in service.
- D. City of San Diego Staff and contractor shall jointly determine the order in which the pumps are rehabilitated.
- E. Refurbishment of the pumping units shall be coordinated with the electrical motor improvements on the pump units.
- F. The Contractor and Construction Manager shall field inspect and photograph all pump units after removal from the pump barrel. The pumps and motors shall be re-inspected by the Pump Repair Facility personnel upon disassembly and shall identify and document all the necessary pump repair improvements. The list of the identified improvements shall be submitted to Construction Manager and Engineer for review and approval by the City. All deficiencies not covered by repairs defined in this specification shall be documented and notice provided to the Construction Manager. Recommended repairs not covered in this specification shall be made only with the written authorization of the Construction Manager. The Contractor shall install all elements of the equipment in accordance with the specifications herein, all applicable codes and standards, and all referenced documents.
- G. The City, and/or its Designated Representatives (Construction Manager or Engineer) shall be provided with access to the Pump Repair Facility while the repairs are

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being performed to execute inspections, but not limited, of material, fabrication, conformance with specifications, and to witness factory testing.

1.4 DEFINITIONS

A. Terminology pertaining to pumping unit performance and construction shall conform to the ratings and nomenclature of the Hydraulic Institute Standards.

1.5 SUBMITTALS

- A. Pump Repair Facility inspection reports and recommendations for repair.
- B. Factory Functional and Performance Test Report and Log, including data curves showing head, capacity, horsepower demand, and pump efficiency over the entire operating range of the pump, from shutoff to maximum capacity. Indicate separately the head, capacity, horsepower demand, overall efficiency, and pump and motor vibration limits. Factory test data for each pump shall be submitted for review and approval by the Engineer prior to shipment of equipment back to the site.
- C. Pump and motor sectional assembly drawings indicating parts replaced during the rehabilitation. For parts replaced drawings shall include, parts nomenclature, and materials of construction.
- D. Pump Repair Facility information meeting the requirement of Section 1.6 below.
- E. Recommendations for secure pump and motor packaging and support during transportation between Pump Testing Facility and site.
- F. Description of Pump Testing Facility and pump testing procedures.

1.6 QUALIFICATION REQUIREMENTS

- A. Pump Repair Facility shall have repaired/rehabilitated at least 5 vertical turbine pumps and motors of similar size to the units for this project. Pump Repair Center shall have facilities capable of performing factory testing in accordance with ANSI/HI standards. Provide basic information on pumps repaired and owner references and contact information. Provide information on factory test facilities.
- B. Candidate Pump Repair Facilities include:
1. Sulzer Pump Services (US), Santa Fe Springs, CA
 2. ITT Goulds Pump Inc., Los Angeles Pro Service Shop, City of Industry, CA
 3. FlowServe, Compton, CA
 4. Or approved equal

1.7 WARRANTY

A. The Contractor shall warrant or obtain a warranty of the pump and motor repairs against material and workmanship defects for a minimum period of 1 year which starts on the date of acceptance. The CONTRACTOR shall submit the warranty document before final acceptance.

PART 2 - PRODUCTS

2.1 EXISTING PUMPS AND MOTORS TO BE REHABILITATED

A. Six (6) sets of pumps and motors are to be rehabilitated. Following is specific name plate information for one of the existing pumps and motors. The other pump name plates and motors are similar. Additional information on the pumps and motors is included in Attachment A to this Specification.

1. Pumps:

Manufacturer	Johnston Pump Co. or approved equal
Serial No. (P-6)	72087 E
Design Capacity	11,600 gpm
Design Head	53 ft
RPM	710
BHP	200
Size & Type	33CLC
Stages	1
Impeller Lift	½ in.
Additional information not on name plate	
Nominal pump hydraulic efficiency at rating point (from factory test.)	84%

2. Motors:

Manufacturer	General Electric or approved equal
Model	5KSS11ST511P
NEMA Design	A-TEFC
HP	200
RPM	710
Volts	460
Amps	240
Phase	3-phase
Hz	60
Power Factor	82.0
Service Factor	1.15
NEMA Nominal Efficiency	95.0

2.2 PUMP REPAIR PARTS AND MATERIALS

A. Pump rehabilitation shall consist of replacing all wear parts, gaskets, seals and fasteners with new parts, inspecting and adjusting the pump shaft and column for straightness, parallelism and fit, performing static and dynamic balancing of rotating parts and applying new protective coatings. Replacement parts and materials of construction parts shall include but are not limited to the following:

1. Mechanical seals: John Crane 5610

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2. Seal box bearings: C89835 Bismuth Tin Bronze
3. Line shaft bearings: C89835 Bismuth Tin Bronze
4. Top and bottom bowl bearings: C89835 Bismuth Tin Bronze
5. Bell bearings: C89835 Bismuth Tin Bronze
6. Bowl wear ring: C95500 Aluminum Bronze
7. Impeller seal ring: C95400 Aluminum Bronze
8. All gaskets, seals, O-rings: As required
9. All fasteners (nuts bolts, washers screws, clips), including column flange and discharge head flange bolting and motor mounting bolts. Type 316 SS.
10. Guard screen: Type 316 SS

B. Components and Materials in Contact with Water for Human Consumption shall comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Components and materials shall comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

C. The City has an inventory of OEM spare pump bearings, wear rings, and impellers, that were provided when the pumps were procured. The Contractor may request to borrow a set of these for inspection and assistance in procuring and or producing new repair parts for the pump rehabilitation. The Contractor shall remain fully responsible for the suitability and functionality and guarantee all parts used in rehabilitating the pumps. Borrowed spare parts shall be returned to the City within 60 days.

D. The contractors request to borrow a set of the City spare parts shall be in the form of an RFI, including a listing of the parts, date required and estimated date of return. The contractor shall sign and date the listing of parts when the parts are turned over. The construction manager will sign and date the list when the parts are returned.

2.3 MOTOR REHABILITATION PARTS, MATERIALS AND METHODS

A. Motor rehabilitation shall consist of:

1. Perform standard non-load testing, test documentation, and reporting on motors on receipt and after rehabilitation.
2. Include in test report on motors as received, recommendations for additional repairs not covered below for consideration by the City.
3. Disassembly and cleaning the motor.
4. Checking and adjusting the bearing seats for proper fit and alignment.
5. Installing new bearings, seals and gaskets.
6. Clean and redip motor windings.

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7. Install motor shaft grounding ring.
8. Perform static and dynamic balancing of rotor.

2.4 FACTORY PUMP AND MOTOR REFINISHING

- A. Provide new finish coatings all in accordance with Section 09 90 00 Painting and Coating, or if not specified, the manufacturers standard backed enamel.
- B. Coat internal water passages and wetted parts of pump with “3M Scotchkote Liquid Epoxy Coating 323”, or equal. Abrasive blast surfaces SSPC-SP10 near white metal.

2.5 SOURCE QUALITY CONTROL

- A. Factory Tests and Adjustments: All refurbished pumps shall be factory-tested as complete assembled units and the first two factory tests shall be witnessed by the Owner and Engineer. Additional visits for subsequent factory witnessed tests will be as determined necessary by the Engineer. The Contractor shall give provide 4 weeks notification prior to the test.
- B. Factory Test Report: Include test data sheets, curve test results, performance test logs, certified correct by a registered professional engineer.
- C. Functional Test: Perform manufacturers standard motor tests on refurbished motors including vibration tests as follows:
 1. Dynamic balance rotating parts of each pump and its driving unit before final assembly.
 2. Limits:
 - n. Driving Unit Alone: Less than 80% of NEMA MG 1 limits.
 - o. Complete Rotating Assembly including coupling, drive unit and motor: Dynamically balanced to quality grade G2.5
- D. Factory Performance Test:
 1. Conduct on each pump at rated speed using actual pump and one actual job motor.
 2. Test in accordance with ANSI/HI 14.6-2016 Rotodynamic Pumps for Hydraulic Performance Acceptance Test. The following minimum test data shall be submitted
 - p. A minimum of six hydraulic test readings shall be taken between shutoff and 120% of BEP. One point shall be at the pump rating point.
 - q. Pump curves showing head, flow, bhp and efficiency.
 - r. Certification that the pump horsepower demand did not exceed the rated motor nameplate horsepower at any point on the curve.
 3. Test for a continuous 1-hour period at the pump rating point without malfunctions.
 4. Test Log: Record the following:

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- s. Total head.
- t. Capacity.
- u. Horsepower requirements
- v. Flow measured by factory instrumentation.
- w. Average distance from pump suction well water surface to pump discharge centerline.
- x. Pump discharge pressure converted to fee of liquid pumped and corrected to pump centerline.
- y. Bowl head
- z. Driving motor voltage and amperage and power measured for each phase and power factor.
- 5. Test tolerances for performance tests shall be based on original rating point and shall be in accordance with Acceptance Grade 1B per ANSI/HI 14.6-2016.
- 6. Vibration limits:
 - aa. Unless otherwise specified, centrifugal machines with sleeve bearing shafts and shaft speed up to 710 rpm shall not exhibit unfiltered RMS readings for vibration displacement in excess of 0.28 inches per second.
 - bb. The machinery shall not exhibit unusual or abnormal frequency components when measured on either the shaft or casing. Normal frequency components are defined as excitations such a rotational speed or blade passing frequency. Unusual or abnormal frequency components are excitations that are nonsynchronous or not related to the known geometry of the machine.
 - cc. Adjust, align or modify units and retest, if necessary.

PART 3 - EXECUTION

3.1 REMOVAL AND TRANSPORTATION

- A. The Contractor shall remove and transport the Pump Assembly to the Pump Repair Facility in compliance with the recommendations of the Pump Repair Facility.

3.2 PUMP INSPECTION

- A. The Contractor shall photograph and visually inspect the pump for damage upon removal at the site and when received at the rehabilitation shop.
- B. At Pump Repair Facility, prepare inventory of pump and motor and if applicable, customer provided spare parts. Take photographs prior to disassembly
- C. Setup, check and document all critical dimensions before disassembly.
- D. Disassemble pump complete. Take photographs during disassembly. Document all loose parts.

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- E. Sand blast/clean all pump parts as applicable.
- F. Visually and dimensionally inspect all critical registered fits and faces and document and submit all findings in a “As Found Report” Inspection to include:
1. Inspect and perform NDT/PT on all critical welds, impeller hub and vanes, shafting, couplings and diffuser bowl.
 2. Discharge Head: Record all critical registered fit dimensions. Document signs of erosion, corrosion, wash cuttings and other forms of material failure. Inspect flange faces and threaded connections.
 3. Impeller: Visual inspection for erosion, cavitation, or foreign object damage to vanes or shrouds, including cracks, porosity. Dimensionally inspect shaft to bore fit, wear ring diameter, vane and shroud.
 4. Discharge Bowl and Suction Bell: Inspect as required.
 5. Shaft: Record critical fit O.D., impeller fits sleeve fits, coupling and bearing fits. Record all visual defects including grooves, fretting, keyway damage and thread damage.
 6. Wear Parts (sleeves, bushings, bearings etc.). Record all dimensions as well as I.D./O.D. clearances. Record all critical visual defects such as cracking, heat evidence, excessive grooving, one-sided wear, etc.
 7. Couplings: Record critical face and registered fit dimensions and taper bore couplings.
 8. Flanged Column Pipe: Record critical dimensions. Check flanges for parallelism. Flanges to be perpendicular to column centerline. Check bolt pattern and registers for concentricity.
- G. Prepare and submit report of details and inspection results, including photographs of areas of concern. Include in report recommendations for rehabilitation. Identify rehabilitation needs beyond the scope of rehabilitation listed below including if impellers are or are not suitable for reuse.

3.3 PUMPS REHABILITATION

- A. The Pump Repair Facility shall perform the following pump rehabilitation:
1. Replace all wear parts including bearings, wear rings, mechanical seal,
 2. Replace all gaskets, o-rings and other seals.
 3. Replace internal and external bolting, nuts and screws.
 4. Straighten, and refinish pump shaft if required. Perform dynamic balance.
 5. Adjust all column and pump discharge head flanges and other fitting bores for proper alignment and fit. Repair welding cracks if discovered.
 6. Chase all threads.

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7. Pump discharge head flange: Drill and tap a new hole (1/2-inch diameter NPT) for installation of a suction pressure gag and switch.
8. Impeller, Suction Bell, and Bowl:
 - dd. If the impellers are found suitable for reuse “as-is” or with minor repair by the inspection, the CONTRACTOR shall clean up the hydraulic surfaces, make minor repairs if required, install new wear rings, machine for true running diameter and clearances and perform static and dynamic balancing.
 - ee. If found unsuitable the CONTRACTOR shall, as a “Changed Condition”, procure a new replacement impeller(s) identical to the existing impeller(s). To mitigate the impact on rehabilitation time and project schedule, the CONTRACTOR shall request the use of a “spare impeller(s)” from City inventory, with subsequent replacement of the impeller(s) with newly procured units. Impellers shall be trimmed and adjusted for the original pump design point and performance.
 - ff. Check and adjust mating surfaces to match suction bell, bowl, and column fits.
 - gg. Install new seal ring in suction bell. Machine to match impeller running diameter and clearances.
9. Provide new protective coatings to internal water passages and wetted submerged surfaces as required by Section 09 90 00. Provide factory primer protective coatings to exterior of pump discharge head compatible finish coatings specified in Section 09 90 00.
10. Assemble pumps complete, adjust clearances. Record all settings, fits, and clearances during rehabilitation. Fill suction bell bearing and lubrication tubing with grease.
11. Perform Factory Testing.
12. The Pump Repair Facility shall re-install all existing equipment nameplates and tagging and identification. Provide and attach an additional nameplate for the Pump Repair Facility including the following information:
 - hh. Pump Repair Facility name
 - ii. Rehabilitation vendor name
 - jj. Date of pump rehabilitation completion.
13. Upon completion of Factory Test and authorization, prepare and ship pump back to site for installation.

3.4 MOTOR INSPECTION AND REHABILITATION

- A. Perform standard no-load electrical tests on motors as received
- B. Disassemble and clean motor
- C. Clean and re-dip motor windings

VERTICAL TURBINE PUMP REHABILITATION

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- D. Check and re-true bearing races and install new bearings
- E. Perform static and dynamic balancing of rotor
- F. Install shaft grounding rings
- G. Assemble motor using new gaskets, seals, etc.
- H. Perform no-load electrical tests on reconditioned motors and submit test results
- I. Clean and touch up exterior coatings. Provide complete new exterior primer coatings compatible with field coatings
- J. Provide sufficient new oil in unopened containers for complete filling oil reservoirs at site

3.5 INSTALLATION

- A. The Pump Assembly shall be installed in accordance with Pump Repair Facility printed instructions.
- B. Adjust pump assemblies such that pumps and drivers are properly aligned with the interconnecting shafts and couplings. Use of flexible coupling to compensate for misalignment is not allowed.
- C. Connect discharge piping without imposing strain to pump flanges.
- D. Install pump accessories including pressure gages and switches and air release valves as shown on the drawings.

3.6 FIELD FINISHING

- A. As specified in Section 09 90 00, Painting and Coating.

3.7 FIELD QUALITY CONTROL

- A. Functional Tests: Conduct on each pump after installation.
 - 1. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.
 - 2. Field Vibration shall be measured in accordance with ANSI/HI Standard 9.6.4 for all installed pumps. An independent vibration testing organization that is acceptable to the Engineer shall be retained by the Contractor to perform the measurements and shall submit the results directly to the Engineer.
 - kk. The independent vibration organization shall provide the services of a vibration specialist to supervise all data collection work, analysis and reporting, and who shall hold a current certificate as an ISO qualified - Level IV Vibration Analyst as recognized by the Vibration Institute. Data collection and analysis shall be conducted by the vibration specialist or may be conducted by an individual holding a current ISO Level III Vibration Analyst certificate with vibration specialist oversight.
 - ll. The independent testing organization shall be fully equipped to provide continuous velocity and displacement values for all rotating equipment

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installed under the requirements of this section. Vibration readings shall be taken at all bearing pedestals in orthogonal radial directions and the axial direction. All vibration measurements and equipment settings should be per procedures advocated by the vibrations institute.

- mm. Pumps: Vibration testing equipment shall include sufficient calibrated pressure and flow monitoring devices to determine pump operating conditions as well as vibration levels. Overall (RMS) vibration velocity and discrete frequencies, within the specified continuous duty operating conditions, shall not exceed the limits established in ANSI/HI Standard 9.6.4.
- nn. The independent vibration testing organization shall provide a test report that includes recommended reporting information presented in ANSI/HI Standard 9.6.4 and shall include a narrative describing the testing and an interpretation of the test results.
- 3. Flow Output: Measured by existing flow meter on 48" discharge header.
- 4. Operating Temperatures: Monitor bearing areas on pump and motor for temperatures that are above the manufacturer's recommended tolerances.
- 5. Test at the following speeds and continuous durations without failure:
 - oo. 4-hours at maximum speed (710 RPM)
- pp. For VFD driven pumps:
 - 1) Additional 2-hours at 87% speed (618 RPM), and
 - 2) Additional 2-hours 78% speed (518 RPM)
- 6. Power failover test
- 7. VFD Tuning under live, actual conditions
- 8. Point-to-point instrument to HMI testing including generator
- 9. Test Report Requirements: In accordance with ANSI/HI Standard 14.6.

B. Pump Efficiency Test:

- 1. After Functional Tests have been conducted, Pump Efficiency Tests are to be conducted by Pump Check of Riverside, CA or equivalent and must be conducted per Attachment B of this Specification.

C. Performance Test:

- 1. After each pair of installed pumps have been tested individually, both pumps shall operate automatically without failure for 24 hours with the rest of the pumps as a system as described in Specification Section 40 92 00.

3.8 REPAIR FACILITY FIELD SERVICES

- A. Pump Repair Facility's Representative: Present at site for minimum person-days listed below, travel time excluded for each group of pumps rehabilitated:

VERTICAL TURBINE PUMP REHABILITATION

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

1. Two (2) person-days for installation assistance and inspection.
 2. One (1) person-days for functional testing and completion of Manufacturer's Certificate of Proper Installation for each pair of pumps installed.
- B. Inspection, Startup, and Field Adjustment: Where required by individual Sections, the Pump Repair Facility's authorized service representative shall visit the site for the number of days indicated in those Sections to witness the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.
1. Installation of the equipment.
 2. Inspection, checking, and adjusting the equipment.
 3. Field functional testing for proper operation.
 4. Performing field adjustments to ensure that the equipment installation and operation comply with the specified requirements.
- C. See Section 01 43 33, Manufacturers' Field Services and Section 01 91 14, Testing, Integration and Startup.

3.9 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is part of this specification.
1. Attachment A – Existing Pump and Motor Documentation
 2. Attachment B – Pump Efficiency Testing Requirements

END OF SECTION

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

ATTACHMENT A TO SPECIFICATION 43 01 20:

EXISTING PUMP AND MOTOR DOCUMENTATION.

The existing pump and motor documentation is taken from the original pump and motor shop drawing information and is provided for reference. The information is believed to be accurate but is not guaranteed. The information is as follows:

3. Johnston Pump Company: Factory Pump Performance Test Curve and Data (For Unit P-1, other units similar).
4. Johnston Pump Company: Sectional Illustration for Pumps
5. John Crane Inc.: Drawing and information on pump seal.
6. Johnston Pump Company: Special Manufacturing Instructions.
7. GE Industrial Systems: Pump Motor Information.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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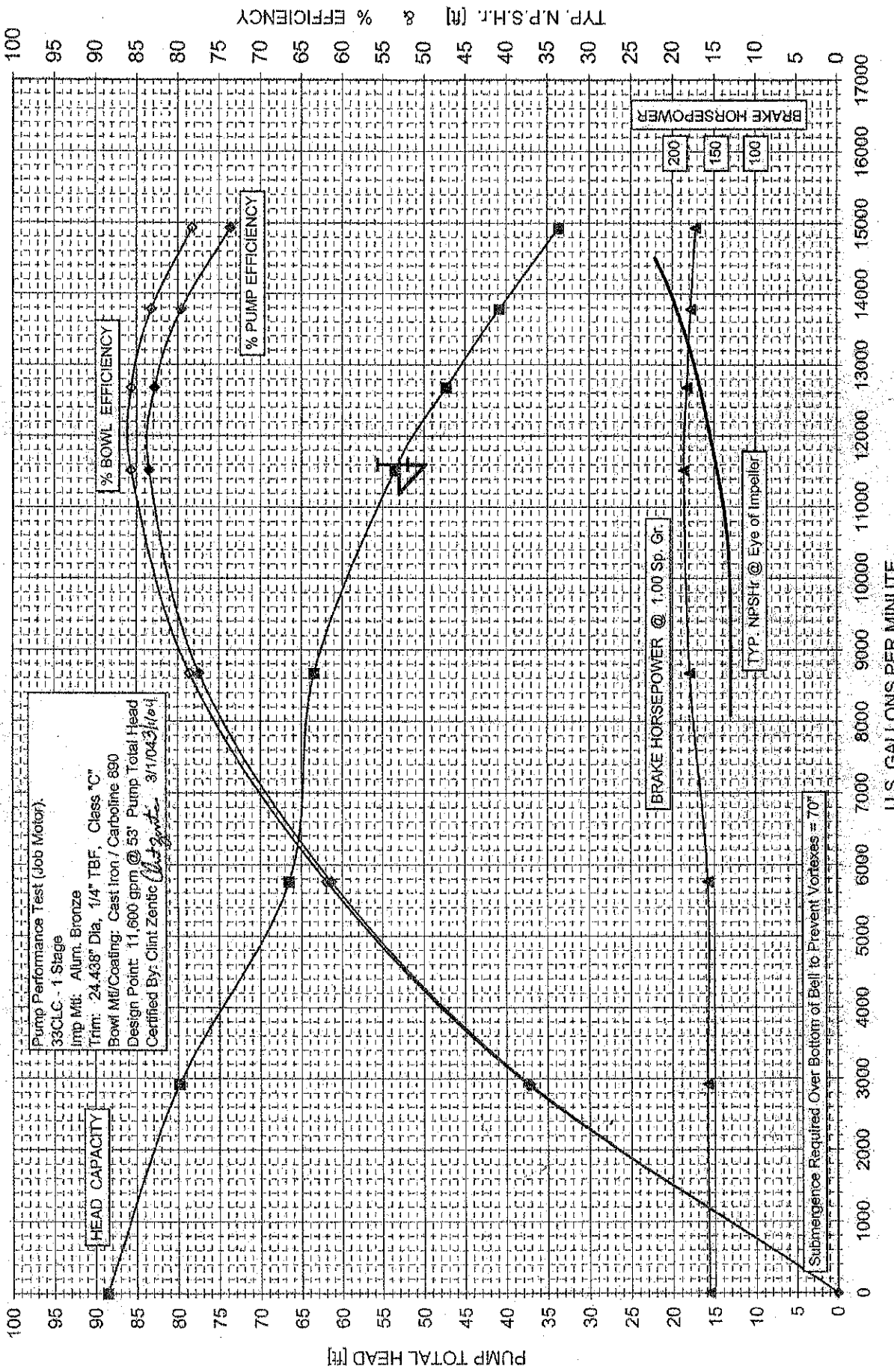
Johnston Pump Company

Brook, Texas

Customer: Archer Western

Job#: 72087 A TC-11549 Rev #: 0

End User: City of San Diego Item: P-1, Fluid: Raw Water 710 RPM



Johnston Pump Company

Performance Test: Set up and Test Data Sheet

Comments: Witnessed Performance & Vibration Tests (6 units) at full speed with Job driver. Test conducted in assembly rooming the mechanical steel. Post pump head & calculated head (PSF) were taken on the curve. Head loss was calculated using the following: 5% BHP - 4200 GPM over the slope of curve. Full test results are in table 4 (80% of 180) and 2 (100% of 180). For Typ. WPS on curve. List minimum submergence on curve. Customer curve approval required.

Motor Mfg. Data		Job Motor Nameplate Data	
H.P.	Volts	G.E.	R.P.M.
200	480		710
	60		200
Cycles	Type	Phase	S.F.
KS			1.15
% Eff.	Frame		
64.900	LSB11V724		
Remarks: S/N: 444W65381A			

Project Manager: Scott Bergavik

① Test - Floor to bottom of baseplate: 14.50 In.
 Total Pump Length (T.P.L.): 182.00 In.
 ② Test - Submergence over Suction Bell: 11.71 Ft.

DAQ Test
 Flow Meter: 30" Mag. 3-66-700 GPM, L# 321
 Power Meter: 20040 LPS, L# 300
 Pressure Meter: 1500 PSI, L# 250
 Tachometer: 3600 RPM, L# 250
 Temp Meter: 50-135° F, L# 222
 Test Line: 30"

Manual Test
 VIB Analyzer: 890.858

Pump Driver: J46
Water Temp: 70.5 F
Head Constant: 2.31

Impeller Adjustments: 1/2"
Acceptance Criteria: 10%
Rating: 210 GPM
Flow: 1192.0 GPM
Head: 83.0 FT
Power: 188.0 BHP
Efficiency: 68.000 %
Test Lab Water Sg: 1.00
As Tested Lab: 1.03

Fluid: Sea Water
Application: TAC, P-123456
Marking: End User: City of San Diego

Revision:
Rev. Date:
Comment:

Test Curve No.: 11549
Job Number: 7267
Unit: A
Customer: Archer Western
Pump Category: Turbine

Model: 3521C
Stages: 1
Test Imp. Dia (in): 24.839
Calc'd Imp. Dia (in): 147.7°C
Imp. Material: 303-Atom Brz
Bowl Material: 130-Steel Iron
Bowl ID Coating: Carbide 959

Specific Speed: 85
Suction Type: 56d
Discharge head: J63
Column Pipe: J65
Pipe ID @ Gauge: 18.250 inches
Water To Floor: 7 inches
Floor To Gauge: 6 inches
Press Tap Location: Head

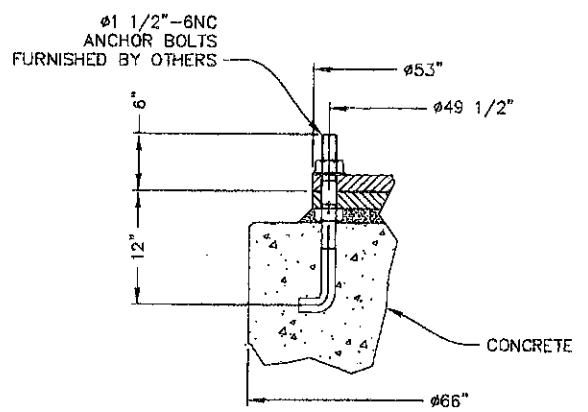
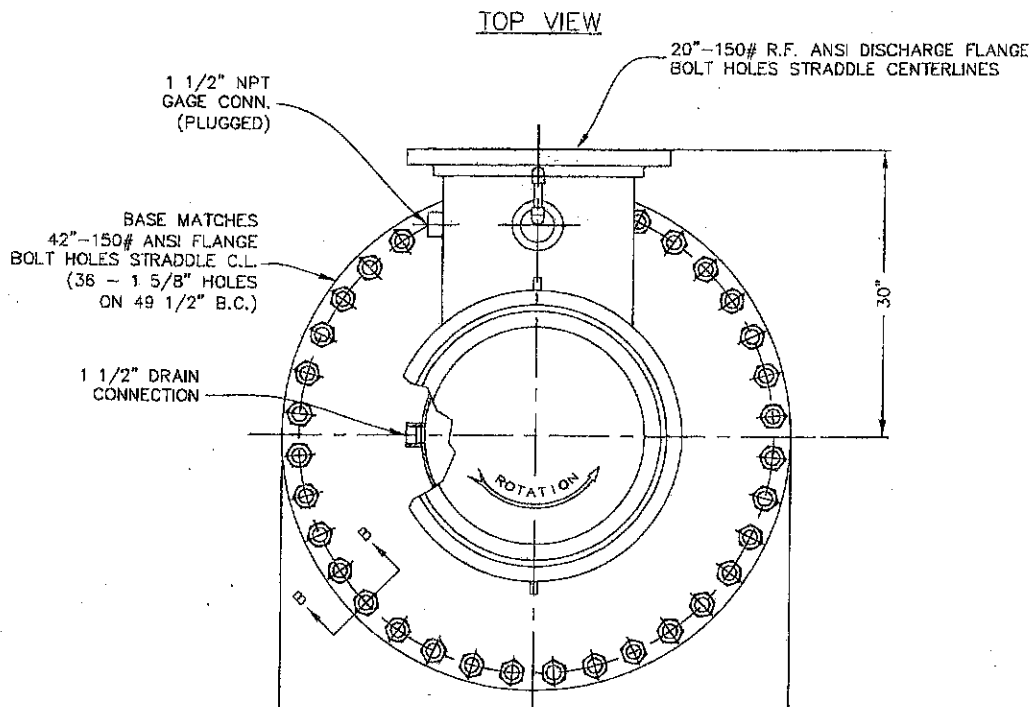
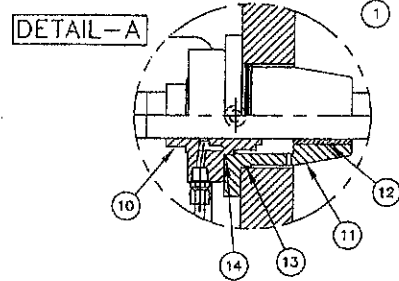
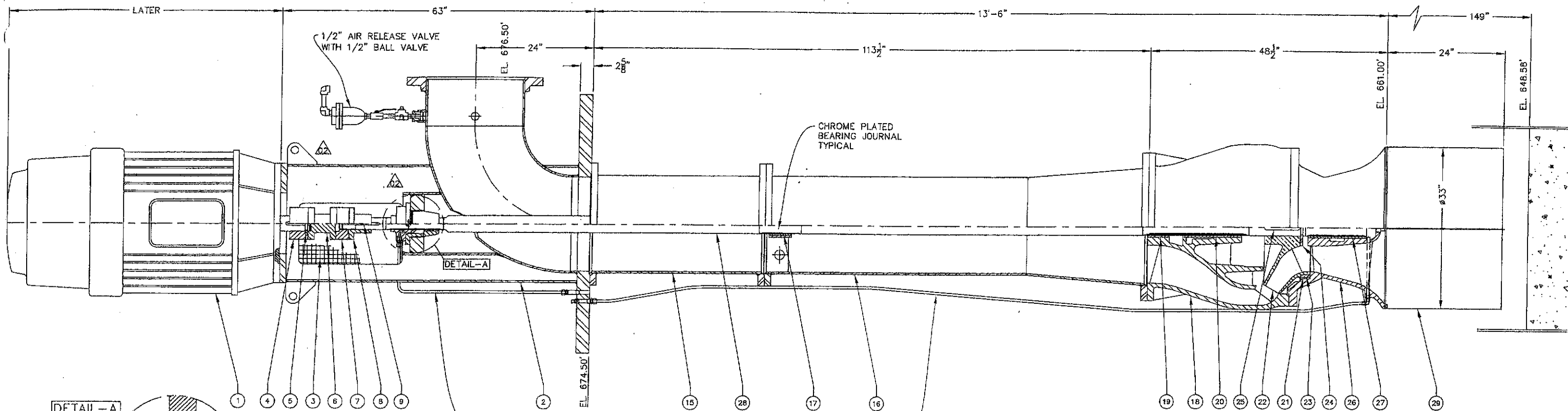
Test Point Number	1	2	3	4	5	6	7	8	9
Target Flow (gpm)	1192.0	290.0	870.0	870.0	1192.0	1273.0	1397.0	1500.0	0.0
Actual Flow Rate (gpm)	1161.4	295.24	878.3	870.2	1156.2	1273.4	1385.1	1505.5	0.0
Head Discharge Pressure (psf)	21.8	734.3	26.3	26.5	21.7	19.8	15.9	12.3	38.3
Head (ft)	50.3	79.3	58.4	61.3	48.4	43.4	35.4	28.5	88.5
Stage Elev. Corr. (ft)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Velocity Head Loss (ft)	2.5	0.2	0.6	1.4	2.5	3.1	3.9	4.3	0.0
Total Head (ft)	54.1	80.7	60.0	64.0	54.0	47.7	41.3	34.0	89.8
Watt Reading (kW)	149.90	128.24	125.57	143.24	148.10	148.21	143.09	137.80	125.41
Input BHP	204.9	189.5	188.0	198.9	199.0	199.0	191.8	184.8	188.1
Watt (kW)	458.4	460.7	460.6	460.6	460.5	460.5	460.5	460.5	461.4
Acceptance	203.1	199.2	199.2	221.5	227.7	223.9	219.0	213.2	187.5
Job Motor Efficiency	0.845	0.850	0.846	0.846	0.845	0.842	0.849	0.848	0.861
B.H.P.	183.9	181.2	181.7	181.7	186.9	185.2	181.5	173.2	189.8
Rated Speed (rpm)	710	714	713	713	713	719	714	714	715
Rated Flow Rate (gpm)	1192	710	710	710	710	710	710	710	710
Rated Total Discharge (ft)	1165	2819	5784	6871	41515	12973	10176	14682	0
Rated B.H.P. @ Sg 1	187.49	183.50	183.45	179.45	186.50	185.02	178.50	172.26	188.48
Rated Pump Efficiency	85.6%	87.1%	86.3%	87.4%	86.5%	85.8%	86.8%	85.0%	86.8%
Calculated Bowl Efficiency	85.8%	87.4%	86.9%	86.9%	86.7%	86.7%	86.2%	86.2%	86.8%

Witnessed By: Kevin Carroll

Tested By: Darryl Clark

Certified By: Chad Zent 3/1/04

Date of Test: 3/1/2004



ITEM	QTY	DESCRIPTION	MATERIAL / ASTM NO.
1	1	GENERAL ELECTRIC VERTICAL SOLID SHAFT MOTOR, 200 HP, 710 RPM 460 VOLTS, 3 PHASE, 60 HZ, TEFC-SD ENCLOSURE, 1.15 S.F., L5D11VP24 FRAME	
2	1	TYPE "BF" DISCHARGE HEAD - 24 1/2" BD X 20"-150# DISCH.	FAB. STEEL A36/A53 GR.B
3	2	GUARD SCREEN	316 ST. STEEL
4	1	MOTOR COUPLING HALF	STEEL A108 GR.1045
5	1	THRUST RING	STEEL A108 GR.1045
6	1	SPACER	STEEL A108 GR.1045
7	1	ADJUSTING NUT	STEEL A108 GR.1045
8	1	PUMP COUPLING HALF	STEEL A108 GR.1045
9	1	KEY AND PIN ASSEMBLY	STEEL A108 GR.1018
10	1	MECHANICAL SEAL - MAKE: JOHN CRANE #5610	
11	1	SEAL BOX	CAST IRON A48 CL30
12	1	BEARING, SEAL BOX	BRONZE B584 ALLOY C93200
13	1	'O'-RING, SEAL BOX	BUNA-N
14	1	'O'-RING, SEAL	BUNA-N
15	1	TOP COLUMN PIPE - 20" O.D. X 1/2" WALL	FAB. STEEL A36/A53 GR.B
16	1	COLUMN PIPE - #24" X #20" X 1/2" WALL	FAB. STEEL A36/A53 GR.B
17	1	BEARING, LINESHAFT	BRONZE B584 ALLOY C93200
18	1	DISCHARGE BOWL	CAST IRON A278 CL30
19	1	TOP BEARING, BOWL	BRONZE B584 ALLOY C93200
20	1	BOTTOM BEARING, BOWL	BRONZE B584 ALLOY C93200
21	1	WEAR RING, BOWL	BRONZE B584 ALLOY C93200
22	1	IMPELLER - 33CLC	NI. AL. BRONZE B148 ALLOY C95800
23	1	SEAL RING, IMPELLER	BRONZE B148 ALLOY C95300
24	1	THRUST RING, IMPELLER	ALUM. BRONZE B584 ALLOY C95400
25	1	KEY, IMPELLER	ST. STEEL A582 TP.416
26	1	SUCTION BELL	CAST IRON A278 CL30
27	1	BEARING, BELL	BRONZE B584 ALLOY C93200
28	1	COMBINATION PUMP & HEADSHAFT - #3 7/16" X #2 7/16"	ST. STEEL A278 TP.316
29	1	VORTEX BREAKER	STEEL A36

CONDITIONS
 FLOW 11,600 U.S. GALLONS PER MINUTE
 TOTAL DYNAMIC HEAD 53 FEET
 LIQUID PUMPED RAW WATER
 SPECIFIC GRAVITY 1.00
 TEMPERATURE 60°F

CUSTOMER
 CUSTOMER ARCHER WESTERN CONTRACTORS
 PURCHASE ORDER NO. LATER
 END USER CITY OF SAN DIEGO
 SITE MIRAMAR WTP
 TAG NO.(S) P-1/P-2/P-3/P-4/P-5/P-6
 APPLICATION RAW WATER PUMPS

WEIGHTS
 DRIVER LATER
 DISCHARGE HEAD ASSY 2900 LBS.
 COLUMN ASSY 1600 LBS.
 BOWL ASSY 3200 LBS.
 TOTAL LATER

JOHNSTON PUMP COMPANY
 SERIAL NO. 72087A/B/C/E/F/G



SECTIONAL ILLUSTRATION 24 1/2 X 20 "BF" DISCH. HEAD - 20 X 2 7/16 COLUMN - 1 STAGE 33CLC BOWL ASSY.

03	ADDED VORTEX BREAKER & REV COATING	R.G.	1/22/04
02	REV. SEAL & HEAD DESIGN	R.G.	11/4/03
01	MOTOR RPM WAS 720	DA	8/03

NO. _____ REVISION _____ BY _____ DATE _____

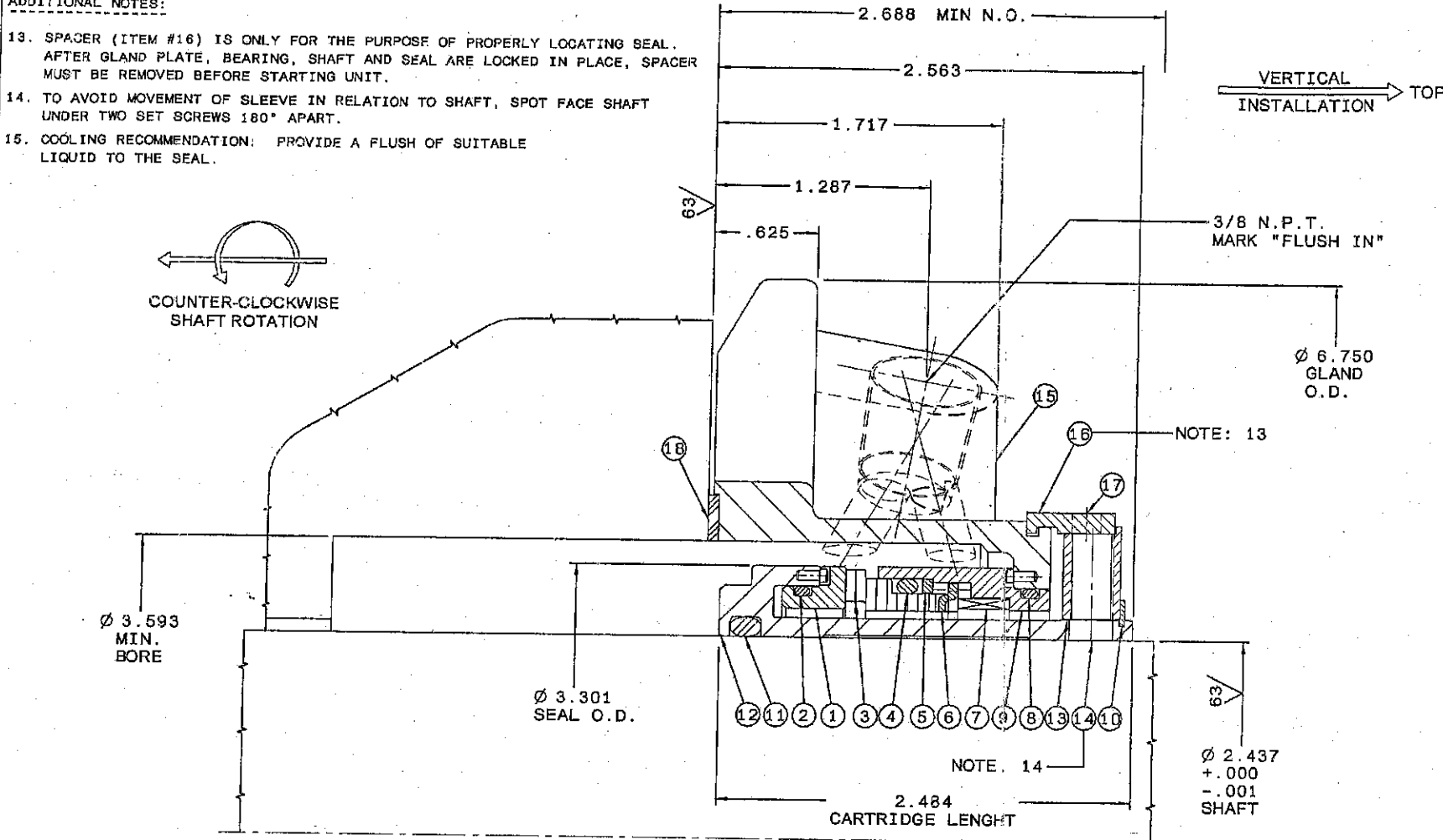
JOHNSTON PUMPS
 800 KOOMEY ROAD
 BROOKSHIRE, TEXAS 77423
 TEL. 281-934-6000
 JOHNSTON PUMP IS A DIVISION OF FLOW PRODUCTS, INC.

PLANT SCALE = 10"
 DRAWN: R. GUIDA 10/23/02
 CHECKED: D. ADKINS 10/24/02
 APPROVED: _____
 827 | Page
 DRAWING NO. H-8293-D

DRAWING No. HSP-47979-203
 ISSUE A
 REVISIONS: A ORIGINAL ISSUE

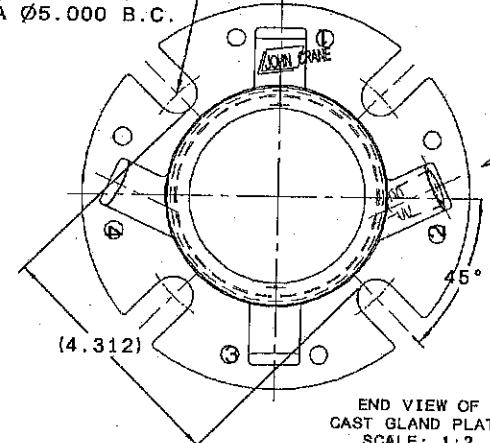
ADDITIONAL NOTES:

- 13. SPACER (ITEM #16) IS ONLY FOR THE PURPOSE OF PROPERLY LOCATING SEAL. AFTER GLAND PLATE, BEARING, SHAFT AND SEAL ARE LOCKED IN PLACE, SPACER MUST BE REMOVED BEFORE STARTING UNIT.
- 14. TO AVOID MOVEMENT OF SLEEVE IN RELATION TO SHAFT, SPOT FACE SHAFT UNDER TWO SET SCREWS 180° APART.
- 15. COOLING RECOMMENDATION: PROVIDE A FLUSH OF SUITABLE LIQUID TO THE SEAL.



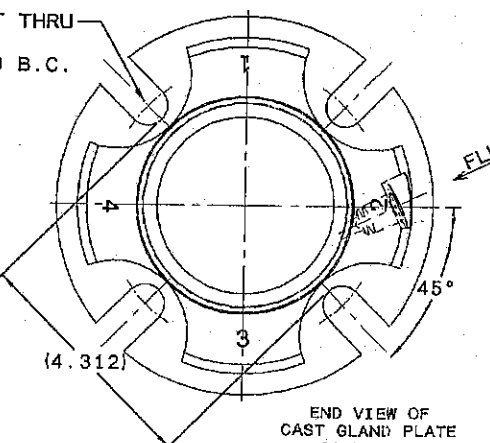
Ø 3.593 MIN. BORE

Ø 0.687 SLOT THRU (4X) 90° C.C. ON A Ø 5.000 B.C.

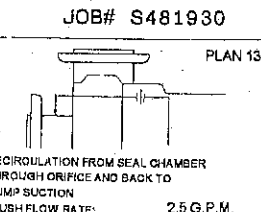


END VIEW OF CAST GLAND PLATE SCALE: 1:2

Ø 0.687 SLOT THRU 4X 90° C.C. ON A Ø 5.000 B.C.



END VIEW OF CAST GLAND PLATE SCALE: 1:2



PLAN 13

ITEM	COMPONENT	DESCRIPTION	MATERIAL	QTY	SPARES
1	H 2501 569 9221	MATING RING	SILICON CARBIDE	1	X
2	0000 040 9549	O-RING	FLUOROELASTOMER	1	X
3	H 2501 568 9055	PRIMARY RING	CARBON	1	X
4	0000 151 9549	O-RING	FLUOROELASTOMER	1	X
5	H 2501 568 0550	ANTI-X-RING	316 S.S.	1	X
6	H 2501 586 0550	DRIVE RING	316 S.S.	1	X
7	7597	SPRING	HAST. C	1	X
8	0000 040 9549	O-RING	FLUOROELASTOMER	1	X
9	H 2501 585 0550	RETAINER	316 S.S.	1	X
10	AUS2 68XX XX2 0500	SNAP RING	18-8 S.S.	1	X
11	0000 230 9549	O-RING	FLUOROELASTOMER	1	X
12	H 2502 179 0550	SLEEVE	316 S.S.	1	X
13	H 2501 586 0550	COLLAR	316 S.S.	1	X
14	1725 2008 000 0650	SET SCREW	HARDENED 416 S.S.	0	X
15	H 2501 579 0550	GLAND ASS'Y. *	316 S.S.	1	X
16	D 0002 684 0570	SPACER	SINT. 316 S.S.	4	X
17	2108 3206 000 0550	SOCKET HEAD CAP SCREW	316 S.S.	4	X
18	H 2501 587 7510	GASKET	G.F. CHEM.	1	X
19					
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35					

CUSTOMER P/N# 310-72087

* H 2501 690 (MACHINED GLAND OPTIONAL.)

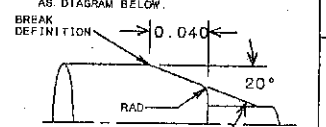
SEAL ASS'Y NO.	BILL OF MATERIALS NUMBER	
MTG. RG. ASS'Y NO.	COMPLETE	1-18 M125024
	SEAL HD.	
	MTS. RG.	
	ASS'Y.	ITEMS NUMBER

EQUIPMENT REFERENCE:	CUSTOMER INFORMATION:
UNIT BY: JOHNSTON PUMP	CUSTOMER: JOHNSTON PUMP
EQUIPMENT TYPE:	P.O. NO. 717703
<input checked="" type="checkbox"/> PUMP <input type="checkbox"/> AGITATOR	END USER: CITY OF SAN DIEGO
<input type="checkbox"/> COMPRESSOR <input type="checkbox"/> OTHER	LOCATION: SAN DIEGO, CA
MODEL/SIZE 33 CLC /	REQ. NO.
SERIAL NO. 72087	INSTALLED AT:

SEAL DATA	
SEAL DESCRIPTION A851	MATERIAL CODE X F55 1 X 058 H 316/HC
A.P.I. CODE BSPFN	A.P.I. PLAN 13

SERVICE DATA	
FLUID RAW WATER	BARRIER FLUID
SEAL PRESS. 53 PSIG	SUCT. PRESS. 30 PSIG
TEMPERATURE 60°F	DISCH. PRESS. 53 PSIG
SHAFT SPEED 720 RPM	SP. GR. 1.0
REFERENCE DATA	DRAWN DATE CHK'D APP'D
DATA SH. DTG.: 10/20/03	JACOBO 102703 ALS MWL 1.75:1
BY: MARK KLEPACZ	REF. DWG.: HSP-47979
PROJ. NO.: 53871-HDU	HOUSTON BRANCH#61

- THE FOLLOWING NOTES ARE IMPORTANT AND MUST BE OBSERVED FOR CORRECT SEAL INSTALLATION AND OPERATION
- REMOVE ALL SHARP EDGES ON SHAFT &/OR SLEEVE BEFORE INSTALLATION OF SEAL
 - SURFACE OF SHAFT OR SLEEVE ON WHICH SEAL IS INSTALLED MUST BE MACHINED TO FINISH OR BETTER.
 - LUBRICATE SHAFT/SLEEVE & SEAL O-RING TO ASSIST INSTALLATION OF SEAL WITH STP OR DOW CORNING #6 GREASE
 - LUBRICATE MATING RING (SEAT), SEALING MEMBER & HOUSING TO ASSIST INSTALLATION.
 - MUST BE CIRCULATED AROUND PRIMARY RING (SEAL FACE)/THROUGH MATING RING (SEAT) (AT NOT LESS THAN) IN ORDER TO REMOVE HEAT GENERATED OR FAILURE MAY OCCUR.
 - WHEN SHAFT IS SLEEVED THROUGH STUFFING BOX, SLEEVE MUST BE TIGHT THROUGH BORE.
 - SHAFT OR SLEEVE MUST BE OF CORROSION RESISTANT MATERIAL WITH A HARDNESS OF 125 BRINELL MINIMUM & BE MACHINED TO DIMENSIONS & TOLERANCES STATED.
 - END OF SEAL CHAMBER & AXIS OF SHAFT MUST BE AT 90° TO EACH OTHER WITHIN .002 P.I.U.
 - PRESSURE IN SEAL CHAMBER MUST BE MAINTAINED AT MINIMUM ABOVE MAXIMUM PRESSURE GENERATED AT INNER SEAL.
 - BEFORE COMPLETING SEAL INSTALLATION WIPE LAPPED SURFACES OF MATING RING (SEAT) & PRIMARY RING (SEAL FACE) PERFECTLY CLEAN.
 - VENT GAS ENTRAPMENT BEFORE STARTUP.
 - ALL SHOULDERS OVER WHICH SEAL MUST PASS WHEN FITTING, TO BE PREPARED AS DIAGRAM BELOW.

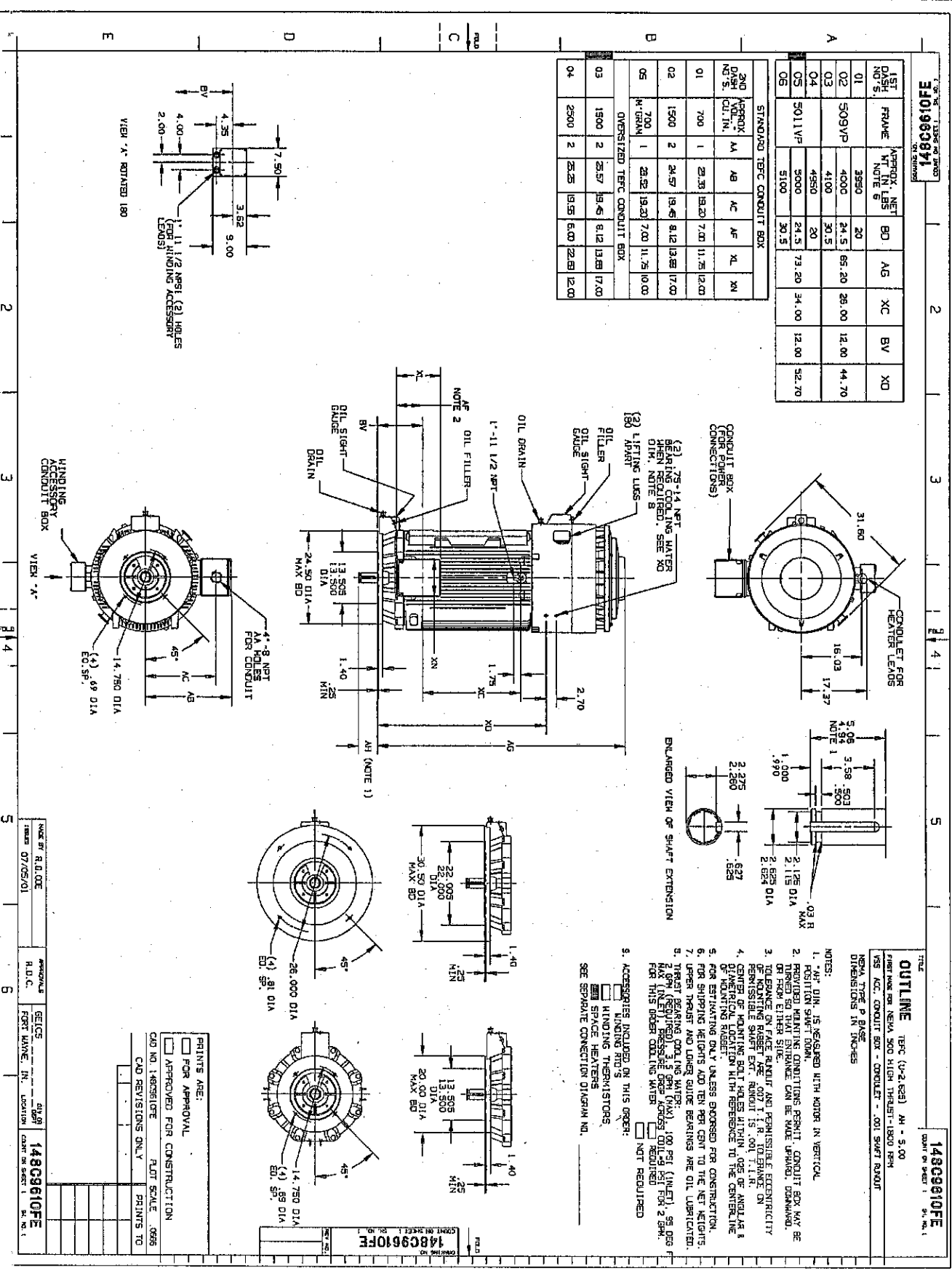


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CAD ENGINEERED
 SEAL SIZE: Ø 2.500 (Ø 2.437 SHAFT)
 SEAL TYPE: T-5610

John Crane
JOHN CRANE INC.
 International Sealing Systems
 6400 Oakton Street
 Morton Grove, IL 60053, U.S.A.

Marks: RCP DATA: CPM = 2050
 STATIC DEFLECTION = 0.0084 (INCHES)
 CTR OF GRAVITY = 31.00 (INCHES)



148C9610FE

DATE BY: R.D.LOE
 ISSUED: 07/25/01

APPROVALS: R.D.L. (DATE: 07/25/01)
 FORT WANE, IN, LOCATION: 148C9610FE

PRINTS ARE:
 FOR APPROVAL
 APPROVED FOR CONSTRUCTION
 CAD NO. 148C9610FE PLOT SCALE: 6666
 CAD REVISIONS ONLY PRINTS TO:

NOTES:

1. "A" DIA. IS MEASURED WITH MOTOR IN VERTICAL POSITION SHUT DOWN.
2. PROVIDED MOUNTING CONDITIONS PERMIT, CONDUIT BOX MAY BE TIPPED SO THAT ENTRANCE CAN BE MADE UPWARD, DOWNWARD, OR FROM EITHER SIDE. MINOR AND SIGNIFICANT EXCEPTICITY OF MOUNTING RISES USE .0071 IN. CLEARANCE ON PERMISSIBLE SHAFT EXT. RADIUS 15.000 T.I.N.
3. CENTER OF MOUNTING BOLT HOLES WITHIN .005 OF ANGULAR & PLACEMENT TOLERANCE WITH REFERENCE TO THE CENTERLINE OF MOUNTING HOLES.
4. FOR ESTIMATING WEIGHTS ADD TEN PER CENT TO THE NET WEIGHTS.
5. UPPER BEARING AND LOWER GUIDE BEARINGS ARE OIL LUBRICATED.
6. TARGET BEARING OIL LUB. W/ATER: 2.0PM (REQUIRED) 3.5 3PM (MAX) 1.00 PSI (INLET) .95 DEG F MAX (INLET) PRESSURE DIPS ACROSS OIL LUB. FOR 2.0PM. MAX (INLET) PRESSURE DIPS ACROSS OIL LUB. FOR 2.0PM.
7. TARGET BEARING OIL LUB. W/ATER: 2.0PM (REQUIRED) 3.5 3PM (MAX) 1.00 PSI (INLET) .95 DEG F MAX (INLET) PRESSURE DIPS ACROSS OIL LUB. FOR 2.0PM.

3. ACCESSORIES INCLUDED ON THIS ORDER:
 WINDING THERMISTORS
 SPACE HEATERS
 SEE SEPARATE CONNECTION DIAGRAM NO. _____

Item / BOM Attachments

CZENTIC

Organization : J30
Item : 72087-1
Description : HEAD, ASSY-AF-24.50X20-PL

Attachment Type

Description

Bill Attachments

72087

SPECIAL MANUFACTURING INSTRUCTIONS:

72087

PROJECT ENGINEER: RAY GUIDA
PROJECT MANAGER: MIKE KRAIS
REVISION: 0

NOTE

DESCRIPTION

B DYNAMIC BALANCE IMPELLER IN ACCORDANCE WITH JOHNSTON PUMP MANUFACTURING PROCESS INSTRUCTION DB01-0001. MAXIMUM RESIDUAL UNBALANCE PER PLANE IN-GM/LB: 0.312 (IN-OZ/LB: 0.011)

D NON-WITNESSED HYDROTEST TO 100 P.S.I.G. FOR 30 MINUTES DISCHARGE HEAD, COLUMN & BOWL ASSEMBLY

F PAINT/COATING REQUIREMENTS AS FOLLOWS:
JP CO STD GREEN PRIMER & ENAMEL ON OUTSIDE OF DISCH HD. CARBOLINE 891 ON ID & OD OF BOWL ASSY, COLUMN AND ID OF DISCH HD. 16 MILS DFT.

G ENVELOPE: H-8293-D

H IMPELLER TO BE FINISHED AS FOLLOWS:
DIAMETER: 24.438" TBF: 1/4" CLASS: "C"

WITNESSED PERFORMANCE & VIBRATION TESTS (6 UNITS) AT FULL SPEED WITH JOB DRIVER. TEST COMPLETE PUMP ASSEMBLY INCLUDING MECHANICAL SEAL. PLOT TYP. NPSHR ON CURVE. LIST MINIMUM SUBMERGENCE ON CURVE. FULL SPECTRUM VIBRATION REQUIRED. CUSTOMER CURVE APPROVAL REQUIRED.
ACCEPTANCE CRITERIA: 11,600 GPM @ 53 FT PUMP TOTAL HEAD, 85% BOWL EFFY. (APPROX. 82.6% PUMP EFFY.), 710 F/L RPM, BHP < 200 HP OVER RANGE OF CURVE. HEAD TOLERANCE ONLY +5%/-2%.

TEST LAB SETUP:

TEST @ FULL SPEED
USE JOB 20"-150# R.F. DISCH HEAD W/ JOB COMPLETE COLUMN PIPE
USE 30" TEST LINE W/ 30" MAG FLOW METER
USE JOB 200 HP 710 RPM MOTOR (3/60/460v)

TEST SETUP & TRIM SELECTION BY C.ZENTIC 11/6/03

***** NAMEPLATE STAMPING INSTRUCTIONS *****

REQD

R.P.M. - 710
B.H.P. - 200

Request: CZENTIC

Item / BOM Att. ents

Date : 06-NOV-03
Page : 2 Of 2

Organization : J30
Item : 72087-1
Description : HEAD, ASSY-AF-24.50X20-PL

Attachment Type

Description

CAPACITY - 11600 USGPM
HEAD - 53 FT.
SIZE & TYPE - 33CLC
STAGES - 1
FLUID - RAW WATER
SP. GR. - 1.0
TAG - P-1/2/3/4/5/ & 6
PO# -
IMPELLER LIFT - 1/2"

***** PUMP CONSTRUCTION DETAILS *****

PARAMETER REQ'D BY ASSEMBLER APPROVAL AS BUILT OC

PUMPSHAFT LENGTH: 209 3/4"
IMPELLER DIAMETER: PER NOTE H ABOVE
GREASE BELL BRG: YES
GREASE ENCLOSING TUBE: N/A
MIN. END PLAY: 1"
PUMPSHAFT PROJ: 165"
(+/- 1/8")
TUBE SEAT PROJECTION: N/A
(+/- 1/16")
BOWL ASSY LENGTH: 48 1/2"
(+/- 1/4")
BELL LIP DIA: 33"
(+/- 1/8")
TOTAL PUMP LENGTH: 13'-6"
(+/- 1/2")
COLUMN LENGTH: 113 1/2"
(+/- 1/4")
SH PRJ BELO DRVR SEAT: 11 1/2"
(+/- 1/8")
HD SHAFT PROJECTION: N/A
(+/- 1/4")
FREE ROTATE OF SHAFT: YES
PLUG SUCTION BELL: YES

***** SIGN-OFF *****

ASSEMBLED BY:
ASSEMBLY DATE:
PAINT THKNSS/QUALITY: PER NOTE F ABOVE
ASSEMBLY SUPERVISOR/DATE:

FINAL REVIEW & RELEASE FOR SHIPMENT
BY PROJECT MANAGER:
ON TRUCK INSPECTION/PIC'S:



Tuesday, November 12, 2002

Technical Data Center
PO Box 2205
Fort Wayne, IN 46802-2205

Customer: JOHNSTON PUMP/GENERAL
VALVE INC
800 KOOMEY RD
BROOKSHIRE TX 77423

DataPack Document, Version: v02118125.01

Contact: Technical Data Center
Model Number: 5KS511ST511P
GE Requisition/Item: 69033605\1
GE Job Number: 021009399
Instruction Manual: GEK-95350
Connection Diagram: GEM2034E-FIG7

Phone: 219-439-2000
Customer Order No: 705521
Customer Item No:
Customer Part No: 300-72087
Outline Drawing: 148C9610FE-05-03

Accessory Connection Diagrams

Bearing Thermocouple: None
RTD: None
Thermostat: 3027JE-2
Bearing RTD: None

Heater: 3027JE-1
Thermistor: None
Winding Thermocouple: None

Revision History

<u>Version</u>	<u>Date</u>	<u>Comments</u>
v02118125.01	11/12/2002	Original Version

Distribution Information

<u>Quantity</u>	<u>Recipient</u>
1	FOLDER COPY

<u>Quantity</u>	<u>Recipient</u>
1	M KRAIS MKRAIS@FLOWSERVE.COM E-Mail Distribution

1	DELORES CLOUD DELORES.CLOUD@INDSYS.GE.COM E-Mail Distribution
---	---------------------------------------------------------------------

1	JOANN GOODSON JOANN.GOODSON@INDSYS.GE.COM E-Mail Distribution
---	---------------------------------------------------------------------



Tuesday, November 12, 2002

Technical Data Center
PO Box 2205
Fort Wayne, IN 46802-2205

Customer: JOHNSTON PUMP/GENERAL
VALVE INC
800 KOOMEY RD
BROOKSHIRE TX 77423

DataPack Document, Version: v02118125.01

Customer Order / Item: 705521
Customer Part: 300-72087

GE Requisition / Item: 69033605/1
GE Job Number: 021009399

Marks:

RCF DATA: CPM = 2050
STATIC DEFLECTION = 0.0084 (INCHES)
CTR OF GRAVITY = 31.00 (INCHES)

MODEL NUMBER: 5KS511ST511P
Outline Drawing: 148C9610FE-05-03
Connection Diagram: GEM2034E-FIG7
Instruction Book: GEK-95350
Design Code: 50DS5341AB
Type: KS
Frame: L5011VP24
Phases: 3
Horsepower: 200
RPM: 710
Voltage: 460
Hertz: 60
Amps - FL: 240.0
Service Factor: 1.15

ESTIMATED WEIGHT: 4270 Lbs
Time Rating: CONT
Enclosure: TEFC
Encl Construction: SD
Ambient: 50
Insulation Class: F
NEMA Design: A
Nominal Efficiency: 95.0
Guaranteed Efficiency: 94.5
KVA Code: G
Max KVAR: 62.0
Power Factor: 82.0
Bearing - DE: 6219ZC3
Bearing - ODE: 235A2531AA01

Enclosure is Totally Enclosed Fan-Cooled

Additional Notes:

RCF=2050 RPM
THERMOSTAT LEADS PC-PC
HTR LDS H 115V 350W
UPPER OIL: 16.0 QTS ISO 32
LOWER OIL: 2.5 QTS ISO 32
10P-RANDOM-VSS-HT (175% 2D)-OVERSIZE
COND BOX-115V HTRS TO CONDULET-N.C. TSTAT
LDS TO ACCESS BOX-.0015 SHAFT RUNOUT

Diagrams for Model: 5KS511ST511P

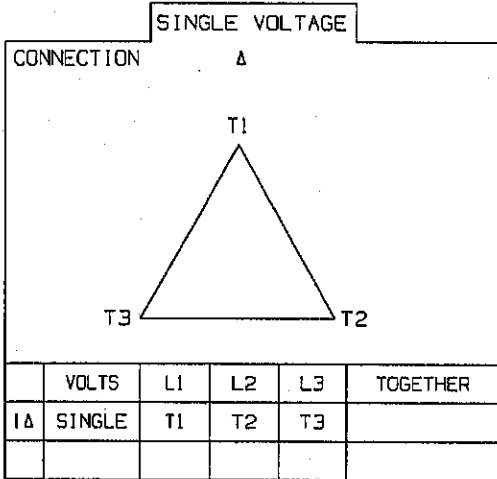
Marks:

RCF DATA: CPM = 2050

STATIC DEFLECTION = 0.0084 (INCHES)

CTR OF GRAVITY = 31.00 (INCHES)

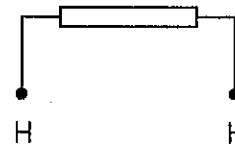
Connection Diagram
GEM2034E-FIG7



Heater Connection

3027JE-1

FIG. 1
HEATER CONN.

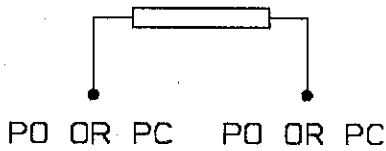


CONTROL	L1	L2
VOLTAGE ONLY	H	H

Thermostat Connection

3027JE-2

FIG. 2
THERMOSTAT CONN.



PO = NORM. OPEN	PC = NORM. CLOSED
--------------------	----------------------

Performance Characteristics

1st Winding 1st Connection

Design: 50DS5341AB

Marks:

RCF DATA: CPM = 2050

STATIC DEFLECTION = 0.0084 (INCHES)

CTR OF GRAVITY = 31.00 (INCHES)

LOAD %	125.0	115.0	100.0	75.0	50.0	25.0	0.0
% EFF	94.39	94.70	95.00	95.52	95.45	93.62	0.00
% PF	83.56	83.21	82.00	78.17	68.73	46.55	3.01
AMPS	296.65	273.19	240.00	188.02	142.67	107.39	86.53

TORQ(FL)#FT 1479.82

TORQ(LR)%FL 120.25

TORQ(BD)%FL 252.34

AMPS(LR) 1482.05

PF AT START 0.31

This motor is capable of two cold or one hot start with a maximum connected load inertia of 36803.3 Lb-Ft Sq (1550.9 Kgs-Meter Sq) at 100% voltage, where the load torque varies with the square of the speed. Acceleration time with maximum inertia and the above load type is 46 seconds. Safe stall time at 100% voltage is 78 seconds cold, 61 hot. Rotor inertia is 270.77 Lb-Ft Sq (11.410 Kgs-Meter Sq).

Open Circuit A-C: 0.483

Short Circuit D-C: 0.028

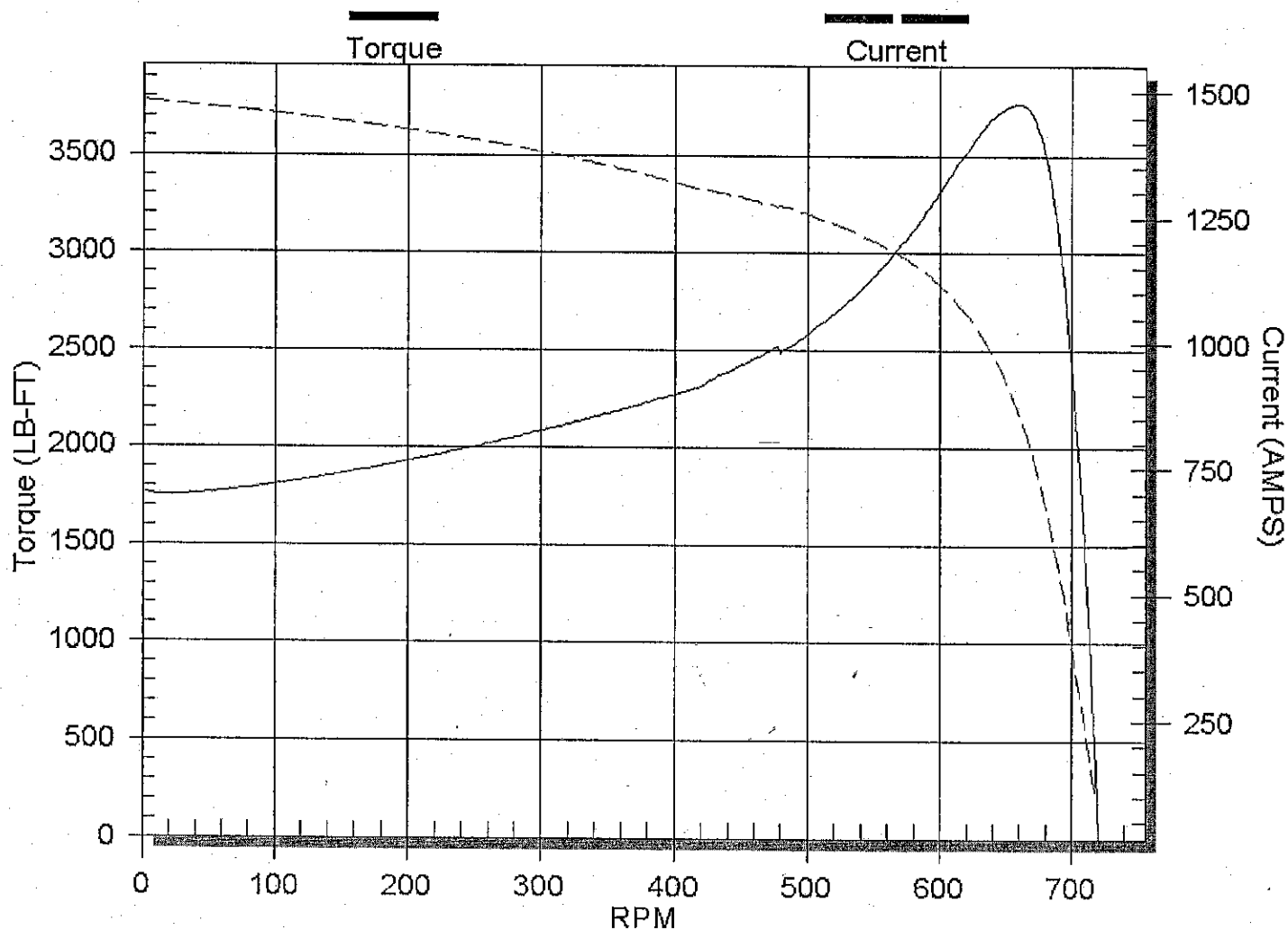
Short Circuit A-C: 0.026

X/R Ratio: 10.560

Model Number: 5KS511ST511P

Design: 50DS5341AB

Speed Torque Current Curve (First Connection, First Speed)



MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

43 01 20

PUMP EFFICIENCY TESTING REQUIREMENTS

Section 1 – Summary of Work

Section 2 – Test Classifications

Section 3 – Equipment

Section 4 – Pump Testing Procedures

Section 5 – Pump Test Data Sheets, Pump Reports, and Cost Analysis

Section 6 – Test Technician Standards

Section 1 – Summary of Work

Pump efficiency testing and shall be conducted in accordance with this document.

Section 2 – Test Classifications

The following classifications of tests are defined in the third edition of the Pump Handbook (Karassik, Messina, Cooper and Heald, 2001).

Shop tests are also called *laboratory, manufacturer's, or factory acceptance* tests. They are conducted in the pump manufacturer's plant under geometrically similar, ideal, and controlled conditions and are usually assumed to be the most accurate tests.

Field tests are made with the pumping unit installed in its exact environment and operating under existing field or ultimate conditions. The accuracy and reliability of field testing depend on the instrumentation used, installation, and advance planning during the design stages of the installation. By mutual agreement, field tests can be used as acceptance tests.

Index tests are a form of field testing usually made to serve as a standard of comparison of wear, changing conditions, or overhaul evaluation. Index tests should always be run by the same procedures, instruments, and personnel where possible, and a very accurate record and log of events should be kept to give as complete and comparable a history of the results as possible.

Model tests precede the design of the prototype and are usually quite accurate. They supplement or complement field tests of the prototype for which the model was made. The role of the model test must be clearly established as early in the design as possible, preferably in the specification or invitation to bid. Model tests may be used when very large units are involved, when the performances of several models must be compared, and when an advance indication of prototype design is required.

The work of this contract applies to field tests and index tests only.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

Section 3 – Equipment

The pump test technician is required to furnish all tools and equipment necessary to perform pump efficiency testing. The following table lists mandatory measuring devices to be used in performing pump efficiency tests under this contract. The table also lists the quantity to be measured and calibrated limit of accuracy of each.

<u>Quantity to be Measured</u>	<u>Type of Measuring Device</u>	<u>Calibrated Limit of Accuracy (%)</u>
Capacity	Hall pitot tube and manometer	1.5%
Head	US Gauge test gauge set, 0 – 1000 psi	0.5%
Vacuum	US Gauge vacuum gauge, 0 – 30 in.	0.5%
Power Input	Epic kW meter	1.5%
Speed	Electronic photo tachometer	1.0%
Voltage	Extech kW, Volt, Amp.	1.5%
Current	Extech kW, Volt, Amp.	1.5%

Section 4 – Pump Testing Procedures

Part 1 – Upon Arrival

1.1 Determine pumps to be tested; normal operation of the pumps; source and destination of water. Determine test points. Determine if pumps can operate long enough to complete tests.

1.2 Complete pump test data sheet.

Part 2 – Test Set-up (to be performed for each pump)

2.1 Flow Measurement

- A. Determine appropriate location for pitot tube.
- B. Isolate and depressurize pipe.
- C. If necessary, drill and tap appropriate size hole for pitot tube.
- D. Measure pipe inside diameter.
- E. Install pitot tube and connect manometer.

2.2 Pressure/Head Measurement

- A. Locate appropriate location for pressure gauge cocks.
- B. Utilize existing pressure gauge cocks if possible.

PUMP EFFICIENCY TESTING REQUIREMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

- C. If necessary, drill and tap holes for pressure gauge cocks.
- D. If necessary, customer to install pressure gauge cocks in proper locations.

2.3 Energy Input Measurement to Motor

- A. Determine appropriate location to measure kW input.
- B. Open appropriate electrical panels for inspection.

2.4 Pump Speed Measurement

- A. Install reflective tape for electronic tachometer operation.

2.5 Preparation for Operation

- A. Open all valves.
- B. Clear area and make final safety check.

Part 3 – Begin Test

Three tests are to be performed for each pump: (1) Test with one pump running at full capacity, (2) Throttling discharge to near design conditions, (3) Four pumps running in parallel

3.1 Adjustments

- A. Start pump and allow to stabilize
- B. Bleed pressure gauge cocks, install pressure gauges and check operation.
- C. Set valves for proper head
- D. Bleed and set pitot tube and manometer

3.2 Head Measurements – Verify head and record pressures.

3.3 Flow Measurement – Read manometer and record reading.

3.4 Energy Measurement

- A. Take kW readings at appropriate location by single phase method & record
- B. Measure running voltage and record.
- C. Measure running current and record.

PUMP EFFICIENCY TESTING REQUIREMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

D. Note any unusual voltage or current conditions.

3.5 Pump Speed Measurement – Measure pump speed w/ electronic photo tachometer

Part 4 – Test Observations (paraphrased from AWWA E101-88)

The recommended observation procedure is to make a continuous observation of at least 1 min of all instrumentation showing rate or instantaneous values. During the observation period all totaling instruments are read against time to determine rate. Rate may be observed with instantaneous reading instruments by mentally rejecting random fluctuations and selecting the value that represents that prevailing most of the time during the observation period. The use of linear scales for nonlinear values may cause error in the process of obtaining a time-weighted average. If possible, readings should be repeated and different observers employed to agree on readings. Evaluating the effect of fluctuating readings can be difficult due to highly variable dampening that may be present with some types of instrumentation. It is not recommended devices be used to increase dampening. Devices used to increase dampening may superimpose an asymmetrical response on the instrument when subjected to dynamic fluctuations.

Part 5 – Additional Test Points

Same procedure repeated for each additional test point as determined in advance.

Part 6 – Calculations

- 6.1 Calculate total lift and convert to feet.
- 6.2 Calculate flow in gallons per minute.
- 6.3 Calculate kW input and convert to Horsepower.
- 6.4 Determine wire to water efficiency.
- 6.5 Calculate kVA and power factor.
- 6.6 Accuracy of Field Testing shall be calculated and reported as demonstrated in AWWA Standard E101-88.

Part 7 – Test Standards

All pump tests shall be conducted in accordance with Hydraulic Institute Test Standards 1.6, 2.6, and 11.6 to the extent that the pump station physical installation allows.

Section 5 – Pump Test Data Sheets, Pump Reports, and Cost Analysis

PUMP EFFICIENCY TESTING REQUIREMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

Part 1 – Pump Test Data Sheets

Raw data during the pump efficiency tests shall be recorded on the Pump Test Data Sheet. A copy of the Pump Test Data Sheet is provided as Figure 1. If the Pump Test Data Sheet shown in Figure 1 is not used, then a proposed Pump Test Data Sheet shall be submitted for review and approval by the City of San Diego.

Part 2 – Pump Efficiency Test Report

All reports shall be prepared and provided with a cover letter summarizing potential savings from operational changes or pump replacement with a new pump properly designed when necessary as identified thru the pump test. Hard copy of all reports shall be provided to City on company letterhead, and in addition, and electronic copy of all reports shall be submitted electronically (PDF). The report shall include as a minimum the following information:

- (1) All System and Location information
- (2) All Pump information
- (3) All Motor information
- (4) All Electric Meter information
- (5) Test results on the following:
 - a. Discharge pressure, PSI
 - b. Suction pressure, PSI
 - c. Suction lift, ft.
 - d. Suction vacuum, ft.
 - e. Standing water level, ft.
 - f. Drawdown, ft.
 - g. Discharge head, ft.
 - h. Pumping water level, ft.
 - i. Total head, ft.
 - j. Capacity, GPM
 - k. GPM per ft. drawdown
 - l. Acre ft. pumped in 24 hr.
 - m. kW input to motor
 - n. HP input to motor
 - o. Motor load (%)
 - p. Measured speed to pump, RPM
 - q. KWH per acre ft.
 - r. Overall plant efficiency (%)

A copy of the Pump Efficiency Test Report is provided as Figure 2. If Pump Efficiency Test Report shown in Figure 2 is not used, then a test report format shall be submitted for review and approval by the City of San Diego.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

Part 3 – Cost Analysis

A Cost Analysis must be included as a part of the Pump Test Report. If hours of operation are available the Cost Analysis shall include as a minimum the following information for the Existing Conditions, Improved Efficiency and Savings:

<u>Existing Conditions</u>	<u>Improved Efficiency</u>	<u>Savings</u>
1. Total annual kWhrs	1. Total annual kWhrs	1. Total annual kWhrs
2. Total annual cost	2. Total annual cost	2. Total annual cost
3. kW input to motor	3. kW input to motor	3. kW input to motor
4. Hrs of operation/yr	4. Hrs of operation/yr	4. Average cost per acre-ft
5. Equivalent 24 hour days	5. Equivalent 24 hour days	5. kWh per acre foot
6 Acre-ft pumped 24 hr day	6 Acre-ft pumped 24 hr day	6. Overall plant efficiency
7. Average cost per kWhr	7. Average cost per kWhr	
8. Average cost per hour	8. Average cost per hour	
9 Average cost per acre-ft	9 Average cost per acre-ft	
10. kWh per acre foot	10. kWh per acre foot	
11. Overall plant efficiency	11. Overall plant efficiency	

A copy of the Cost Analysis Report is provided as Figure 3. If the Cost Analysis Report format as shown in Figure 3 is not used, then a cost analysis report format shall be submitted for review and approval by the City of San Diego.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

PUMP TEST DATA SHEET	
Test No. _____	Date _____
Owner: Name _____	
Address _____	
Pump:	Location _____ Type _____ Size _____ Stages _____
	Make _____ Serial Number _____
Motor:	Make _____ Serial Number _____
	Rated hp: _____ rpm _____ vss _____ vhs _____ subm _____
Power Supply:	Nominal Voltage _____ Frequency _____
Column:	Pipe Size _____ Shaft Size _____ Disch Pipe Size _____
	or Length _____ Cable Size _____
Test Conducted by: _____ Witnessed by: _____	
Pump Serial Number _____ Test Date _____	
Test Instruments	
Head Below Datum Measured with _____	
Length Air Line (if used) _____	
Discharge Pressure	
	Make Gauge _____ Size Face _____ Serial Number _____
	Gauge Calibration: Date _____ by _____ Chart No. _____
	Manometer Fluid _____ Specific Gravity _____
Measured Pipe Inside Diameter at Pressure Tap _____	
Type Capacity-Measuring Device Used _____	
	Size _____ Make _____
	Serial No. _____
	Calibration _____ Date _____ by _____ Chart No. _____
	_____ Ft Downstream From _____ (Valve, Elbow, or Other Fixture)
	_____ Ft Upstream From _____ (Valve, Elbow, or Other Fixture)
Measured Diameter of Pipe at Instrument _____	
Condition of Pipe Upstream: Excellent _____ Good _____ Poor _____	
Type and Make of Power-Measuring Device Used _____	
	Watt-Hour Meter Disc Constant _____ No. _____
	Watt Meter Multiplier _____ No. _____
	Current Transformer Ratio _____ No. _____
	Potential Transformers Ratio _____ No. _____
	Calibration of Meter _____ Chart No. _____
	Date _____ by _____
Voltmeter:	Type _____ Serial Number _____
Ammeter	Type _____ Serial Number _____
Speed Measuring Device _____	

Figure 1 (page 1)

PUMP EFFICIENCY TESTING REQUIREMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

Expected Accuracy of Field Test						
<u>Measurement</u>	<u>Instrument</u>	<u>Accuracy</u>	<u>Accuracy Squared</u>			
Head Above Datum			--			
Head Below Datum			--			
Weighted-average head accuracy*						
Capacity						
Power						
Sum of Accuracy Squared						
Combined Accuracy						
*Average is weighted according to the proportion of head above datum and head below datum to total head: (accuracy h_b) x $h_b \div H$ + (accuracy h_a) x $h_a \div H$ = weighted-average head accuracy.						
Test Readings and Calculations						
All readings except No. 1 are taken when pumping						
No.	Symbol		Units	1	2	3
1		Head below datum when not pumping	ft			
2		Drawdown	ft			
3	<i>hb</i>	Head below datum	ft			
4		Datum to centerline discharge gauge	ft			
5		Pressure head reading	ft or psi			
6		Pressure head above datum	ft			
7	<i>hv</i>	Velocity head in discharge pipe.	ft			
8	<i>ha</i>	Head above datum. = (6) + (7)	ft			
9	<i>H</i>	Total head. = (3) + (8)	ft			
10	<i>Q</i>	Capacity	gpm			
11		Current	amp			
		Line A				
		Current	amp			
		Line B				
		Current	amp			
		Line C				
12		Voltage	V			
		Phase AB				
		Voltage	V			
		Phase BC				
		Voltage	V			
		Phase AC				
13		Revolutions of watt-hour meter disc				
14		Time	sec			
15		Watt meter reading				
16		Electrical input from (13 & 14) or (15)	kW			
17		Horsepower input. = (16)10.746	hp			
18		Revolutions of counter				
19		Time	sec			
20		Pump speed = (18) x 60/(19)	rpm			
21		Pump output = (9) x (10) x sp gr/3960	Hp**			
22		Overall efficiency* = (21) x (17)	percent			
23		Motor efficiency* (source)	percent			
24		Pump field efficiency* = (22)/(23)	percent			
*Calculated						
**Results will be in horsepower only if head measurements are in feet of liquid (hp x 0.746 = kW)						

Figure 1 (page 2)

PUMP EFFICIENCY TESTING REQUIREMENTS

FEBRUARY 2022

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

<i>COMPANY LETTERHEAD</i>			
City of San Diego	Test Date:		
Address of Pump Station:	Pump Type:		
Pump Station Name:	Pump Name:		
Efficiency test was performed on this booster pump & the following information was obtained.			
EQUIPMENT			
Pump:	Serial:		
Motor:	Serial:		
H.P. Meter:	Lat/Lon:		
TEST RESULTS			
	TEST 1	TEST 2	TEST 3
Discharge, PSI			
Discharge head, feet			
Suction head, PSI			
Suction head, feet			
Total pumping head, feet			
Gallons per minute flow			
Acre feet pumped per 24 hours			
KW input to motor			
HP input to motor			
Motor load, % BHP			
Measured speed of pump, RPM			
KWH per acre foot			
Overall plant efficiency in %			
Shut off head in feet			
<p>Test 1 results were obtained with one pump operating</p> <p>Test 2 results were obtained by throttling the pump discharge at near design.</p> <p>Test 3 was the operating condition of this pump with all pumps operating.</p> <p>If you have any questions please contact _____ at _____.</p>			

Figure 2

PUMP EFFICIENCY TESTING REQUIREMENTS

FEBRUARY 2022

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

ANNUAL PUMPING COST ANALYSIS			
City of San Diego	Test date: _____		
Pump Name: _____			
H.P.: _____			
<p>The following cost analysis is presented as an aid to your cost accounting and planning. It is an ESTIMATE based on the pump test data and your energy use or hours of operation during the previous 12-month period.</p>			
<p>This analysis is based on the following electric rate: _____</p>			
<p>Existing Conditions</p>			
Total annual hours of operation: _____			
Average Cost per kWh: _____			
	Test 1	Test 2	Test 3
KW input to motor	_____	_____	_____
Acre feet pumped per 24 hour day	_____	_____	_____
Average cost per hour	_____	_____	_____
KWh per acre foot	_____	_____	_____
Cost per acre foot	_____	_____	_____
Pump RPM	_____	_____	_____
Overall plant efficiency	_____	_____	_____
Expected efficiency, new pump in %	_____		
Cost savings in %	_____		

Figure 3

PUMP EFFICIENCY TESTING REQUIREMENTS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

Section 6 – Test Technician Standards

There are three levels of qualified test technicians.

First Level

Apprentice Test Technician – A testman shall be considered an apprentice while in training for the first two years and 500 pump tests.

Second Level

Journeyman Test Technician – A testman will be considered a journeyman on completion of two years of testing, the completion of 500 pump tests and passing an oral or written test given by the company.

Third Level

Pump System Analyst – A testman will be considered a pumping systems analyst on completion of five years of testing and a demonstration of knowledge of complete hydraulic systems for agriculture, municipal water systems, and industrial and commercial applications.

At a minimum, a Journeyman Test Technician must be present and responsible for performing for all pump efficiency tests under this contract. The Journeyman's work and test results must be checked by a Pumping System Analyst before submission to the City of San Diego.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
ATTACHMENT B TO SPECIFICATION

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SECTION 43 01 40

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. 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. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - d. 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).
 - e. D4259, Standard Practice for Abrading Concrete.
 2. Society for Protective Coatings (SSPC)
 - a. SSPC.SP-3 Power Tool Cleaning
 - b. SSPC.SP 12NACE 5: Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
 3. American Concrete Institute (ACI)
 - a. ACI 364.1R: Guide for Evaluation of Concrete Structures Prior to Rehabilitation

1.2 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: Surface defect such as soft cement mortar, indentations and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch diameter, cracks 0.010-inch wide and wider, spalls, chips.
- C. Low-Pressure Water Cleaning: Sometimes referred to as “power washing” or “pressure washing”. Water cleaning performed at pressures less than 5,000 psi.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

Surfaces to be cleaned similar to WJ-4 standard as described as in SSPC 12: “A WJ4 surface shall be cleaned to finish which when viewed without magnification, is free of all visible oil, grease, dirt, dust loose mill scale loose rust and loose coating. Any residual material shall be tightly adherent.”

- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.

1.3 SUBMITTALS

A. Action Submittals:

- 1. Product data sheets for each material supplied.
- 2. Samples: Mesh reinforcement

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. Manufacturer’s Certificate of Compliance, in accordance with
 - b. Section 01 61 00, Common Product Requirements, that proposed repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
- 5. Statements of Qualification:
 - a. Repair mortar system applicator.
- 6. Confined space and entry plan and procedure for pump barrel inspection and repair activities. Include name, experience and certifications for personnel who will provide confined space entry assistance.
- 7. Product data sheet for personnel inspection basket and method of lowering and raising basket in pump barrel.
- 8. Pump barrel ventilation and dewatering equipment and procedure.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Repair Mortar System Applicator:

B. Pre-repair Conference:

- 1. Required Meeting Attendees:
 - a. Contractor.

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer 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.

1.5 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

2.1 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 renovation mortar acceptable for drinking water application.
- 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.

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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 belowgrade 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

2.2 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.

2.3 REINFORCEMENT

- A. Mesh Reinforcement: Welded wire fabric flat sheet 1½-in x 1½-in mesh, 10 gage plain steel wire.

2.4 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.
 - d. Bonding agent shall not produce a vapor barrier.
 - e. Compatible with and from same manufacturer as the repair system used.
- B. Manufacturers and Products:

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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

2.5 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.6 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall furnish all tools, equipment, materials, consumables and supplies and shall perform all labor required to assist the Engineer with pump barrel inspections and complete the WORK of pump barrel repairs to fulfill the requirements outlined in this Specification.

3.2 ASSISTANCE FOR PUMP BARREL INSPECTIONS.

- A. Provide access assistance (including all confined space entry and standby emergency rescue requirements) for the inspection of the pump barrels by the Engineer following the removal of the pumps under Specification 43 42 20 and for the pump barrel repair inspections generally consisting of the following items and actions:
 1. Dewater the pump barrels and maintain in a dewatered state during inspection.
 2. Clean pump barrel with high pressure water jet prior to inspection
 3. All water drained from pump barrel shall be processed through a filter which removes all Quagga larva before discharge.
 4. Provide ventilation during inspection.
 5. Provide a suitable cage or basket for the inspector to be safely lowered into the pump barrel for the inspection.
 6. Provide a suitable method to safely raise and lower the cage and inspector for the inspection.
 7. Methods and materials shall be suitable for Confined Space entry requirements.
 8. Provide and install a blind flange and gasket to close and seal the pump barrel following inspection/rehabilitation until the rehabilitated pumps are reinstalled.

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

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3.3 PUMP BARREL REPAIRS.

- A. Repair damaged and deficient areas of the pump barrels and or lining identified by the Engineer during the inspection.
- B. Repairs will be performed following the can inspection. Repairs may include but not be limited to the following:
 - 1. Saw cut lining to a depth of approximately ¼ in. around the perimeter of the patch identified by the Engineer to provide a square edge for the patch.
 - 2. Remove all soft, loose and dis-bonded cement mortar lining within the area identified using mechanical abrading procedures per ASTM D4259.
 - 3. If the metal pump barrel is exposed, clean exposed metal: SSPC.SP-3 Power Tool Cleaning.
 - 4. Repair metal pump barrel where corrosion pits are greater than 1/8 – in. deep:
 - a. For areas less than ½-in diameter, repair by plug welding and grind to smooth surface matching profile of pump barrel.
 - b. For areas greater the ½-in diameter, repair by welding a formed ¼-in thick ASTM A36 steel plate over the damaged area. Provide minimum ½-in overlap of patch plate with undamaged pump barrel material. Utilize continuous fillet welds, ground smooth.
 - c. Apply cement mortar liner over repaired barrel’s steel plate.
 - 5. Provide access assistance to the Engineer for inspecting the metal pump barrel repair prior to placement of the cement mortar lining.
 - 6. Repair the cement mortar pump can lining:
 - a. If area to be patched is larger than 2 sq. ft. in area, tack welded wire mesh to pump barrel can before applying bonding agent and grout.
 - b. Coat area to be patched, both steel and cement mortar, with bonding agent.
 - c. Place cement mortar in areas to be patched.
 - d. Trowel finish mortar patch match contour of lined pump can.
 - e. Mix, apply and cure all products in conformance with manufacturer’s written instructions.
 - 7. Provide access assistance for the Engineer to inspect the mortar repairs. Correct all deficiencies identified by Engineer.
 - 8. Remove and dispose of all debris from pump barrel following repair operations.
 - 9. Install blind flange on pump barrel following acceptance.

END OF SECTION

INSPECTION ASSISTANCE AND REPAIR OF PUMP BARRELS

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SECTION 43 01 50

INSPECTION ASSISTANCE AND REPAIR OF 48-IN. PUMP DISCHARGE PIPELINE

PART 1 - GENERAL

1.1 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. 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. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - d. 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).
 - e. D4259, Standard Practice for Abrading Concrete.
 2. Society for Protective Coatings (SSPC)
 - a. SSPC.SP-3 Power Tool Cleaning
 - b. SSPC.SP 12NACE 5: Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
 3. American Concrete Institute (ACI)
 - a. ACI 364.1R: Guide for Evaluation of Concrete Structures Prior to Rehabilitation

1.2 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: Surface defect such as soft cement mortar, indentations and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch diameter, cracks 0.010-inch wide and wider, spalls, chips.

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

- C. Low-Pressure Water Cleaning: Sometimes referred to as “power washing” or “pressure washing”. Water cleaning performed at pressures less than 5,000 psi. Surfaces to be cleaned similar to WJ-4 standard as described as in SSPC 12: “A WJ4 surface shall be cleaned to finish which when viewed without magnification, is free of all visible oil, grease, dirt, dust loose mill scale loose rust and loose coating. Any residual material shall be tightly adherent.”
- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product data sheets for each material supplied.
 - 2. Samples: Mesh reinforcement
- B. Informational Submittals:
 - 1. Repair Mortar System: Manufacturer’s preparation and installation instructions.
 - 2. Written description of equipment proposed for lining and coating mortar removal and surface preparation.
 - 3. Certificates:
 - a. Manufacturer’s Certificate of Compliance, in accordance with
 - b. Section 01 61 00, Common Product Requirements, that proposed repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
 - 4. Statements of Qualification:
 - a. Repair mortar system applicator.
 - 5. Confined space and entry plan and procedure for discharge pipe internal inspection and repair activities. Include name, experience and certifications for personnel who will provide confined space entry assistance.
 - 6. Pipeline ventilation and dewatering equipment and procedure.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Repair Mortar System Applicator:
- B. Pre-repair Conference:
 - 1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.

INSPECTION ASSISTANCE AND REPAIR OF 48- in. PUMP DISCHARGE PIPELINE

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- c. Technical representative for repair material manufacturer.
- d. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer 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.

1.5 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

2.1 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 renovation mortar acceptable for drinking water application.
- 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.

STANCE AND REPAIR OF 48- in. PUMP DISCHARGE PIPELINE

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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

2.2 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.

2.3 REINFORCEMENT

- A. Mesh Reinforcement: Welded wire fabric flat sheet 1½-in x 1½-in mesh, 10 gage plain steel wire.

2.4 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) Wet on Wet: 2,500 psi minimum.
 - 2) 24-Hour Open Time: 2,000 psi minimum.
- d. Bonding agent shall not produce a vapor barrier.
- e. Compatible with and from same manufacturer as the 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.

INSPECTION ASSISTANCE AND REPAIR OF 48- in. PUMP DISCHARGE PIPELINE

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

3. Euclid Chemical Co., Cleveland, OH: Dural Prep AC.
4. Or approved equal

2.5 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.6 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall furnish all tools, equipment, materials, consumables and supplies and shall perform all labor required to assist the Engineer with the pump station discharge pipeline inspections and complete the WORK of pipeline repairs as directed to fulfill the requirements outlined in this Specification.
- B. Existing pipe material is 48-in. diameter, cement mortar lined and coated steel pipe. A potential defect was identified by PURE Technologies through an October 17, 2018 inspection using Pure Technologies' electromagnetic inspection technology. The potential defect is located approximately 134-ft. from the pump station header blind flange in a buried section of the pipe. Defect orientation is of 105 deg. from vertical looking in direction of flow in a clockwise rotation.

3.2 ASSISTANCE FOR PIPELINE INSPECTIONS

- A. Provide access assistance for the exterior inspection of the pipeline by the Engineer. Inspections assistance generally consisting of the following items and actions:
 1. Expose at least 10 ft length of pipe centered on the suspected defect location down to an orientation of 120 deg.
 2. Clean a 4 ft high by 8 ft. long section of the pipe centered on the suspected defect location using wire brushes or low-pressure water cleaning method.
 3. Provide access for Engineer to inspect the pipe mortar coating for of defects.
 4. Remove pipe cement mortar coating down to pipe steel cylinder up to an area as directed by the Engineer up to an area of 4 ft high by 8 ft long. Saw cut mortar coating to a depth of approximately ¼ in. around the area to provide a square edge for the patch. Use mechanical abrading procedures per ASTM D4259 and clean exposed metal to SSPC.SP-3
 5. Provide access for Engineer to inspect pipe steel cylinder for defects.
 6. Provide additional access for Engineer to inspect exterior pipe cylinder and/or mortar coating repairs following each repair step.
- B. Provide access assistance for interior inspection of the discharge pipeline by the Engineer if directed. Inspection assistance generally consists of the following items.

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1. Dewater and drain header after City isolates header segment. All water pumped out of pipeline shall be processed through a filter which removes all Quagga larva before discharge.
2. Remove blind flange from western end of header. Provide ventilation of pipe segment during inspection.
3. Provide and install and secure suitable provisions for contractor's workmen and Engineer to safely access the suspected defect area in pipeline for inspection.
4. If directed remove internal pipe cement mortar lining up to an area up to 16 sq. ft. for inspection of interior of the pipe steel cylinder.
5. Methods and materials shall be suitable for Confined Space entry requirements.
6. Reinstall blind flange with new gasket and replace nuts and bolts in-kind following inspection/rehabilitation.
7. Provide a confined space rescue team with appropriate equipment.
- 8.

3.3 PIPELINE REPAIRS

- A. Repair damaged and deficient areas of the pipeline identified and as directed by the Engineer during the inspection.
- B. Repairs may include but not be limited to the following:
 1. Saw cut lining or coating to a depth of approximately $\frac{1}{4}$ in. around the perimeter of the lining or coating removal area a square edge for the patch.
 2. Remove all soft, loose and dis-bonded cement mortar lining or coating within the area identified using mechanical abrading procedures per ASTM D4259.
 3. Clean exposed metal to SSPC.SP-3 in areas where the steel pipe cylinder has been exposed.
 4. Repair pipe cylinder if directed by Engineer.
 - a. Repair by welding a formed 8 Gage (0.17-in thick) ASTM A36 steel plate over exterior of pipe at damage location. Provide minimum 1 in overlap of patch plate with undamaged pipe cylinder. Utilize continuous fillet welds, ground smooth.
 5. Provide access assistance to the Engineer for inspecting the pump can repair prior to placement of the cement mortar lining.
 6. Repair the cement mortar pipe lining and/or coating in areas where coating were removed:
 - a. If area to be patched is larger than 2 sq. ft. tack welded wire mesh to metal pipe can before applying bonding agent and grout.

INSPECTION ASSISTANCE AND REPAIR OF 48- in. PUMP DISCHARGE PIPELINE

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- b. Coat area to be patched, both steel and cement mortar, with bonding agent.
 - c. Place cement mortar in areas to be patched to match thickness of existing lining and/or coating.
 - d. Trowel finish mortar patch to match contour of existing lining and/or coating.
 - e. Mix, apply and cure all products in conformance with manufacturer's written instructions.
7. Provide access assistance for the Engineer to inspect the mortar repairs. Correct all deficiencies identified by Engineer.
 8. Remove and dispose of all debris from pipe interior following repair operations.
 9. Install blind flange blind flange on pump manifold following acceptance.

END OF SECTION

INSPECTION ASSISTANCE AND REPAIR OF 48- in. PUMP DISCHARGE PIPELINE

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MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

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SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A
FINAL PROGRAM ENVIRONMENTAL IMPACT REPORT

This document can be obtained at the following web link under the Pure Water San Diego North City Project Final Environmental Impact Report section:

<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.)

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 2 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

- 3.2 **Temporary Water Use:** Water provided to the customer for no longer than twelve (12) months.
- 3.3 **Backflow Preventor:** A Reduced Pressure Principal Assembly connected to the outlet side of a Fire Hydrant Meter.

4. **POLICY**

- 4.1 The Water Department shall collect a deposit from every customer requiring a fire hydrant meter and appurtenances prior to providing the meter and appurtenances (see Section 7.1 regarding the Fees and Deposit Schedule). The deposit is refundable upon the termination of use and return of equipment and appurtenances in good working condition.
- 4.2 Fire hydrant meters will have a 2 ½" swivel connection between the meter and fire hydrant. The meter shall not be connected to the 4" port on the hydrant. All Fire Hydrant Meters issued shall have a Reduced Pressure Principle Assembly (RP) as part of the installation. Spanner wrenches are the only tool allowed to turn on water at the fire hydrant.
- 4.3 The use of private hydrant meters on City hydrants is prohibited, with exceptions as noted below. All private fire hydrant meters are to be phased out of the City of San Diego. All customers who wish to continue to use their own fire hydrant meters must adhere to the following conditions:
 - a. Meters shall meet all City specifications and American Water Works Association (AWWA) standards.
 - b. Customers currently using private fire hydrant meters in the City of San Diego water system will be allowed to continue using the meter under the following conditions:
 - 1. The customer must submit a current certificate of accuracy and calibration results for private meters and private backflows annually to the City of San Diego, Water Department, Meter Shop.

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SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 3 OF 10	EFFECTIVE DATE October 15, 2002
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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)"

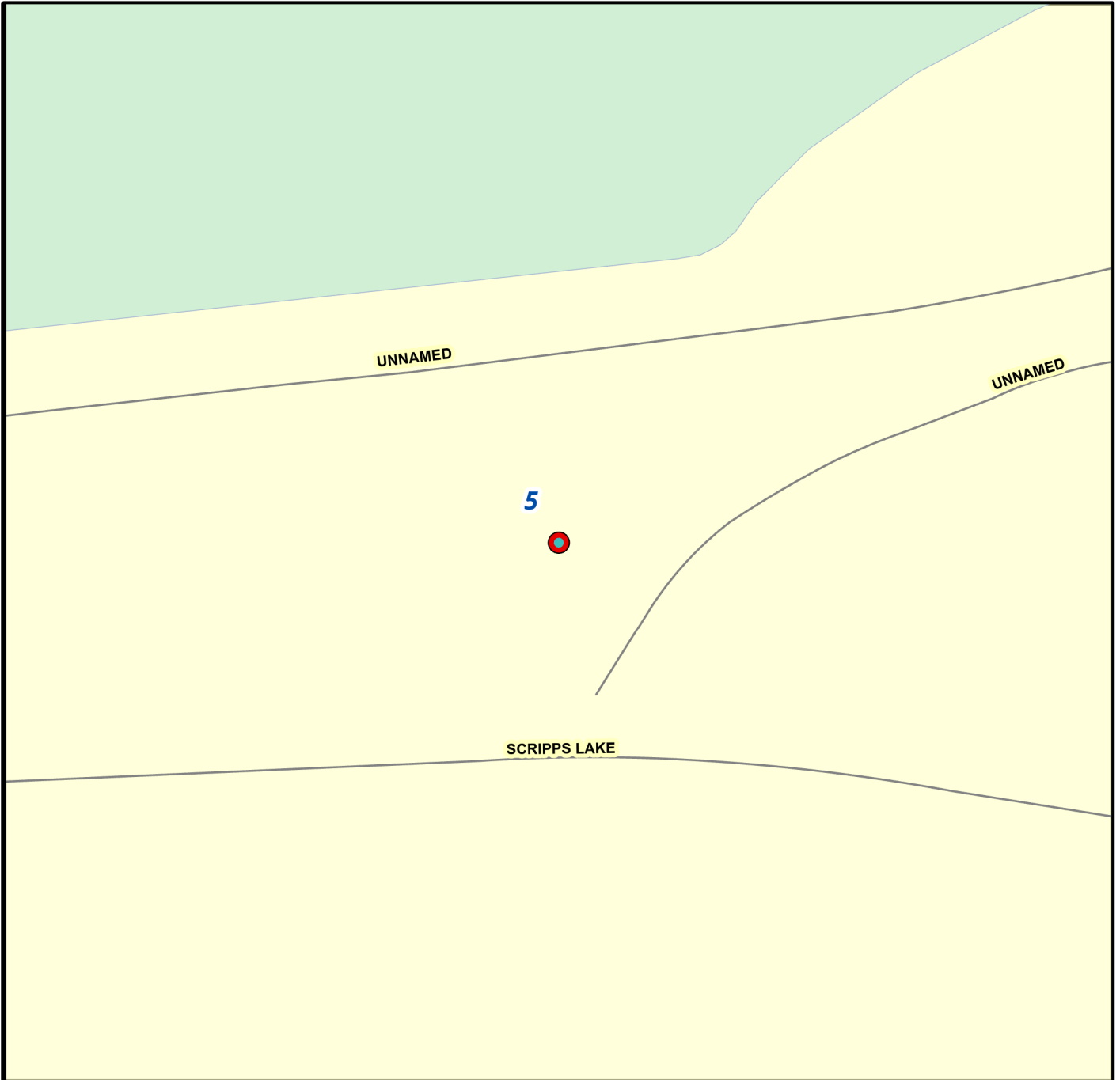
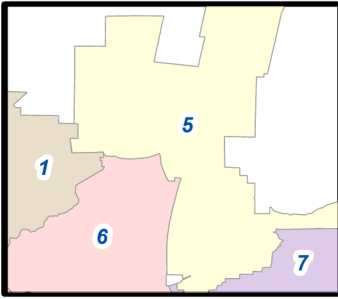
Year	January	February	March	April	May	June	July	August	September	October	November	December
2018				15,000	25,000	52,000	52,000	100,000	10,000	100,000	100,000	100,000
2019	10,000	10,000	85,000	58,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000	1,000,000
2020	100,000	100,000	100,000	1,000,000	1,000,000							
2021												
2022												
2023												
2024												
2025												

SAMPLE REFERENCE

APPENDIX E
LOCATION MAP

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SENIOR ENGINEER ALICE ALTES 619-527-7473	PROJECT MANAGER FABIOLA AMARILLAS 619-533-5437	PROJECT ENGINEER MARIA VENTURA 858-614-4557	FOR QUESTIONS ABOUT THIS PROJECT Call: (619) 533-4207 Email: engineering@sandiego.gov
------------------------------------------------	------------------------------------------------------	---------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------



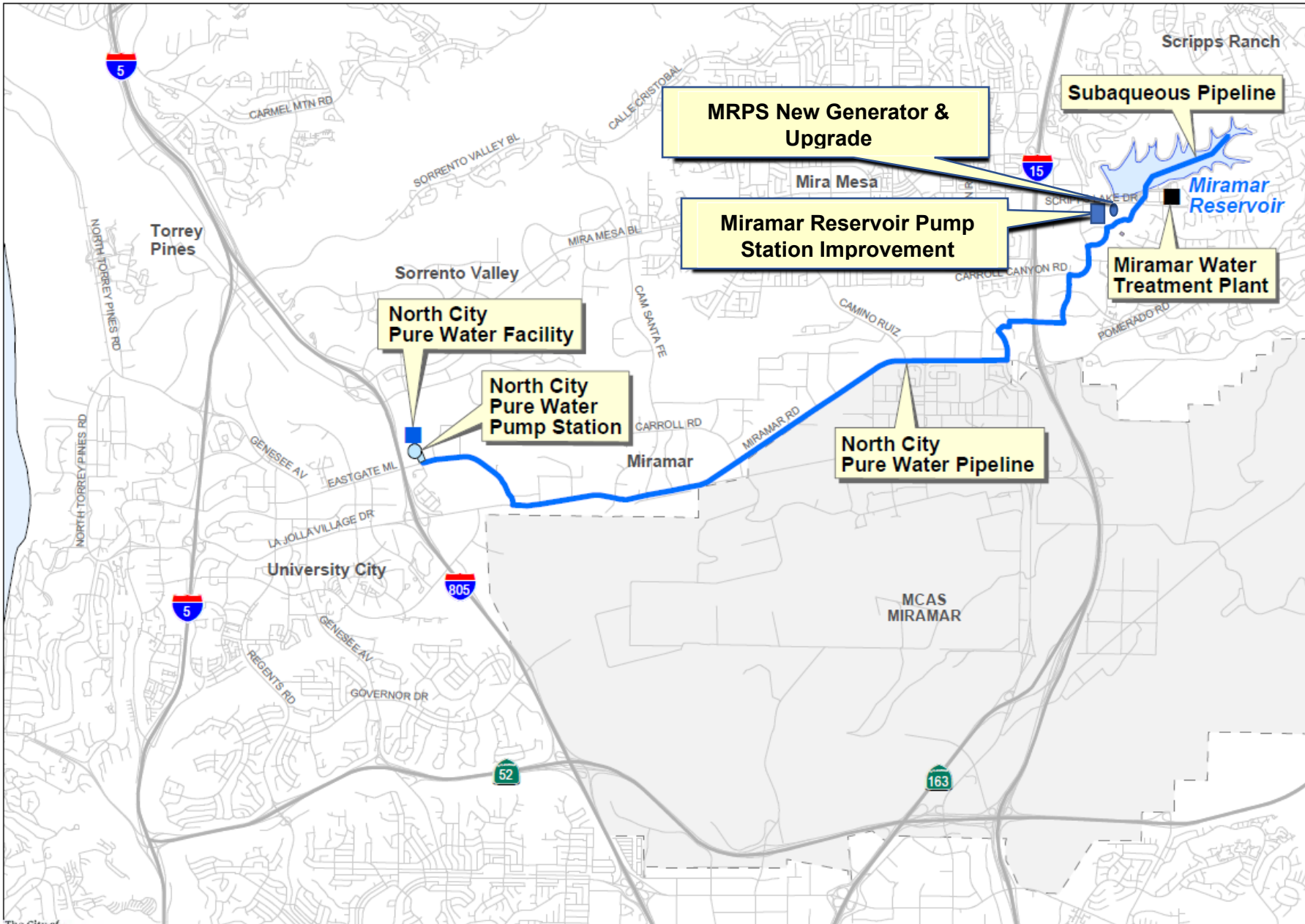
Legend

- B17190 Miramar Reservoir Pump Station Improvement
- B19099 Miramar Reservoir PS Generator & Upgrade



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APPENDIX F
ADJACENT PROJECTS MAP



**MIRAMAR RESERVOIR PUMP STATION IMPROVEMENT /MRPS
NEW GENERATOR & UPGRADE**



APPENDIX G
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) _____

UNNA 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)		
F	<input type="checkbox"/> ACUTE OR IMMEDIATE (explain) _____		
F	<input type="checkbox"/> CHRONIC OR DELAYED (explain) _____		
F	<input type="checkbox"/> NOTKNOWN (explain) _____		
G	ADVICE REGARDING MEDICAL ATTENTION NECESSARY FOR EXPOSED INDIVIDUALS		
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.		
I	REPORTING FACILITY REPRESENTATIVE (print or type) _____		
I	SIGNATURE OF REPORTING FACILITY REPRESENTATIVE _____ DATE: _____		

EMERGENCY RELEASE FOLLOW-UP NOTICE REPORTING FORM INSTRUCTIONS

GENERAL INFORMATION:

Chapter 6.95 of Division 20 of the California Health and Safety Code requires that written emergency release follow-up notices prepared pursuant to 42 U.S.C. § 11004, be submitted using this reporting form. Non-permitted releases of reportable quantities of Extremely Hazardous Substances (listed in 40 CFR 355, appendix A) or of chemicals that require release reporting under section 103(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [42 U.S.C. § 9603(a)] must be reported on the form, as soon as practicable, but no later than 30 days, following a release. The written follow-up report is required in addition to the verbal notification.

BASIC INSTRUCTIONS:

- The form, when filled out, reports follow-up information required by 42 U.S.C § 11004. Ensure that all information requested by the form is provided as completely as possible.
- If the incident involves reportable releases of more than one chemical, prepare one report form for each chemical released.
- If the incident involves a series of separate releases of chemical(s) at different times, the releases should be reported on separate reporting forms.

SPECIFIC INSTRUCTIONS:

Block A: Enter the name of the business and the name and phone number of a contact person who can provide detailed facility information concerning the release.

Block B: Enter the date of the incident and the time that verbal notification was made to OES. The OES control number is provided to the caller by OES at the time verbal notification is made. Enter this control number in the space provided.

Block C: Provide information pertaining to the location where the release occurred. Include the street address, the city or community, the county and the zip code.

Block D: Provide information concerning the specific chemical that was released. Include the chemical or trade name and the Chemical Abstract Service (CAS) number. Check all categories that apply. Provide best available information on quantity, time and duration of the release.

Block E: Indicate all actions taken to respond to and contain the release as specified in 42 U.S.C. § 11004(c).

Block F: Check the categories that apply to the health effects that occurred or could result from the release. Provide an explanation or description of the effects in the space provided. Use Block H for additional comments/information if necessary to meet requirements specified in 42 U.S.C. § 11004(c).

Block G: Include information on the type of medical attention required for exposure to the chemical released. Indicate when and how this information was made available to individuals exposed and to medical personnel, if appropriate for the incident, as specified in 42 U.S.C. § 11004(c).

Block H: List any additional pertinent information.

Block I: Print or type the name of the facility representative submitting the report. Include the official signature and the date that the form was prepared.

MAIL THE COMPLETED REPORT TO:

**State Emergency Response Commission (SERC)
Attn: Section 304 Reports
Hazardous Materials Unit
3650 Schriever Avenue
Mather, CA 95655**

NOTE: Authority cited: Sections 25503, 25503.1 and 25507.1, Health and Safety Code. Reference: Sections 25503(b)(4), 25503.1, 25507.1, 25518 and 25520, Health and Safety Code.

APPENDIX H
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 I
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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• 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

To contact the City of San Diego: SD Public Works 619-533-4207 | engineering@sandiego.gov | sandiego.gov/CIP

This information is available in alternative formats upon request.

To contact the City of San Diego: SD Public Works 619-533-4207 | engineering@sandiego.gov | sandiego.gov/CIP

This information is available in alternative formats upon request.

APPENDIX J

LCP TRACKER THIRD PARTY USER AGREEMENT



Third Party User Agreement

LCPtracker, Inc., a California corporation with a place of business located at 117 East Chapman, Orange, California 92866 ("LCPtracker"), and Parsons-Black & Veatch Joint Venture, a joint venture governed by the laws of the state of California ("Parsons B&V JV") are willing to provide you, [NAME OF CONTRACTOR/CONSULTANT] _____ with a place of business located at [ADDRESS OF CONTRACTOR/CONSULTANT] _____ ("Third Party User") with a limited license (subject to the terms of this Agreement) to the Licensed Software Services (as defined below), pursuant to the Master Subscription Software as a Service License Agreement between Parsons B&V JV and LCPtracker dated March 5, 2021 (the "Master Agreement"), but only on the condition that Third Party User accepts and complies with all the terms in this Third Party User Agreement (this "Agreement") which is entered into as of [insert date of signature by Contractor/Consultant] _____, 2021 (the "Effective Date") and governs the license and use of Licensed Software Services (defined below). LCPtracker and Third Party User therefore agree as follows:

1. DEFINITIONS.

"Affiliate" means any entity which directly or indirectly controls, is controlled by, or is under common control with the subject entity. "Control," for purposes of this definition, means direct or indirect ownership or control of more than fifty percent (50%) of the voting interests of the subject entity.

"Applicable Law" means all federal, state, local and other laws, rules and regulations, ordinances, interpretive letters and other official releases of or by any governmental authority, decrees, orders and codes as the same are promulgated, supplemented and or amended from time to time and as are, or may be, applicable to a Party's performance of its obligations under the Agreement, including any applicable law relating to the privacy or processing, protection, collection, use, disclosure or distributions of personally identifiable information or personally identifiable healthcare information about an individual as more particularly described in any such applicable law. "Applicable Law" includes, without limitation, the California Privacy Rights Act.

"Third Party Data" means all Third Party User's or its Users' electronic data or information entered into any Licensed Software Services.

"Documentation" means the online user guides, training material and other documentation for the applicable Licensed Software Services, accessible via login and updated from time to time.

"Licensed Software Services" means any LCPtracker software as a service products and related services that are provided to Third Party User (and listed at Exhibit 1) by LCPtracker or Parsons B&V JV online, including associated offline components, as described in the Documentation. "Licensed Software Services" excludes non-LCPtracker applications and Licensed Software Services are only to be used for the certain Pure Water Program projects detailed in Exhibit 1 (the "Pure Water Projects").

"Malicious Code" means viruses, worms, time bombs, Trojan horses and other harmful or malicious code, files, scripts, agents or programs.

“Subscription Term” means the applicable license term detailed at Exhibit 1.

"Users" means persons or entities who are authorized by Third Party User to use the Licensed Software Services for the Pure Water Projects pursuant to a Licensed Software Schedule, and who have been entered as a user in the Licensed Software Services by Third Party User, Parsons B&V JV, or LCPtracker, and is listed as a subcontractor to Third Party User in the Licensed Software Services. Users include Third Party User (or User) employees, consultants, contractors and agents. Use of the Licensed Software Services is solely for the benefit of Third Party User and its Users for the Pure Water Projects, and Third Party User remains liable for any breach by itself or any of its Users of the terms of this Agreement (which Users are governed in their use of the Licensed Software Services in the same way as Third Party is governed hereunder). For the avoidance of doubt, any persons or entities who are authorized by Third Party User to use the Licensed Software Services are Users. Third Party User must ensure that Users not share their user identification or passwords.

2. SUBSCRIPTION LICENSED SOFTWARE SERVICES

2.1. Provisions of Licensed Software Services. LCPtracker shall make the Licensed Software Services available to Third Party User pursuant to this Agreement during the Subscription Term specified in Exhibit 1.

2.2. Limitations. Licensed Software Services are licensed and not purchased. All rights not expressly granted herein are reserved by LCPtracker and/or its licensors and/or suppliers. Without limiting the generality of the preceding sentence, Third Party User receives no rights and will not: (i) modify , port, translate, localize or create derivative works based on the Licensed Software Services, (ii) use, copy, rent, lease, market, distribute or sublicense the Licensed Software Services except as otherwise permitted hereunder; (iii) reverse engineer, decompile, or disassemble the Licensed Software Services; (iv) disclose the results of benchmark or other performance test run on the Licensed Software Services to any third party without LCPtracker’s prior written consent (which results are LCPtracker Confidential Information). This Agreement grants no additional express or implied license, right or interest in any copyright, patent, trade secret, trademark, invention or other intellectual property right of LCPtracker. Third Party User will not remove, or allow to be removed, any LCPtracker copyright, trade secret or other proprietary rights notice from any LCPtracker product.

3. USE OF THE SERVICES

3.1. Third Party User Responsibilities. Third Party User may permit any number of Users (unless otherwise set forth in Exhibit 1) to use the Licensed Software Services for the purposes of uploading the appropriate data for Third Party User’s use for the specified Pure Water Projects in accordance with Exhibit 1. Each User shall access and use the Licensed Software Services (i) in accordance with the terms of this Agreement, Exhibit 1 and the Documentation, and (ii) through a unique and reasonably secure username and password. If a two-factor authentication login system is provided, it is required to be used. Third Party User shall (i) be responsible for the administration of user identifications and passwords and it’s Users’ compliance with this Agreement and shall require Users to acknowledge their understanding of and compliance with the restrictions and responsibilities related to the use of the Licensed Software Services, including, without limitation, protecting their user identification and passwords; (ii) use commercially reasonable efforts to prevent unauthorized access to or use of the Licensed Software Services, and notify LCPtracker promptly of any such unauthorized access or use, and (iii) use the Licensed Software Services only in accordance with the Documentation, Applicable Laws. Third Party User shall not (a) make the Licensed Software Services available to anyone other than Users, (b) sell,

resell, rent or lease the Licensed Software Services, (c) use the Licensed Software Services to store or transmit infringing, libelous, or otherwise unlawful or tortious material, or to store or transmit material in violation of third-party privacy rights, (d) use the Licensed Software Services to store or transmit Malicious Code, (e) interfere with or disrupt the integrity or performance of the Licensed Software Services or third-party data contained therein, or (f) attempt to gain unauthorized access to the Licensed Software Services or their related systems or networks. Third Party User is solely responsible for its and its Users' legal compliance in its use of the Licensed Software Services and LCPtracker shall have no liability for Third Party Users, or the Users' input or implementation of the Licensed Software Services.

4. [INTENTIONALLY OMITTED]

5. PROPRIETARY RIGHTS

5.1. Reservation of Rights in Licensed Software Services. Subject to the limited rights expressly granted hereunder, LCPtracker reserves all rights, title and interest in and to Licensed Software Services and its underlying software covered by this Agreement, including but not limited to all related intellectual property rights. No rights are granted to Third Party User hereunder other than as expressly set forth herein. The Licensed Software Services are licensed and not sold to Third Party User. Third Party User is granted a limited, revocable, non-transferable (except in accordance with this Agreement) and non-exclusive right to access and use the specified Licensed Software Services solely for the Third Party User's internal business purposes, subject to the terms and conditions of this Agreement, the LCPtracker documentation and Exhibit 1 for the applicable Subscription Term(s).

5.2. Restrictions. In addition to the restrictions set forth in Section 3 above, Third Party User shall not (i) permit any third party to access the Licensed Software Services except as permitted herein, (ii) create derivative works based on the Licensed Software Services, (iii) copy, frame or mirror any part or content of the Licensed Software Services, (iv) reverse engineer the Licensed Software Services, or (v) access the Licensed Software Services in order to (a) build a competitive product or service, or (b) copy any features, functions or graphics of the Licensed Software Services.

5.3. Suggestions. Any suggestions, enhancement requests, recommendations or other feedback relating to the operation of the Licensed Software Services provided by Third Party User or its Users ("**Feedback**"), during and after the Subscription Term is and remains the intellectual property of LCPtracker and LCPtracker has all rights therein to exploit and commercialize any Feedback as LCPtracker chooses without compensation or other consideration to Third Party User or its Users.

5.4. Federal Government End Use Provisions. LCPtracker provides the Licensed Software Services, including related software and technology, for ultimate federal government end use solely in accordance with the following: Government technical data and software rights related to the Licensed Software Services include only those rights customarily provided to the public as defined in this Agreement. This customary commercial license is provided in accordance with FAR 12.211 (Technical Data) and FAR 12.212 (Software) and, for Department of Defense transactions, DFAR 252.227-7015 (Technical Data - Commercial Items) and DFAR 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation). If a government agency has a need for rights not conveyed under these terms, it must negotiate with LCPtracker to determine if there are acceptable terms for transferring such rights, and a mutually acceptable

written addendum specifically conveying such rights must be included in any applicable contract or agreement.

5.5. Service Provider. Use of Third Party Data. LCPtracker, as a service provider on behalf of Third Party User, shall not access, use, process or retain Third Party Data except as necessary to perform its obligations under this Agreement and Exhibit 1 or as otherwise in strict accordance with the written instructions of Third Party User except and only to the extent that such Third Party Data is deidentified or in the aggregate and such is prevented from being re-identified and accessed or acquired by unauthorized parties. Upon termination of Licensed Software Services, LCPtracker shall comply with Third Party User's direction as set forth in Section 11.1.

"Termination." All Licensed Software Services that are provided depend on the accuracy of information submitted by Third Party User or its Users. LCPtracker is not responsible for any errors due to inaccurate information.

6. CONFIDENTIALITY

6.1. Definition of Confidential Information. As used herein, "**Confidential Information**" means all information disclosed by a party ("**Disclosing Party**") to the other party ("**Receiving Party**"), whether orally or in writing, that is designated as confidential or that reasonably should be understood to be confidential given the nature of the information and the circumstances of disclosure. Third Party User Confidential Information shall include Third Party Data; LCPtracker Confidential Information shall include all Licensed Software Services; and Confidential Information of each party shall include the terms and conditions of this Agreements, as well as business and marketing plans, technology and technical information, product plans, pricing and designs, and business processes disclosed by such party. However, Confidential Information (other than Third Party Data) shall not include any information that (i) is or becomes generally known to the public without breach of any obligation owed to the Disclosing Party, (ii) was known to the Receiving Party prior to its disclosure by the Disclosing Party without breach of any obligation owed to the Disclosing Party, (iii) is received from a third party without breach of any obligation owed to the Disclosing Party, or (iv) was independently developed by the Receiving Party without access or reference to the Disclosing Party's Confidential Information.

6.2. Protection of Confidential Information. The Receiving Party shall (i) use the same degree of care that it uses to protect the confidentiality of its own confidential information of like kind (but in no event less than reasonable care), (ii) not use any Confidential Information of the Disclosing Party for any purpose outside the scope of this Agreement, and (iii) except as otherwise authorized by the Disclosing Party in writing, limit access to Confidential Information of the Disclosing Party to those of its and its Affiliates' employees, contractors and agents who need such access for purposes consistent with this Agreement and who have signed confidentiality agreements with the Receiving Party containing protections no less stringent than those contained herein. Neither party shall disclose the terms of this Agreement to any third party other than its Affiliates that have a need to know and their legal counsel and accountants without the other party's prior written consent.

6.3. Compelled Disclosure. The Receiving Party may disclose Confidential Information of the Disclosing Party if it is compelled by law to do so, provided the Receiving Party gives the Disclosing Party prior notice of such compelled disclosure (to the extent legally permitted) and reasonable assistance, at the Disclosing Party's cost, if the Disclosing Party wishes to contest the disclosure. If the Receiving Party is compelled by law to disclose the Disclosing Party's Confidential Information

as part of a civil proceeding to which the Disclosing Party is a party, and the Disclosing Party is not contesting the disclosure, the Disclosing Party will reimburse the Receiving Party for its reasonable cost of compiling and providing secure access to such Confidential Information.

7. WARRANTIES AND DISCLAIMERS

7.1. Warranties. LCPtracker warrants that (i) LCPtracker has validly entered into this Agreement and has the legal power to do so, (ii) the Licensed Software Services shall perform materially in accordance with the Documentation, (iii) LCPtracker will not transmit Malicious Code to Third Party User, provided it is not a breach of this subpart (iii) if Third Party User or a User uploads a file containing Malicious Code into the Licensed Software Services and later downloads that file containing Malicious Code. For any breach of a warranty above, Third Party User exclusive remedy shall be as provided in Section 11.1 (Termination for Cause).

7.2. Third Party User Warranties. Third Party User represents and warrants that Third Party User has all rights and necessary authority to enter into this Agreement and the person signing this Agreement on behalf of Third Party User has the necessary authority to do so. Third Party User acknowledges that Third Party User is solely responsible for the content uploaded into the Licensed Software Services included in Third Party Data or by any User authorized by Third Party User and warrants that Third Party User shall comply with all Applicable Law with regard to its use of the Licensed Software Services and content and shall require all Users to acknowledge and agree to the use obligations and restrictions under this Agreement. The parties acknowledge and agree that during the term of this Agreement, Third Party User or other third parties on its behalf may disclose certain Third Party Data, including personally identifiable data regarding employees or other individuals, to LCPtracker for the benefit of Third Party User and Parsons B&V JV. Third Party User represents and warrants to LCPtracker that: (i) each of Third Party User and such other third parties are authorized to collect, use and disclose the Third Party Data to LCPtracker for use and storage pursuant to this Agreement; (ii) such disclosure, use or storage does not and shall not violate Applicable Law (including for the avoidance of doubt all privacy rules including the CCPA and CPRA), the rights of any third party or, if applicable, such Third Party User's agreements with or privacy notices to individuals with respect to whom the Third Party Data relates; and (iii) Third Party User shall not request LCPtracker to use, store, disclose or otherwise process Third Party Data in any manner that would not be permissible under Applicable Law or, if applicable, Third Party User's agreements with or privacy notices to individuals with respect to whom the Third Party Data relates, if done by Third Party User.

7.4. Third Party User Obligations. Third Party User shall: (i) safeguard the usernames, passwords and other security data, methods and devices furnished by Parsons B&V JV or LCPtracker to Third Party User in connection with the Service and prevent unauthorized access to or use of the Service and promptly notify LCPtracker or Parsons B&V JV if it becomes aware of any such unauthorized access or that the security of its usernames or passwords has been compromised; (ii) be responsible for Third Party User networks, equipment and system security required or appropriate in connection with the Service; and (iii) have sole responsibility for the accuracy, quality, integrity, legality, reliability and appropriateness of all Third Party Data.

7.3. Disclaimer. EXCEPT AS EXPRESSLY PROVIDED HEREIN, LCPTRACKER MAKES NO OTHER WARRANTIES OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, AND SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, TO THE MAXIMUM EXTENT

PERMITTED BY APPLICABLE LAW.

8. MUTUAL INDEMNIFICATION

8.1. Indemnification by LCPtracker. LCPtracker shall defend Third Party User against any claim, demand, suit, or proceeding made or brought against Third Party User by a third party alleging that the use of the Licensed Software Services as permitted hereunder infringes or misappropriates the intellectual property rights of a third party (a "**Claim Against Third Party User**"), and shall indemnify Third Party User for any damages, reasonable attorney fees and costs finally awarded against Third Party User as a result of, and for amounts paid by Third Party User under a court-approved settlement of a Claim Against Third Party User; provided that Third Party User (a) promptly provides LCPtracker written notice of the Claim Against Third Party User; (b) allows LCPtracker sole control of the defense and settlement of the Claim Against Third Party User (provided that LCPtracker may not settle any Claim Against Third Party User unless the settlement unconditionally releases Third Party User of all liability); and (c) provides to LCPtracker all reasonable assistance, at LCPtracker's expense. In the event of a Claim Against Third Party User, or if LCPtracker reasonably believe the Licensed Software Services may infringe or misappropriate a third party's intellectual property rights, LCPtracker may, in LCPtracker's sole discretion and at no cost to Third Party User, (i) modify the Licensed Software Services so that they are no longer infringing, without breaching LCPtracker warranties under "LCPtracker Warranties" above, (ii) obtain a license for Third Party User's continued use of the Licensed Software Services in accordance with this Agreement, or (iii) if neither of the foregoing is commercially practicable despite LCPtracker using all reasonable efforts and if Third Party User is not permitted to continue using the Licensed Software Services, then this Agreement will terminate with respect to such infringing Licensed Software Services.

8.2. Indemnification by Third Party User. Third Party User shall defend LCPtracker against any claim, demand, suit or proceeding made or brought against LCPtracker by a third party alleging that Third Party Data, or Third Party User's or its Users' use of the Licensed Software Services in a manner not permitted hereunder (i) infringes or misappropriates the intellectual property rights of a third party or (ii) violates Applicable Law (a "**Claim Against LCPtracker**"), and shall indemnify LCPtracker for any damages, attorney fees and costs finally awarded against LCPtracker as a result of, or for any amounts paid by LCPtracker under a court-approved settlement of, a Claim Against LCPtracker; provided that LCPtracker (a) promptly give Third Party User written notice of the Claim Against LCPtracker; (b) give Third Party User sole control of the defense and settlement of the Claim Against LCPtracker (provided that Third Party User may not settle any Claim Against LCPtracker unless the settlement unconditionally releases LCPtracker of all liability); and (c) provide to Third Party User all reasonable assistance, at Third Party User expense.

8.3. Exclusive Remedy. THIS SECTION 8 STATES THE INDEMNIFYING PARTY'S SOLE LIABILITY TO, AND THE INDEMNIFIED PARTY'S EXCLUSIVE REMEDY AGAINST, THE OTHER PARTY FOR ANY TYPE OF CLAIM DESCRIBED IN THIS SECTION.

9. LIMITATION OF LIABILITY

9.1. Limitation of Liability. LCPTRACKER'S LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT OR ANY SCHEDULE HEREUNDER (WHETHER IN CONTRACT OR TORT OR UNDER ANY OTHER THEORY OF LIABILITY) SHALL NOT EXCEED \$25,000.

9.2. Exclusion of Consequential and Related Damages. EXCEPT FOR (i) A BREACH OF THE LICENSE GRANT HEREUNDER BY THIRD PARTY USER, (ii) A BREACH OF THE CONFIDENTIALITY

OBLIGATIONS BY EITHER PARTY, (iii) DEATH, PERSONAL INJURY OR TANGIBLE PROPERTY DAMAGE CAUSED BY A PARTY, (iv) VIOLATION OF LAW OR (v) A PARTY'S INDEMNIFICATION OBLIGATIONS (COLLECTIVELY, THE "EXCLUSIONS"), IN NO OTHER EVENT SHALL EITHER PARTY HAVE ANY LIABILITY TO THE OTHER PARTY FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR, CONSEQUENTIAL DAMAGES HOWEVER CAUSED, WHETHER IN CONTRACT, TORT OR UNDER ANY OTHER THEORY OF LIABILITY, AND WHETHER OR NOT THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. NOTWITHSTANDING THE FOREGOING, IN NO EVENT, INCLUDING WITH REGARD TO THE EXCLUSIONS, SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR ANY LOST PROFITS OR REVENUES OR, COVER OR PUNITIVE DAMAGES HOWEVER CAUSED, WHETHER IN CONTRACT, TORT OR UNDER ANY OTHER THEORY OF LIABILITY, AND WHETHER OR NOT THE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE FOREGOING DISCLAIMERS SHALL NOT APPLY TO THE EXTENT PROHIBITED BY APPLICABLE LAW.

10. TERM

10.1. Term of Agreement. This Agreement commences on the date of this Agreement and continues until termination as provided below, or upon termination of the Master Agreement, whichever occurs first.

11. TERMINATION

11.1. Termination for Cause. LCPtracker may terminate this Agreement (i) effective immediately upon written notice to Third Party User if Parsons B&V JV directs LCPtracker to cease providing Third Party User access to the Service, and (ii) effective immediately upon written notice to Third Party User if Third Party User or one of its Users materially breaches this Agreement and such breach is incapable of cure, or with respect to a material breach capable of cure, Third Party User does not cure such breach within 30 days after receipt of written notice of such breach.

11.2. Automatic Termination and Actions Following. In addition, this Agreement shall terminate immediately and automatically upon (i) any termination or expiration of the Master Agreement or (ii) the termination or expiration of a License Product Schedule under which the license for the Licensed Software Services in Exhibit 1 is granted. Upon any termination or expiration of this Agreement, Third Party User and its Users shall no longer be permitted to use the Licensed Software Services and Third Party User shall destroy or return (as directed by LCPtracker) all Confidential Information of LCPtracker (including Documentation) related to such Exhibit 1 and an officer of Third Party User shall certify the same in writing within thirty (30) days of such termination.

11.2. Surviving Provisions. All Sections intended by their nature to survive termination, including, without limitation, Section 6 "Confidentiality", shall survive any termination or expiration of this Agreement.

12. GOVERNING LAW AND JURISDICTION

12.1. General. Each party agrees that this Agreement shall be governed by and construed under the laws of the State of California without regard to the conflicts of law provisions thereof, or any other provisions which would result in the application of a different body of law and to the exclusive jurisdiction of the applicable courts for San Diego County, California. The parties agree that the United Nations Convention on Contracts for the International Sales of Goods is expressly excluded from this Agreement.

13. GENERAL PROVISIONS

13.1. Notices. Any notice required or permitted to be delivered pursuant to this Agreement, and any permission and approval required hereunder shall be in writing and shall be deemed to have been given: (i) upon delivery, if delivered in person, (ii) upon electronic confirmation of delivery if sent by electronic mail, or (iii) three (3) business day after deposit in the United States mail, registered or certified mail, return receipt requested, postage prepaid, in each case addressed to the addressee set out in the first paragraph of this Agreement or to such other address as may be specified by either Party hereto upon notice given to the other Party in accordance with this Section.

13.2. Severability. If a provision of the Agreement or portion thereof is found to be invalid or unenforceable under Applicable Law, it shall be, to the extent practicable, conformed to meet the original intention of the parties, and shall not invalidate the remainder of such provision or the remaining provisions of the Agreement.

13.3. Export Compliance. The Licensed Software Services and other technology the LCPtracker makes available, and derivatives thereof may be subject to export laws and regulations of the United States and other jurisdictions. Third Party User shall not, and further shall not permit Users to, access or use Services in a U.S.- embargoed country or in violation of any U.S. export law or regulation.

13.4. Anti-Corruption. Third Party User acknowledges that it has not received or been offered any illegal or improper bribe, kickback, payment, gift, or thing of value from any LCPtracker employees or agents in connection with this Agreement. Reasonable gifts and entertainment provided in the ordinary course of business do not violate the above restriction. If Third Party User learns of any violation of the above restriction, Third Party User will use reasonable efforts to promptly notify LCPtracker in writing.

13.5. Relationship of the Parties. The parties are independent contractors. This Agreement does not create a partnership, franchise, joint venture, agency, fiduciary or employment relationship between the parties.

13.6. No Third-Party Beneficiaries. There are no third-party beneficiaries to this Agreement.

13.7. Waiver. No failure or delay by either party in exercising any right under this Agreement shall constitute a waiver of that right.

13.8. Attorney Fees. The prevailing party shall be entitled to all expenses, including attorneys' fees and costs, incurred in connection with any dispute hereunder including mediation, arbitration, lawsuit, appeal, bankruptcy proceedings or other actions.

13.9. Assignment. Neither party may assign any of its rights or obligations hereunder, whether by operation of law or otherwise, without the prior written consent of the other party (not to be unreasonably withheld). Notwithstanding the foregoing, either party may assign this Agreement in its entirety, without consent of the other party, to its Affiliate or in connection with a merger, acquisition, corporate reorganization, or sale of all or substantially all of its assets not involving a direct competitor of the other party, provided that the assignee agrees in writing to be bound by the terms of this Agreement. A party's sole remedy for any purported assignment by the other party in breach of this paragraph shall be, at the non-assigning party's election, termination of this Agreement upon written notice to the assigning party.

13.10. Entire Agreement. This Agreement, including all exhibits and addenda hereto, constitutes the entire agreement between the parties and supersedes all prior and contemporaneous agreements, proposals or representations, written or oral, concerning its subject matter. No modification, amendment, or waiver of any provision of this Agreement shall be effective unless in writing and either signed or accepted electronically by the party against whom the modification, amendment or waiver is to be asserted. However, to the extent of any conflict or inconsistency between the provisions in the body of this Agreement and any exhibit or addendum hereto, the terms of such exhibit or addendum. Notwithstanding any language to the contrary therein, no terms or conditions stated in a Third Party User purchase order or other order documentation shall be incorporated into or form any part of this Agreement, and all such terms or conditions shall be null and void.

13.11. Counterparts; Electronically transmitted Documents and Signatures. This Agreement may be executed in one or more counterparts; each of which shall be deemed an original and all of which together shall constitute one and the same instrument, it being understood that the Parties need not sign the same counterpart. An electronic signature or a manual signature on this Agreement which image, in either case is transmitted electronically, shall constitute an original signature for all purposes. The delivery of this Agreement, including signature pages may be transmitted or exchanged by the Parties by way of exchanging (a) signed originals, (b) facsimile transmission, (c) by any other electronic means intended to preserve the original graphic and pictorial appearance of a document, including sending in portable document format (pdf) via email, or (d) any combination of any such means, and the Parties hereby adopt as original any such documents received. Delivery of such documents by facsimile or by any other electronic means shall have the same effect as physical delivery of the paper bearing the original signature.

[SIGNATURES BEGIN ON THE FOLLOWING PAGE]

IN WITNESS WHEREOF, authorized representatives of the parties have executed this Agreement effective as of the Effective Date defined above.

LCPtracker, Inc.

THIRD PARTY USER: [Name of 3rd Party User]

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

EXHIBIT 1

Limited use license in accordance with the Agreement for the following construction projects: **Miramar Reservoir Pump Station (MRPS) Improvement Project** (the “**Pure Water Projects**”)

Name of Software	License Duration
LCPtracker Pro	From activation in the Licensed Software Services until termination by Parsons B&V JV or LCPtracker with 30 days notice to Third Party User, or the date of termination of the Master Agreement, whichever occurs first.

For the avoidance of doubt, the only Users that are permitted to use the Licensed Software Services are those working on the Pure Water Projects.

APPENDIX K

SAMPLE CERTIFICATION LETTER FOR AIS IMPLEMENTATION

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

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 Shimmick Construction Company, Inc., herein called "Contractor" for construction of **Miramar Reservoir Pump Station (MRPS) Improvement Project**; Bid No. **K-22-2058-DBB-3**; in the total amount of **TWELVE MILLION SIX HUNDRED NINETY TWO THOUSAND DOLLARS (\$12,692,000)**, which is comprised of the Base Bid, consisting of an amount not to exceed **\$4,365,788** for Phase I and **\$8,326,212** 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) Phased Funding Schedule Agreement.
 - (e) That certain documents entitled **Miramar Reservoir Pump Station (MRPS) Improvement Project**, on file in the office of the City Clerk as Document No. **B-17190, B-19099**, 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 **Miramar Reservoir Pump Station (MRPS) Improvement Project**, Bid Number **K-22-2058-DBB-3**, 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).


CONTRACT AGREEMENT (continued)

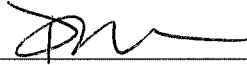
- 5. No claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.
- 6. This contract 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 Municipal Code §22.3102, authorizing such execution.

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

By 

Mara W. Elliott, City Attorney
By 

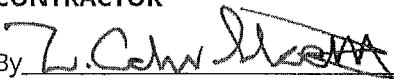
Print Name: Claudia C. Abarca
Director
Purchasing & Contracting Dept.

Print Name: Bonny Hsu
Deputy City Attorney

Date: August 23, 2022

Date: 8/24/22

CONTRACTOR

By 

Print Name: W. Andrew Sloane, III

Title: Executive Vice President

Date: 7/21/2022

City of San Diego License No.: B2016003848

State Contractor's License No.: 594575

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 100001063

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:

Purchasing & Contracting Department, Public Works Division
1200 3rd Ave., Suite 200, MS56
San Diego, California, 92101
Attention: Brittany Friedenreich

- 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.

1.5.7. 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, Purchasing & Contracting Department, Public Works 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)

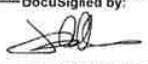
SIGNATORY UNIONS

DocuSigned by:
Michael Patterson
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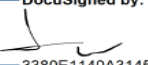
By: Allied Workers Local 5

DocuSigned by:
Chad Boggio Chad Boggio

By: Bricklayer & Allied Crafts Local 4

DocuSigned by:

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By: Electrical Workers Local 569

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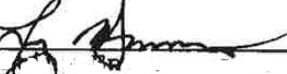
By: Glaziers, Floor Coverings & Painters Local 1399

DocuSigned by:
Valentine R. Macedo
AC5993278764412

By: Laborers Local 89

DocuSigned by:
James Preciado
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By: Plasterer Tenders Local 1414

DocuSigned by:


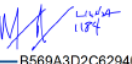
By: Operating Engineers Local 12

DocuSigned by:
Mike Hartley
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By: Plumbers & Pipefitters Local 230

DocuSigned by:
Paul Colmenero
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By: Roofers & Waterproofers Local 45

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By: Laborers Local 1184

DocuSigned by:
Ed Uam
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By: Laborers Local 345

DocuSigned by:
Ricardo Perez
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By: UA Local 345

DocuSigned by:
Stephen Ariza
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By: Southwest Regional Council of Carpenters

DocuSigned by:
Luis Miramontes
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By: Boilermakers Local 92

DocuSigned by:
Jack Alvarado
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By: Cement Masons Local 500 / Area 744

DocuSigned by:
Frank Belio, Jr. For BM Gazzaniga

By: Elevator Constructors Local 18

DocuSigned by:
David Osborne
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By: Iron Workers Local 229

DocuSigned by:
Tom Castleman
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By: Plasterers Local 200

DocuSigned by:
Ronald A. ...

By: Operating Engineers Local 12

DocuSigned by:


By: Operating Engineers Local 12

DocuSigned by:
Todd Barry
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By: Road Sprinkler Fitters Local 669

DocuSigned by:
Dave Gauthier
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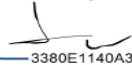
By: Sheet Metal Workers Local 206

DocuSigned by:
Douglas R Tracy
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By: Sheet Metal Workers Local 206

DocuSigned by:
Jose Estrada
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By: Teamsters Local 166

DocuSigned by:

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By: Tradeshow & Sign Craft Local 831

DocuSigned by:
Dario Ramirez
E809E779F50C47E...

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 Methylenedioxymethamphetamine (MDMA)

⁵ Methylenedioxyamphetamine (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.

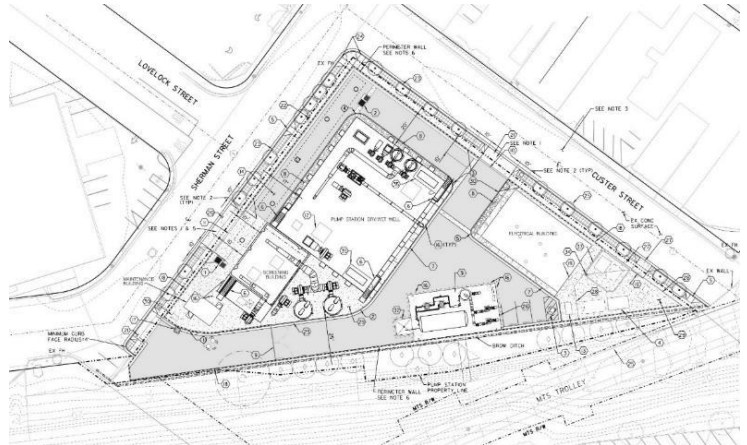
An applicant or employee who selects one of the "quick" screen tests, and who passes the test, shall be put to work immediately. An applicant or employee who fails the "quick" screen test, or who rejects the "quick" screen tests, shall be tested pursuant to the procedures set forth in the Policy. The 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

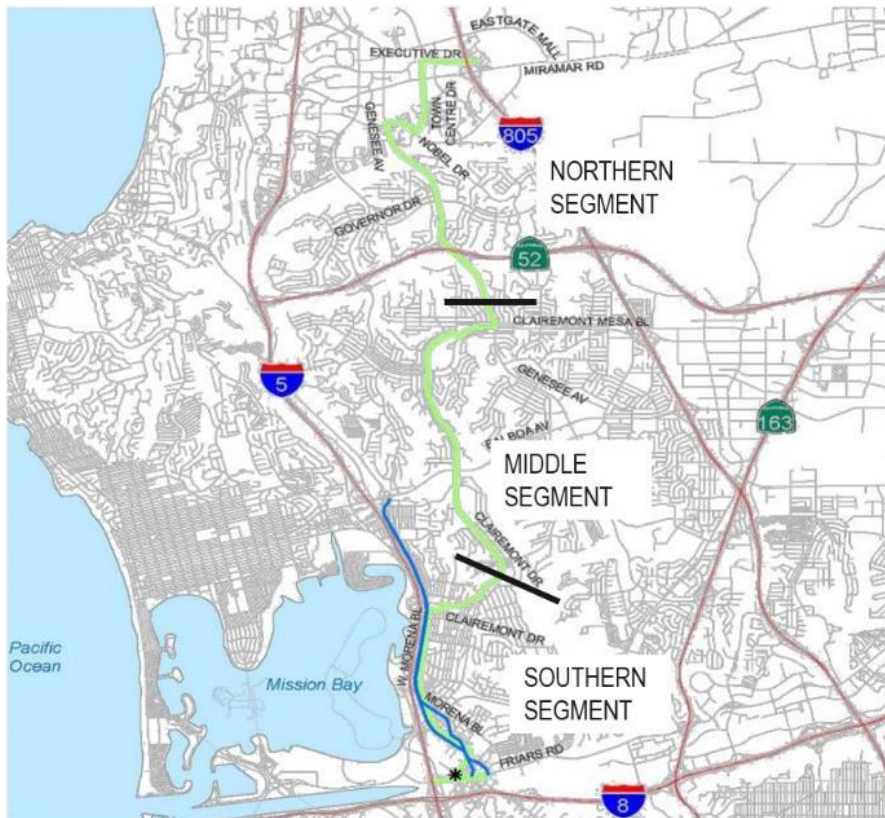
Morena Pump Station Rendering and Site Plan



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

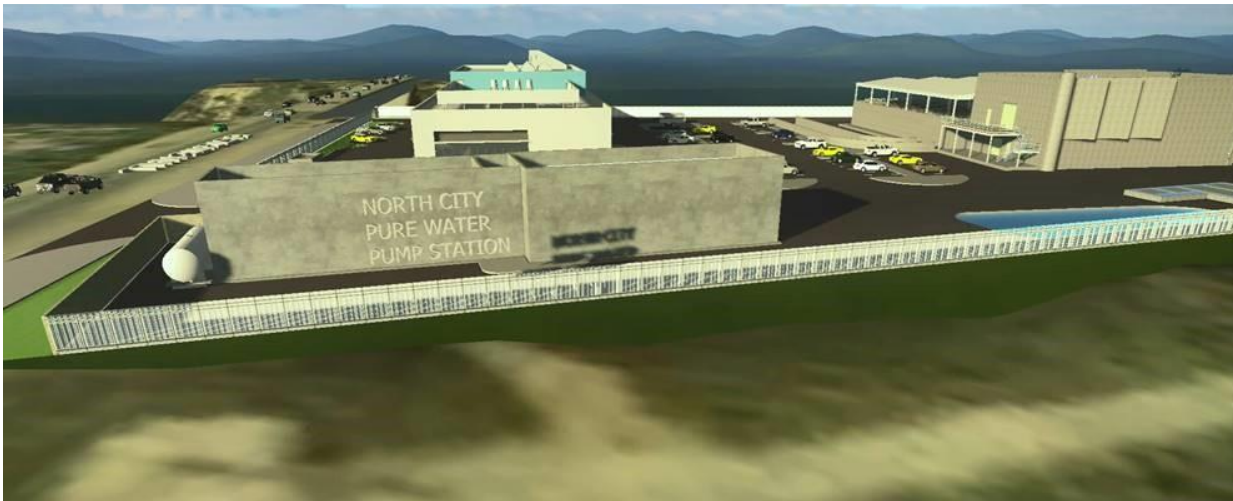
NCWRP Expansion Rendering



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 watermain 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



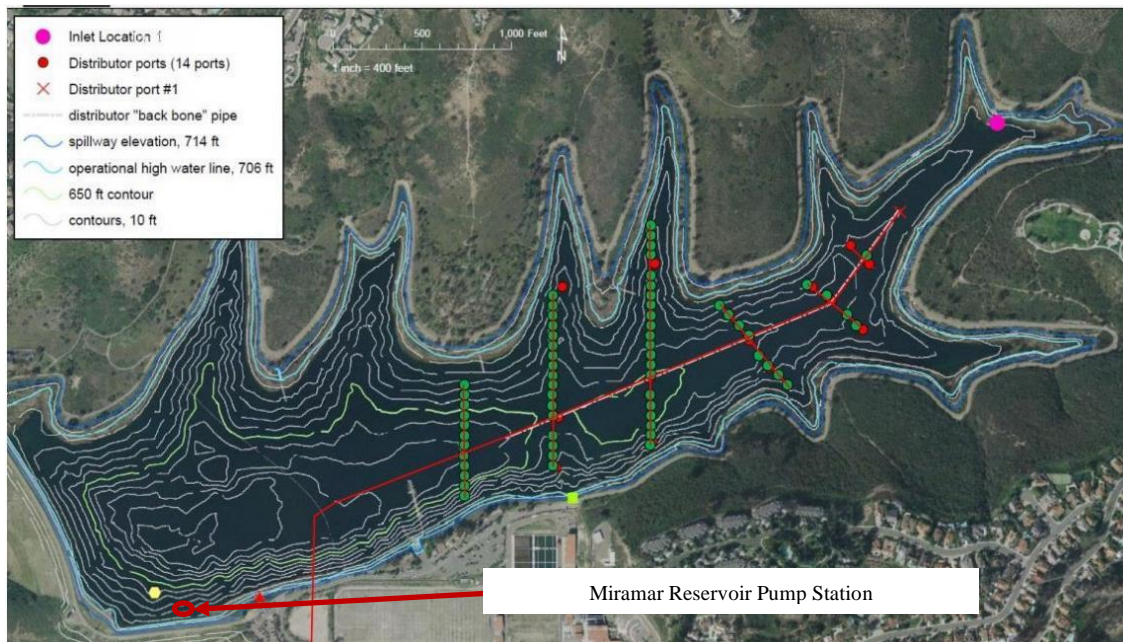
Dechlorination Facility Rendering



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

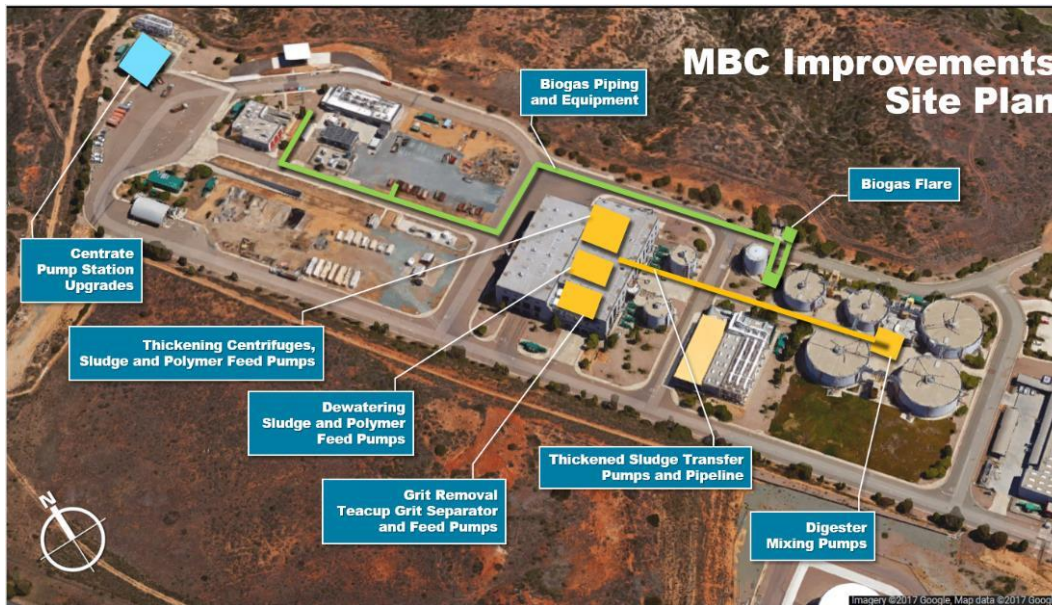
Subaqueous Pipeline Site Plan



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

COVID-19 VACCINATION ORDINANCE

CERTIFICATION OF COMPLIANCE

I hereby certify that I am familiar with the requirements of San Diego City Council Ordinance No. O-2022-53 Emergency Ordinance to Implement the City's Mandatory COVID-19 Vaccination Policy.

TERMS OF COMPLIANCE

The City's Mandatory COVID-19 Vaccination Policy, outlined in San Diego Ordinance O-21398 (Nov. 29, 2021), requires ALL City contractors, who interact in close contact with City employees while providing contracted services indoors in City facilities or while performing bargaining unit work while indoors, to be fully vaccinated against COVID-19, effective January 3, 2022, as a condition for provision or continued provision of contracted services.

1. "City contractor" means a person who has contracted with the City of San Diego to provide public works, goods, services, franchise, or consultant services for or on behalf of the City, and includes a subcontractor, vendor, franchisee, consultant, or any of their respective officers, directors, shareholders, partners, managers, employees, or other individuals associated with the contractor, subcontractor, consultant, or vendor. "Person" means any natural person, firm, joint venture, joint stock company, partnership, association, club, company, corporation business trust or organization.
2. "Fully vaccinated" means a person has received, at least 14 days prior, either the second dose in a two-dose COVID-19 vaccine series or a single-dose COVID-19 vaccine, or otherwise meets the criteria for full vaccination against COVID-19 as stated in applicable public health guidance, orders, or law. Acceptable COVID-19 vaccines must be approved by the U.S. Food and Drug Administration (FDA) or authorized for emergency use by the FDA or the World Health Organization.
3. "Close contact" means a City contractor is **within 6 feet** of a City employee for a **cumulative total of 15 minutes or more over a 24-hour period** (for example, three individual 5-minute exposures for a total of 15 minutes).
4. City contractors who interact in close contact with City employees must fully comply with the City's Mandatory COVID-19 Vaccination Policy, which may include a reporting program that tracks employee vaccination status.
5. City contractors with employees or subcontractors who interact in close contact with City employees must certify that those members of their workforce, and subcontractors regardless of tier, who work indoors at a City facility, are fully vaccinated and that the City contractor has a program to track employee compliance.
6. City contractors that have an Occupational Safety and Health Administration compliant testing program for members of their workforce, as a reasonable accommodation, may be considered for compliance.

Non-compliance with the City's Mandatory COVID-19 Vaccination Policy may result in termination of a contract for cause, pursuant to the City's General Terms and Provisions, Reference Standards, and the San Diego Municipal Code..

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.

CONTRACTOR CERTIFICATION

PRODUCT ENDORSEMENT

I declare under penalty of perjury that I acknowledge and agree to comply with the provisions of City of San Diego Administrative Regulation 95.65, concerning product endorsement. Any advertisement identifying or referring to the City as the user of a product or service requires the prior written approval of the City.

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:

MIRAMAR RESERVOIR PUMP STATION (MRPS) IMPROVEMENT PROJECT

Project Title

as particularly described in said contract and identified as Bid No.; **K-22-2058-DBB-3**; WBS **B-17190, B-19099** and **WHEREAS**, the specification of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and **WHEREAS**, said contract has been completed and all surplus materials disposed of:

NOW, THEREFORE, in consideration of the final payment by the City of San Diego to said Contractor under the terms of said contract, the undersigned Contractor, does hereby affirm that all surplus materials as described in said contract have been disposed of at the following location(s)

and that they have been disposed of according to all applicable laws and regulations.

Dated this _____ DAY OF _____, _____.

By: _____
Contractor

ATTEST:

State of _____ County of _____

On this _____ DAY OF _____, 2____, before the undersigned, a Notary Public in and for said County and State, duly commissioned and sworn, personally appeared _____ known to me to be the _____ Contractor named in the foregoing Release, and whose name is subscribed thereto, and acknowledged to me that said Contractor executed the said Release.

Notary Public in and for said County and State

LIST OF SUBCONTRACTORS

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY*** SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION**

In accordance with the requirements of the "Subletting and Subcontracting Fair Practices Act", Section 4100, of the California Public Contract Code (PCC), the Bidder is to list below the name, address and license number of each Subcontractor who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement, in an amount of or in excess of 0.5% of the Contractor's total Bid. Failure to comply with this requirement may result in the Bid being rejected as non-responsive. The Contractor is to list only one Subcontractor for each portion of the Work. The Bidder's attention is directed to the Special Provisions – General; Paragraph 2-3 Subcontracts, which stipulates the percentage of the Work to be performed with the Bidder's own forces. The Bidder is to also list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors for which the Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB®	WHERE CERTIFIED®	CHECK IF JOINT VENTURE PARTNERSHIP
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

- ① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):
- | | | | |
|-----------------------------------------------|--------|------------------------------------------------|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |
- ② As appropriate, Bidder shall indicate if Subcontractor is certified by:
- | | | | |
|------------------------------------------------------|--------|--------------------------------------------------|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

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.

City of San Diego Pure Water Project OCIP Notice of Subcontract Award

Today's Date _____

To:	From:
Email:	Email:
Phone #:	Phone #:
Fax #:	Fax #:

The subcontractor named below will be issued a contract to perform work on the following:

Project: _____

Contract Number: _____ Contract Value: \$ _____

- Check here if the subcontractor is to be enrolled in the OCIP
- Check here if the subcontractor is to be excluded from the OCIP
- Check here if the subcontractor will be an excluded prime tier fabricator with eligible (enrolled) sub-tier erector/installer

1. Name of subcontractor:	
2. Prime sub or GC name:	
3. Subcontractor FEIN:	
4. Subcontractor contact person:	
5. Subcontractor phone number:	
6. Subcontractor address:	
7. Subcontractor email address:	
8. General description of work:	
9. Date of award:	
10. Anticipated on-site start date:	
11. Anticipated completion date:	



INSURANCE COST WORKSHEET
(Fixed Price Type Contracts)
 Numbers reference attached instructions

City of San Diego Pure Water OCIP

A. Contractor Information: Federal ID # or Soc. Sec. # **1**

Business Information (headquarters) **Contact Information** (address questions to)

Company Name & dba: **2** **3**

Contact Name & Title: _____

Address: _____

City, State, Zip Code: _____

Telephone: _____

E-mail Address: _____

B. Bid Information: Bid Package No.: **1**

Description of Work: **2**

Proposed Contract Price \$: **3** Are you submitting a bid to The City of San Diego? **5** Yes No

Amount of Self Performed Work \$: **4** If No, identify to whom: **6**

C. Workers Compensation Insurance Information for Work Described Above: ^(a) (attach a separate sheet, if necessary)

a State	b Class Code	c Description	d Rate (per \$100 payroll)	e Work Hours	f Payroll	g WC Premium (Payroll*Rate/100)
1						
				Totals	2	3

Identify the Amount of Your Claim Retention **5** Your Company's Workers Compensation Experience Modifier: **6**

Modified Premium (line **C4** x **C6**): **7**

Employers Liability Rate: **8** Employers Liability Premium: **9**

10 Modification & Discount Premium Factors	11 Rate	12 Amount
Mod 1: _____ + or =	_____	_____
Mod 2: _____ + or =	_____	_____
Mod 3: _____ + or =	_____	_____
Mod 4: _____ + or =	_____	_____
Mod 5: _____ + or =	_____	_____
Total Modification Amount (Total of all amounts entered in column C12):		13
Total Workers Compensation Premium (line C7 + C9 + C13):		14

D. General Liability: ^(a) Rate: **1** Based On: **2** Rate factor: **3** Identify the Amount of Your Claim Retention: **4**

Total Payroll (**C3**) Per 100

Contract Price (**B3**) Per 1,000

Other: _____ GL Premium (**D2** x **D1** ÷ **D3**): **5**

Excess/Umb. Liab.: ^(a) Rate: **6** Based On: **7** Rate factor: **8** Excess/Umbrella Premium **9**

Total Payroll (**C3**) Per 100

Contract Price (**B3**) Per 1,000

Other: _____ (**D7** x **D6** ÷ **D8**): **9**

E. Builder's Risk/ Installation Floater: ^(a) Rate: **1** Rate Factor **2** Builder's Risk/Installation Floater Premium (**B3** x **E1** ÷ **E2**): **3**

Per 100

Per 1,000

F. Other Insurance Premiums: ^(a) (Enter total premium costs identified on page 2) **1**

G. Totals Total of all Insurance Premiums (Total of lines **C14**+**D5**+**D9**+**E3**+**F1**): **1**

Overhead & Profit on Insurance Premium %: **2** **15%** O/H & Profit Amount (**G1** x **G2**): **3**

Total Initial Insurance Cost (Total of lines **G1** + **G3**): **4**

Contractor's Initial Insurance Cost Rate (Line **G4** divided by total payroll in line **C3** x **100**): **5**

H. Signature Block: I verify the information presented above and attachments are correct:

Name: _____ Date: _____

Title: _____ (please print) Signature: _____

Completion of this form is a required part of your bid and must accompany your bid documents. Complete a separate form for each contractor, known subcontractor(s) and trades not currently awarded to a subcontractor. Duplicate this form as needed.

(a) Please provide copies of the following documents to support your insurance cost calculations:



**INSURANCE COST WORKSHEET
(Fixed Price Type Contracts)**
Numbers reference attached instructions

City of San Diego Pure Water OCIP

Complete a separate form for each contractor, known subcontractor and trade not currently awarded to a subcontractor. Duplicate this form as needed. Completion of this form is a required part of your bid and must accompany your bid documents.

A. Contractor Information

1. Enter your company's Federal ID number. This number can be found on filings made to the federal government such as your tax return.
2. Enter your company's name, mailing address and phone/fax number for your company's main office location in the space provided below.
3. Enter the name of the person AON should contact if questions arise. Include the mailing address, phone/fax and e-mail address if different than A-2.

B. Bid Information

1. Enter the Bid Package Number, Contract Number or Purchase Order Number that was included in The City of San Diego originating documentation.
2. Provide a brief description of the work you will be performing at the project site.
3. Identify the total amount of your bid. Include both labor and material.
4. Identify the amount of work that you anticipate will be self-performed. Include both labor and material.
5. Check the appropriate box that identifies if you contract directly with The City of San Diego or are a subcontractor.
6. If you are a subcontractor identify the entity with whom you are under contract.

C. Workers Compensation Insurance Information

- 1
 - a. Enter the two letter abbreviation for the state in which the work will be performed.
 - b. Enter each Workers Compensation class code that applies to your work identified in B2. (Most states use a 4 digit Number).
 - c. Enter the Workers Compensation class code description that applies to each class code identified in C1b.
 - d. Enter the Workers Compensation rate that applies to the specified class code.
 - e. Enter the estimated Work Hours required to complete the described work for each Workers Compensation class code.
 - f. Enter the estimated Payroll required to complete your work. Use only unburdened payroll and exclude the premium portion of any overtime pay.
 - g. Calculate the WC Premium by multiplying the Payroll (C1f) by the Rate (C1d) and dividing the result by 100. Repeat this calculation for each WC class code.
2. Total the estimated Work Hours for each class code. Be sure to include information from additional pages if used.
3. Total the estimated Payroll for each class code. Be sure to include information from additional pages if used.
4. Total the Workers Compensation Premium for each class code. Be sure to include information from additional pages if used.
5. Enter the amount of the Claim Retention/ Deductible your company has on their existing Worker's Compensation.
6. Enter you WC experience Modifier. This information can be located on your Workers Compensation policy or on your NCCI Bureau Rating Sheet.
7. Calculate the Modified Premium by multiplying the WC Premium (C4) by the Experience Modifier (C6).
8. Enter your Employer's Liability Insurance Rate. This information can be found in your Workers Compensation Policy.
9. Calculate your Employer's Liability Premium by multiplying the Modified Premium (C7) by the Employer's Liab. Rate (C8).
10. Identify the Modifiers that apply to your Workers Compensation Premium. This information can be located on your Workers Compensation Policy.
11. Enter the rate for each identified Modifier. The information can be located on your Workers Compensation Policy.
12. Calculate the Modified Premium Factor Amount by multiplying the Modified Premium (C7) by the Modified Premium Rate (C11) and dividing by 100. Be sure to identify if the Modification factor is an addition or reduction to your premium.
13. Total the Modified Premium Amounts by adding the numbers in column C12.
14. Calculate the Total Workers Compensation Premium by adding the Modified Premium (C7) to the Employer's Liab Premium (C9) and adding the Premium Modifications (C12).

D. General Liability & Umbrella/Excess Liability Insurance

1. Enter the general liability Rate. This number can be found on your General Liability Policy.
2. Identify the base the General Liability Rate applies to. If the base is other than Payroll or Revenue, enter the amount and the description in the space provided.
3. Identify the General Liability Rate factor by marking the box.
4. Identify the amount of your Claim Retention.
5. Calculate the General Liability Premium by multiplying the Bases (D2) by the Rate and dividing by the factor (D3).
6. Enter the Excess/Umbr Liability Rate. This number can be found on your Excess/Umbr Liability Policy.
7. Identify the base the Excess/Umbr Liab. Rate applies to. If the base is other than Payroll or Revenue, enter the amount and description in the space provided.
8. Identify the Excess/Umbr Liability Rate factor by marking the box.
9. Calculate the Excess/Umbr Liability Premium by multiplying the Bases (D7) by the Rate (D6) and dividing by the factor (100 or 1,000).

E. Builder's Risk / Installation Floater

1. Enter the Builder's Risk / Installation Floater Rate. Locate this information on your Property Policy or Builder's Risk Policy.
2. Identify the base factor that it applies to (100 or 1,000).
3. Calculate the Premium by multiplying the Proposed Contract Price (B3) by the Rate (E1) and dividing it by the Factor (E2).

F. Other Insurance Premiums

1. For each of the Insurance Lines of Coverage identified below, identify the Rate, Base and Factor. Calculate the Premium by multiplying the Base x Rate ÷ Factor. Total the Other Insurance Premiums in the space provided and carry that amount to the front page.

Line of Coverage	Rate	Base	Factor	Premium	Total Premium
------------------	------	------	--------	---------	---------------

G. Totals

1. Calculate the Total of all Insurance Premium by adding Workers Compensation (C14), General Liability (D5), Excess/Umbr Liability (D9), Builder's Risk/Installation Floater (E3), and Other Insurance Premiums (F1).
2. Identify the Overhead & Profit Percentage that was applied to this project during the tabulation of the Proposed Contract Price.
3. Calculate the Overhead & Profit Amount by Multiplying the Total of all Insurance Costs (G1) by your Overhead & Profit Percentage (G2).
4. Calculate the Total Initial Insurance Cost by adding the Overhead & Profit Amount (G3) with the Total of all Insurance Premium (G1).
5. Calculate your rate by Dividing the Total Initial Insurance Cost (G4) by the Estimated Payroll (C3) and multiplying by 100.

H. Signature Block

Note: Please provide copies of the following documents as part of your submittal:

- | | |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Rate Pages | <input type="checkbox"/> General Liability declaration and rate pages |
| <input type="checkbox"/> Workers Compensation declaration and rate pages | <input type="checkbox"/> Umbrella / Excess Liability declaration and rate pages |
| | <input type="checkbox"/> 5 years actual loss experience for each line of coverage in which Contractor retains more than \$5,000 |

This form is to be used by a Prime Contractor to summarize subcontract activity. This form may also be used by Subcontracts that must summarize subcontract activity of any tier. Submit this form with your Bid Documents.

A. Contractor Information		Federal ID # or Soc. Sec. #	<u>1</u>
		2 Business Information (headquarters)	3 Contract Information (address questions to...)
Company Name & dba: Contract Name & Title:			
Address:			
City, State, Zip Code:			
Telephone:			
Fax:			
Email Address:			
Indicate your Organization's Structure:		<u>4</u>	<input type="checkbox"/> Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> S-Corporation <input type="checkbox"/> Joint Venture <input type="checkbox"/> Sole Proprietor <input type="checkbox"/> Other

B. Contract Information:	Contract No.:	<u>1</u>
Date Contract Awarded:	<u>2</u>	
Description of Work:	<u>3</u>	
Proposed Contract Price:	<u>4</u>	Are you Submitting a bid to The City of San Diego? <u>6</u> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		If No, identify to whom: <u>7</u>
Amount of Self Performed Work \$:	<u>5</u>	<input type="checkbox"/> Actual <input type="checkbox"/> Actual <input type="checkbox"/> Estimated <u>9</u> <input type="checkbox"/> Estimated
<u>8</u>	Start Date:	Completion Date:

C. Contacts: (Complete if Applicable)				
Position	1 Name & Title	2 Phone	3 Fax	4 Email Address
Project Manager:				
Resident Engineer:				
Insurance:				
Contract Administrator:				
Payroll:				
Claims:				
Safety Representative:				
Provide Location of payroll records if different than Corporate address:	<u>5</u>	Phone:		
	City, State, Zip Code:	Fax:		

D. Workers Compensation Insurance Information for Work Described Above: (attach a separate sheet, if necessary)				
a State	b Class Code	c Description	d Work Hours	e Payroll
<u>1</u>				
Totals:			<u>2</u>	<u>3</u>

E. Provide your current Off-Site Workers Compensation Information: (for each state you will perform work in)				
1 Applicable State	2 Risk ID Number	3 Rating Bureau	4 Anniversary Rating Date	
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	

Your WC Insurance Carrier	<u>5</u>	Policy #	<u>6</u>	Effective Date	<u>7</u>	Expiration Date	<u>8</u>
1 Subcontractor	2 Subcontract \$	3 Contact Person	4 Address	5 Phone & Fax No.	6 Estimated Start Date		

F. Signature Block: This form must be signed by a representative of your company knowledgeable of its accuracy.	
Name: _____	Date: <u> </u> / <u> </u> / <u> </u>
(please print)	
Title: _____	Signature: _____

This form must be completed and submitted by each successful Contractor and Subcontractor of any tier prior to Site mobilization for each contract awarded. The Contractor and Subcontractor will submit the completed form to Aon Risk Services. Upon receipt of this form, Aon will issue to the Contractor or Subcontractor a Certificate of Insurance evidencing coverage in the Controlled Insurance Program. The completed Certificate of Insurance and Workers Compensation insurance policy will be mailed to the Enrolled party.

A. Contractor Information

- 1 Enter your company's Federal ID number. This number can be found on filings made to the federal government such as your tax return.
- 2 Enter your company's name, mailing address and phone/fax number for your company's primary office location.
- 3 Enter the name of the person Aon should contact if questions arise. Include mailing address, phone/fax and email address, if different than A2.
- 4 Identify your company's legal structure by checking the box that applies. If the correct legal structure is not specifically listed, please check the "Other" box and specify in the space provided.

B. Contract Information

- 1 Enter the Contract Number or Purchase Order Number that was included in The City of San Diego's originating documentation.
- 2 Supply the Date this Contract was awarded to your organization.
- 3 Provide a brief description of the work you will be performing at the project site.
- 4 Identify the total amount of your contract. Include both labor and material.
- 5 Identify the amount of work that you anticipate will be self-performed. Include both labor and material.
- 6 Check the appropriate box that identifies if you contract directly with The City of San Diego or are a Subcontractor.
- 7 If you are a Subcontractor, identify the entity with whom you are under contract.
- 8 Enter the Date you anticipate starting work and then mark whether the date provided is actual or estimated.
- 9 Enter the Date you anticipate completing the described work and then mark whether the date provided is actual or estimated.

C. Contacts *(Requested Contact information is for specific functions. It is possible to have a single person fulfill multiple responsibilities.)*

- 1 Identify the name of the person and their title for each function. These individuals should be located, if at all possible, on-site.
- 2 Provide the phone number for each person identified above.
- 3 Provide the fax number for each person identified above.
- 4 Provide the email address for each person identified above, if applicable.
- 5 Identify the physical location where your payroll records are retained. Provide the Address, City, State, Zip Code, Telephone, Fax Number and Email Address of the person responsible for maintaining the payroll information.

D. Workers Compensation Information (Duplicate or attach additional sheets if necessary. You may create an electronic version of this document if all requested information is included.):

- 1
 - a Enter the two letter abbreviation for the state in which the work will be performed.
 - b Enter each Workers Compensation class code that applies to the work identified in B2. (Most states use a 4 digit Number)
 - c Enter the Workers Compensation class code description that applies to the work identified in D1b.
 - d Enter the estimated Work Hours required to complete the described work by Workers Compensation class code.
 - e Enter the estimated Payroll required to complete the described work for each Workers Compensation class code. Use only unburdened payroll and exclude the premium portions of any overtime pay.
- 2 Total all estimated Work Hours for each class code. Be sure to include information from additional pages if used.
- 3 Total all estimated Payroll for each class code. Be sure to include information from additional pages if used.

E. Current Off-Site Workers Compensation Information (Information relates to your corporation's existing coverage; identify each modification factor that applies.)

- 1 Enter the State that the Modification Information applies to.
- 2 Enter your Bureau File Number also referred to as your Risk Identification Number. This number can also be found on your Modification worksheets.
- 3 Enter the Bureau Rating Agency. In most states this is NCCI.
- 4 Provide your Company's Anniversary Rating Date. Information can be located on your bureau's WC Experience Modification worksheets.
- 5 Identify your insurance carrier for Workers Compensation Coverage.
- 6 Provide your Workers Compensation Policy Number.
- 7 Provide the effective date of your Workers Compensation policy.
- 8 Provide the expiration date of your Workers Compensation policy.

F. Subcontractor Information (Provide the following information for each Subcontractor that will be performing work at the project site. Use additional sheets, if necessary.)

- 1 Identify the name of the Subcontracting firm.
- 2 Provide the estimated value of the subcontracted activity.
- 3 Provide a contact name, preferably the project manager, for the Subcontractor.
- 4 Provide the mailing address for the Subcontractor.
- 5 Provide the phone number for the Subcontractor.
- 6 Provide the date the Subcontractor is scheduled to begin work.

G. Enrollment Questions

- 1 Determine if you will have any locations, off-site, that will be 100% dedicated to this project. Include material/supply storage as a possible location. Mark the appropriate box (yes/no). If you answer yes – provide the address of each location you identified as 100% dedicated.
- 2 Mark the box or boxes that apply. Contemplate only work performed under this contract.
- 3 Mark the box or boxes that apply. Employee Leasing Firm are those firms that supply the labor force for your company (You direct the activities of the Leasing Company's employees). Temporary Labor Firms supplement your labor force.

H. Warranty Statements:

1-6 Read each Warranty statement thoroughly. If you have questions regarding any of these statements, contact the Aon administrator identified on page 2.

I. Signature Block: This form must be signed by a representative of your company knowledgeable of its accuracy.

Forward the completed Enrollment Application to the Aon administrator identified at the bottom of page 2 of this form. The administrator prior to the start of your work on-site must receive this form.

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 work in an apprenticeable occupation utilized on the project known as _____ (the "Project") during the monthly reporting period are either skilled journeypersons or apprentices 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 occupation.

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 LCPTTracker monthly.

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 10th of the following month for work performed corresponding to this reporting period. Items with a red asterisk (*) indicate a required field.

*Project Title:	
*Project Number:	
*Prime Contractor:	
*Subcontractor:	
*Contact Name:	
*Contact Number:	
	Month
	Year
*Work Month & Year:	

*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 the reporting period?		Exempt if (1) is "True"
	(2)(A) The subcontractor was not a listed subcontractor under Section 4104 or a substitute for a listed contractor.		Exempt if both (2)(A) and (2)(B) are "True"
	(2)(B) The subcontractor does not exceed one-half of 1 percent of the price of the prime contract.		

***Report:** Please fill out the following report for all apprenticeable occupations utilized in this reporting period.

SKILLED JOURNEYPerson (SJ) REPORT							
*Apprenticeable Occupation	*Required minimum SJ: Apprentice Graduate % (see 2 nd 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 & 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 & Field Soils & Material Tester	30%	30%	30%
Carpenter	30%	30%	30%
Carpet, Linoleum & 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 & 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 & 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.legislature.ca.gov/>

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 REQUIREMENTS**

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That Shimmick Construction Company, Inc. as Principal,
and Berkshire Hathaway Specialty Insurance Company as Surety, are held
and firmly bound unto The City of San Diego hereinafter called "OWNER," in the sum
of **10% OF THE TOTAL BID AMOUNT** for the payment of which sum, well and truly to be made, we
bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally,
firmly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under
the bidding schedule(s) of the OWNER's Contract Documents entitled

Miramar Reservoir Pump Station (MRPS) Improvement Project

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 19th day of April, 2022

Shimmick Construction Company, Inc. (SEAL)
(Principal)

Berkshire Hathaway Specialty Insurance
Company (SEAL)
(Surety)

By: [Signature]
(Signature)

By: [Signature]
Nicholas Fredrickson (Signature) Attorney-in-Fact
CA Lic #0155652

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

CALIFORNIA ACKNOWLEDGMENT

CIVIL CODE § 1189

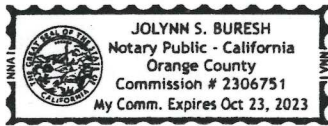
A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California }
County of Orange }

On April 28, 2022 before me, Jolynn S. Buresh, Notary Public,
Date Here Insert Name and Title of the Officer

personally appeared W. Andrew Sloane, III
Name(s) of Signer(s)

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



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

WITNESS my hand and official seal.

Signature [Handwritten Signature]

Place Notary Seal and/or Stamp Above

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: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Corporate Officer – Title(s): _____

Partner – Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer is Representing: _____

Signer's Name: _____

Corporate Officer – Title(s): _____

Partner – Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer is Representing: _____

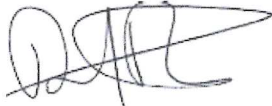
Power Of Attorney

**BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY
NATIONAL INDEMNITY COMPANY / NATIONAL LIABILITY & FIRE INSURANCE COMPANY**

Know all men by these presents, that **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY**, a corporation existing under and by virtue of the laws of the State of Nebraska and having an office at One Lincoln Street, 23rd Floor, Boston, Massachusetts 02111, **NATIONAL INDEMNITY COMPANY**, a corporation existing under and by virtue of the laws of the State of Nebraska and having an office at 3024 Harney Street, Omaha, Nebraska 68131 and **NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, a corporation existing under and by virtue of the laws of the State of Connecticut and having an office at 100 First Stamford Place, Stamford, Connecticut 06902 (hereinafter collectively the "Companies"), pursuant to and by the authority granted as set forth herein, do hereby name, constitute and appoint: Susan Larson, Charla Boadle, Scott Garcia, Elizabeth Hahn, Roger Kaltenbach, Andrew Larsen, Mindee L. Rankin, Scott Fisher, Jana Rov, Derek Sabo, Scott McGilvray, John Claeys, Nicholas Fredrickson, 2233 112th Avenue N.E. of the city of Bellevue, State of Washington, their true and lawful attorney(s)-in-fact to make, execute, seal, acknowledge, and deliver, for and on their behalf as surety and as their act and deed, any and all undertakings, bonds, or other such writings obligatory in the nature thereof, in pursuance of these presents, the execution of which shall be as binding upon the Companies as if it has been duly signed and executed by their regularly elected officers in their own proper persons. **This authority for the Attorney-in-Fact shall be limited to the execution of the attached bond(s) or other such writings obligatory in the nature thereof.**

In witness whereof, this Power of Attorney has been subscribed by an authorized officer of the Companies, and the corporate seals of the Companies have been affixed hereto this date of December 20, 2018. This Power of Attorney is made and executed pursuant to and by authority of the Bylaws, Resolutions of the Board of Directors, and other Authorizations of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY, NATIONAL INDEMNITY COMPANY and NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, which are in full force and effect, each reading as appears on the back page of this Power of Attorney, respectively. **The following signature by an authorized officer of the Company may be a facsimile, which shall be deemed the equivalent of and constitute the written signature of such officer of the Company for all purposes regarding this Power of Attorney, including satisfaction of any signature requirements on any and all undertakings, bonds, or other such writings obligatory in the nature thereof, to which this Power of Attorney applies.**

**BERKSHIRE HATHAWAY SPECIALTY
INSURANCE COMPANY,**



By: _____
David Fields, Executive Vice President



**NATIONAL INDEMNITY COMPANY,
NATIONAL LIABILITY & FIRE INSURANCE COMPANY,**



By: _____
David Fields, Vice President

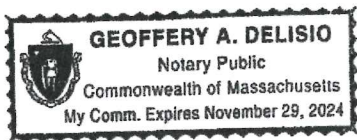


NOTARY

State of Massachusetts, County of Suffolk, ss:

On this 20th day of December, 2018, before me appeared David Fields, Executive Vice President of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY** and Vice President of **NATIONAL INDEMNITY COMPANY and NATIONAL LIABILITY & FIRE INSURANCE COMPANY**, who being duly sworn, says that his capacity is as designated above for such Companies; that he knows the corporate seals of the Companies; that the seals affixed to the foregoing instrument are such corporate seals; that they were affixed by order of the board of directors or other governing body of said Companies pursuant to its Bylaws, Resolutions and other Authorizations, and that he signed said instrument in that capacity of said Companies.

[Notary Seal]




Notary Public

I, Ralph Tortorella, the undersigned, Officer of **BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY, NATIONAL INDEMNITY COMPANY and NATIONAL LIABILITY & FIRE 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 is in full force and effect and has not been revoked. **IN TESTIMONY WHEREOF, see hereunto affixed the seals of said Companies this April 19, 2022.**




Officer

To verify the authenticity of this Power of Attorney please contact us at: BHSISurety Department, Berkshire Hathaway Specialty Insurance Company, One Lincoln Street, 23rd Floor Boston, MA 02111 | (770) 625-2516 or by email at Jennifer.Porter@bhspecialty.com. **THIS POWER OF ATTORNEY IS VOID IF ALTERED**

To notify us of a claim please contact us on our 24-hour toll free number at (855) 453-9675, via email at claimsnotice@bhspecialty.com, via fax to (617) 507-8259, or via mail.

BERKSHIRE HATHAWAY SPECIALTY INSURANCE COMPANY (BYLAWS)

ARTICLE V.

CORPORATE ACTIONS

....

EXECUTION OF DOCUMENTS:

....

Section 6.(b) The President, any Vice President or the Secretary, shall have the power and authority:

- (1) To appoint Attorneys-in-fact, and to authorize them to execute on behalf of the Company bonds and other undertakings, and
- (2) To remove at any time any such Attorney-in-fact and revoke the authority given him.

NATIONAL INDEMNITY COMPANY (BY-LAWS)

Section 4. Officers, Agents, and Employees:

A. The officers shall be a President, one or more Vice Presidents, a Secretary, one or more Assistant Secretaries, a Treasurer, and one or more Assistant Treasurers none of whom shall be required to be shareholders or Directors and each of whom shall be elected annually by the Board of Directors at each annual meeting to serve a term of office of one year or until a successor has been elected and qualified, may serve successive terms of office, may be removed from office at any time for or without cause by a vote of a majority of the Board of Directors, and shall have such powers and rights and be charged with such duties and obligations as usually are vested in and pertain to such office or as may be directed from time to time by the Board of Directors; and the Board of Directors or the officers may from time to time appoint, discharge, engage, or remove such agents and employees as may be appropriate, convenient, or necessary to the affairs and business of the corporation.

NATIONAL INDEMNITY COMPANY (BOARD RESOLUTION ADOPTED AUGUST 6, 2014)

RESOLVED, That the President, any Vice President or the Secretary, shall have the power and authority to (1) appoint Attorneys-in-fact, and to authorize them to execute on behalf of this Company bonds and other undertakings and (2) remove at any time any such Attorney-in-fact and revoke the authority given.

NATIONAL LIABILITY & FIRE INSURANCE COMPANY (BY-LAWS)

ARTICLE IV

Officers

Section 1. Officers, Agents and Employees:

A. The officers shall be a president, one or more vice presidents, one or more assistant vice presidents, a secretary, one or more assistant secretaries, a treasurer, and one or more assistant treasurers, none of whom shall be required to be shareholders or directors, and each of whom shall be elected annually by the board of directors at each annual meeting to serve a term of office of one year or until a successor has been elected and qualified, may serve successive terms of office, may be removed from office at any time for or without cause by a vote of a majority of the board of directors. The president and secretary shall be different individuals. Election or appointment of an officer or agent shall not create contract rights. The officers of the Corporation shall have such powers and rights and be charged with such duties and obligations as usually are vested in and pertain to such office or as may be directed from time to time by the board of directors; and the board of directors or the officers may from time to time appoint, discharge, engage, or remove such agents and employees as may be appropriate, convenient, or necessary to the affairs and business of the Corporation.

NATIONAL LIABILITY & FIRE INSURANCE COMPANY (BOARD RESOLUTION ADOPTED AUGUST 6, 2014)

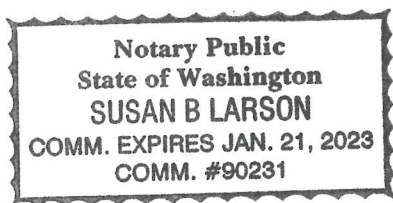
RESOLVED, That the President, any Vice President or the Secretary, shall have the power and authority to (1) appoint Attorneys-in-fact, and to authorize them to execute on behalf of this Company bonds and other undertakings and (2) remove at any time any such Attorney-in-fact and revoke the authority given.

ACKNOWLEDGMENT

State of Washington)
County of King)

On this 19th day of April, 2022, before me, Susan B. Larson, notary public in and for the State of Washington, with principal office in the County of King, residing therein, duly commissioned and sworn, personally appeared Nicholas Fredrickson, known to me to be the person whose name is subscribed to the within instrument as the attorney-in-fact of Berkshire Hathaway Specialty Insurance Company as surety in said instrument, and acknowledged to me that he subscribed the name of said corporation thereto as surety, and his own name as attorney-in-fact.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in the aforesaid County, the day and year in this certificate first above written.



NOTARY PUBLIC

Susan B. Larson

Commission Expires: 01/21/2023

CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS

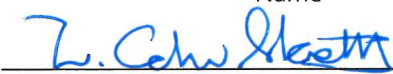
As part of its bid or proposal (Non-Price Proposal in the case of Design-Build contracts), the Bidder shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against the Bidder in a legal or administrative proceeding alleging that Bidder discriminated 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
Please see attachment on the following page.					

Contractor Name: Shimmick Construction Company, Inc.

Certified By W. Andrew Sloane, III Title Executive Vice President
Name

Signature Date 5/3/22

USE ADDITIONAL FORMS AS NECESSARY

Shimmick Construction Company, Inc. - Certification of Pending Actions

<u>Date of Claim</u>	<u>Location</u>	<u>Description of Claim</u>	<u>Litigation (Y/N)</u>	<u>Status</u>	<u>Resolution / Remedial Action Taken</u>
7/29/2020	California: Los Angeles Superior Court (Case No. 20STCV28555)	<u>Alfredo Franco v. Shimmick/FCC/Impregilo Joint Venture</u> Shimmick Construction Company, Inc./FCC Construction S.A./Impregilo S.p.A, a Joint Venture (SFI), contracted with the Port of Long Beach for the design and construction of the Gerald Desmond Bridge Replacement Project. SFI employee Alfredo Franco alleges he was wrongfully terminated in violation of disability and discrimination laws after sustaining an injury to his back. Shimmick Construction Company, Inc. is not a defendant in this action, but is a member of the Joint Venture entity defendant.	YES	Pending	Matter Pending
6/23/2020	California: Los Angeles Superior Court (Case No. 20STCV23684)	<u>Stephen McDaid v. Shimmick Construction Company, Inc.; Trey Dewitt; et al.</u> Shimmick Construction Company, Inc./FCC Construction S.A./Impregilo S.p.A, a Joint Venture (SFI), contracted with the Port of Long Beach for the design and construction of the Gerald Desmond Bridge Replacement Project. SFI employee Stephen McDaid alleges he was wrongfully terminated in violation of disability and age discrimination laws after taking medical leave to recover from an allergic reaction caused by medication he was taking. Although the SFI Joint Venture was Mr. McDaid's employer he named Shimmick Construction Company, Inc. as an individual defendant.	YES	Pending	Matter Pending
6/1/2020	California: Los Angeles Superior Court (Case No. 20STCV20562)	<u>Sonny Lopez v. Shimmick Construction Company Inc.; Salini Impregilo SPA, FCC Construccion, et al.</u> Shimmick Construction Company, Inc./FCC Construction S.A./Impregilo S.p.A, a Joint Venture (SFI), contracted with the Port of Long Beach for the design and construction of the Gerald Desmond Bridge Replacement Project. SFI employee Sonny Lopez alleges he was wrongfully terminated in violation of disability discrimination laws after suffering a work-related injury. Although the SFI Joint Venture was Mr. Lopez's employer he named Shimmick Construction Company, Inc. as an individual defendant.	YES	Pending	Matter Pending
7/9/2019	Santa Clara Superior Court (Case No. 19CV350905)	<u>Carlos Torres v. Shimmick Construction Company, Inc.</u> Skanska USA Civil, Inc./Shimmick Construction Company, Inc./Herzog Contracting Corp., Joint Venture (SSH) entered into a design-build contract with the Santa Clara Valley Transportation Agency (VTA) to design and construct Phase I of the BART Extension Project. Plaintiff alleges he was terminated after he incurred an industrial injury as defined by the FEHA.. Plaintiff subsequently filed a complaint for disability discrimination, among other causes of action. Although Plaintiff was an employee of the SSH Joint Venture (of which Skanska is the managing partner), he named Shimmick Construction Company, Inc. as the sole defendant.	YES	Pending	Matter Pending
4/21/2017	Riverside Superior Court RIC 1707166	<u>Saul Hoefler v. Shimmick Construction Company, Inc.</u> Mr. Hoefler was an employee of Shimmick Construction Company, Inc. (SCCI). Mr. Hoefler was terminated and filed a complaint claiming disability discrimination and wrongful termination, among other causes of action.	YES	Settled	Settled - No remedial action taken
3/3/2016	Superior Court of California, County of Los Angeles BC612444	<u>Edward Meza v. Shimmick Construction Company, Inc; FCC Construccion S.A.; Salini Impregilo SPA, et al.</u> Shimmick Construction Company, Inc./FCC Construction S.A./Impregilo S.p.A, a joint venture ("SFI") contracted with the Port of Long Beach for the design and construction of the Gerald Desmond Bridge Replacement Project. Plaintiff was employed by SFI. He was injured during the course of his work, and filed for Workers' Compensation a year after his injury. Plaintiff failed to notify SFI that he had been put on medical leave by his healthcare provider. SFI terminated his employment when he repeatedly failed to come to work. Plaintiff filed a complaint for disability discrimination, among other causes of action. Although SFI was the Plaintiff's employer, he named Shimmick Construction Company, Inc. as a defendant.	YES	Settled	Settled - No remedial action taken
4/16/2014	Superior Court, County of Santa Clara 114CV263942	<u>MRB California Buisness Enterprises, Inc and Musu Bennett v. Skanska-Shimmick-Herzog Joint Venture; Shimmick Construction Company, Inc.; et al.</u> Plaintiffs entered into an agreement with Skanska USA Civil, Inc./Shimmick Construction Company, Inc./Herzog Contracting Corp., Joint Venture (SSH) to perform street sweeping services on the Silicon Valley Berryessa Extension Project. During the course of work, certain disputes arose and Plaintiffs filed a complaint. In addition to breach of contract, Plaintiffs alleged discrimination, hostile and harassing conduct and statements by employees and supervisors. Although Plaintiffs had an agreement with SSH only, Plaintiffs named Shimmick Construction Company, Inc. as a defendant.	YES	Settled	Settled - No remedial action taken

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name		DBA	
Shimmick Construction Company, Inc.		N/A	
Street Address	City	State	Zip
530 Technology Dr. Suite 300	Irvine	CA	92618
Contact Person, Title		Phone	Fax
W. Andrew Sloane, III		(833) 723-2021	(949) 333-1510

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.

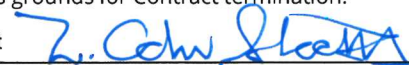
Name	Title/Position
Fernando De Leon	Vice President - MEP Division
City and State of Residence	Employer (if different than Bidder/Proposer)
Irvine, CA	N/A
Interest in the transaction	
No financial interest; communicating or negotiating with City officers or employees, submitting or preparing applications, 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
Kendyll Lightle	Estimator
City and State of Residence	Employer (if different than Bidder/Proposer)
Long Beach, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

* 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.

W. Andrew Sloane, III - Executive Vice President



5/3/22

Print Name, Title

Signature

Date

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Mandatory Disclosure of Business Interests Form

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Legal Name		DBA	
Shimmick Construction Company, Inc.		N/A	
Street Address	City	State	Zip
530 Technology Dr. Suite 300	Irvine	CA	92618
Contact Person, Title		Phone	Fax
W. Andrew Sloane, III		(833) 723-2021	(949) 333-1510

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Name	Title/Position
Carmen Chu	Estimator
City and State of Residence	Employer (if different than Bidder/Proposer)
Irvine, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

Name	Title/Position
Lori Becker	Office Administration/DBE Compliance Assistant
City and State of Residence	Employer (if different than Bidder/Proposer)
Laguna Hills, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

* Use Additional Pages if Necessary *

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W. Andrew Sloane, III - Executive Vice President



5/3/22

Print Name, Title

Signature

Date

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Mandatory Disclosure of Business Interests Form

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Street Address	City	State	Zip
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Contact Person, Title		Phone	Fax
W. Andrew Sloane, III		(833) 723-2021	(949) 333-1510

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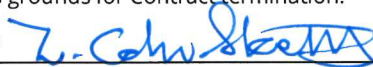
Name	Title/Position
Trina Clay	DBE/SBE Compliance Officer
City and State of Residence	Employer (if different than Bidder/Proposer)
Trabuco Canyon, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

Name	Title/Position
Bruce MacDonald	Operations Manager
City and State of Residence	Employer (if different than Bidder/Proposer)
Perris, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

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W. Andrew Sloane, III - Executive Vice President



5/3/22

Print Name, Title

Signature

Date

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W. Andrew Sloane, III		(833) 723-2021	(949) 333-1510

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Name	Title/Position
Jolynn Buresh	Senior Pursuit Specialist
City and State of Residence	Employer (if different than Bidder/Proposer)
Mission Viejo, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

Name	Title/Position
Joseph Henry	Chief Estimating Manager
City and State of Residence	Employer (if different than Bidder/Proposer)
Huntington Beach, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City, directing or supervising the actions of persons engaged in the above activity.	

* Use Additional Pages if Necessary *

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W. Andrew Sloane, III - Executive Vice President



5/3/22

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.

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name		DBA	
Shimmick Construction Company, Inc.		N/A	
Street Address	City	State	Zip
530 Technology Dr. Suite 300	Irvine	CA	92618
Contact Person, Title		Phone	Fax
W. Andrew Sloane, III		(833) 723-2021	(949) 333-1510

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).

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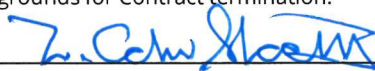
Name	Title/Position
Addison Rieger	Lead Estimator
City and State of Residence	Employer (if different than Bidder/Proposer)
Riverside, CA	N/A
Interest in the transaction	
No financial interest; submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City	

Name	Title/Position
Tomonori Kamimura	Project Manager
City and State of Residence	Employer (if different than Bidder/Proposer)
Vista, CA	N/A
Interest in the transaction	
No financial interest; 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.	

* Use Additional Pages if Necessary *

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W. Andrew Sloane, III - Executive Vice President



5/3/22

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</i> and <i>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
See attached Officer's and Director's List	

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.

N/A

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: Shimmick Construction Company, Inc.

Certified By W. Andrew Sloane, III Title Executive Vice President

Name

 Signature

Date 5/3/22

NOTE: Providing false information may result in criminal prosecution or administrative sanctions.

Report Name : Management Structure
Entity Name: Shimmick Construction Company, Inc.

Name	Title	Title Role	Role Start
Dukellis, Gregory	Class A Director	Director	7/30/2020
Richards, Steven Earl	Class A Director	Director	3/17/2020
Goldsteen, Mitchell	Class B Director and Chairman of the Board	Director	1/3/2021
Dukellis, Gregory	Executive Vice President	Officer	7/30/2020
Dukellis, Gregory	Secretary	Officer	12/27/2018
Walsh, David	Chief Financial Officer	Officer	9/7/2021
Dukellis, Gregory	Chief Legal Officer (General Counsel)	Officer	8/31/2021
McCown, Allen LeRoy	Assistant Secretary	Officer	5/30/2019
Mitchell, Patrick	Vice President	Officer	3/17/2020
Richards, Steven Earl	Chief Executive Officer	Officer	7/30/2020
Richards, Steven Earl	President	Officer	3/17/2020
Bernabe, Nicodemus Retamar	Vice President	Officer	3/1/2022
Robinett, Erica	Vice President	Officer	7/30/2020
Sloane, W. Andrew III	Executive Vice President	Officer	10/24/2018

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
Socal Stormwater Runoff Solution Services Inc.	
Ram Mohseni	CEO

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
CL Suverying & Mapping	
Lam Le	President
Daniel Calvillo	Vice President/CFO

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Shea Reinforcing Steel Inc.	
Matthew Shea	CEO/President
Lorraine Shea	Vice President/Operations

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Alcorn Fence	
Gustavo Madrigal	President
Thomas Stack	Vice President
Oscar Mancilla	Secretary/Treasurer/CFO

Contractor Name: Shimmick Construction Company, Inc.

Certified By W. Andrew Sloane, III Title Executive Vice President

Name

 Signature _____ Date 5/3/22

USE ADDITIONAL FORMS AS NECESSARY*

**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
Nickolas Steel	
Nick Mlagenovich	President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
SOFFA Electric, Inc.	
Salib Mansour, PE	Vice President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Halco Testing Services	
Don Genius	CEO & President

SUBCONTRACTOR SUPPLIER MANUFACTURER

NAME	TITLE
Allison Mechanical, Inc.	
Donald Paul Allison	President
Mark Nicholas Allison	VP/Secretary
Heidi Annette Allison	Treasurer

Contractor Name: Shimmick Construction Company, Inc.

Certified By W. Andrew Sloane, III Title Executive Vice President



 Name _____ Date 5/3/22

 Signature

USE ADDITIONAL FORMS AS NECESSARY*

NON-LOBBYING CERTIFICATION

(FOR FEDERAL-AID CONTRACTS)

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities", in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontractors, which exceed \$100,000 and that all such subrecipients shall certify and disclose accordingly.

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

CONTINUATION SHEET

OMB0348-0046

Reporting Entity: _____ Page ____ of ____

Empty reporting area for disclosure details.

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Authorized for Local Reproduction
Standard Form - LLL-A



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 Socal Stormwater Runoff Solution Services Inc.		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Andrea De Leon	
Address 15030 Ventura Blvd #669, Sherman Oaks, CA 91403			
Telephone No. (310) 343-8313		Email Address estimating@socalstormwatersolutions.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

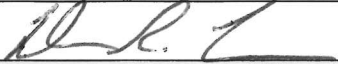
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1.1	Preparation of Stormwater Pollution Prevention Plan (SWPPP)	\$1,395.00
1.2	Prepare/Submit NOI (Notice of Intent) & SWPPP Upload to SMARTS	\$320.00
1.5	Submission of Stormwater Annual Report In SMARTS Due Sept 1st of Each Reporting Year	\$450.00
1.6	Prepare/Submit Application to Obtain NOT (Notice of Termination)	\$320.00
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: <u>Port of Long Beach</u>		Meets/exceeds EPA certification standards? YES NO <input checked="" type="checkbox"/> Unknown


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.

FORM 4500-3 (DBE Subcontractor Performance Form)

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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Ram Mohseni
Title	Date
CEO	05/05/2022

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: 397264

Ram

SoCal stormwater Runoff Solution

15030 Ventura Blvd #669

Sherman Oaks, CA 91403

Thank you for submitting your Vendor Application seeking Small Business Enterprise recognition with the Port of Long Beach (Port). 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.

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

NAICS code(s) for which SBE status is recognized: 541620

SBE Certificate Effective Date: 06/25/21

SBE Certificate Expiration Date: 06/25/24

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 Port.

The Port reserves 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 reserves 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 stated 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,
Sashi Muralidharan
SBE Administrator
Port of Long Beach

415 W. Ocean Blvd, Long Beach, CA 90802 Telephone (562) 283-7598 email: sbeprogram@polb.com



**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.

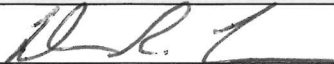
Subcontractor Name CL Surveying and Mapping, Inc		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Lam Le	
Address 400 East Rincon Street, Suite 202, Corona, CA 92879			
Telephone No. 909-484-4200		Email Address lam@cl-survey.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

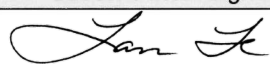
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
TBD	Land Surveying Services	\$25,300
DBE Certified By: <input checked="" type="checkbox"/> DOT <input type="checkbox"/> SBA Other: _____		Meets/exceeds EPA certification standards? YES NO <input checked="" type="checkbox"/> Unknown

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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Lam Le
Title	Date
President	04/29/22

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)

[Skip to Main Content](#)

[Back To Query Form \(licenseForm.htm\)](#)

Search Returned 1 Records

Thu May 05 12:43:04 PDT 2022

Query Criteria

Certification Types: DBE

Firm ID: 38284

Firm ID 38284
DBA Name CL SURVEYING AND MAPPING, INC.
Firm Name
Address Line1 1269 WEST POMONA ROAD
Address Line2 SUITE 108
City CORONA
State CA
Zip Code1 92882
Zip Code2
Mailing Address
Line1
Mailing Address
Line2
Mailing City
Mailing State
Mailing Zip
Code1
Mailing Zip
Code2
Certification DBE
Type
Email DAN@CL-SURVEY.COM
Contact Name DANIEL CALVILLO
Area Code 909
Phone Number 484-4200
Extension
Alt Area Code
Alt Phone
Number
Extension
Fax Area Code 909
Fax Phone 839-4504
Number
Agency Name CITY OF LOS ANGELES
Counties 10; 15; 19; 30; 33; 36; 37; 56;
Districts 06; 07; 08; 11; 12;
DBE NAICS 541370;
ACDBE NAICS
Work Codes C9826 LAND SURVEYING;

Licenses	LS Land Surveyor;
Trucks	
Gender	M
Ethnicity	ASIAN PACIFIC
Firm Type	DBE



**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 Shea Reinforcing Steel Inc.		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Matt Shea	
Address 3082 Camino Del Zuro. Thousand Oaks, Ca. 91360			
Telephone No. 805-990-3963		Email Address m.shea@shearebar.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

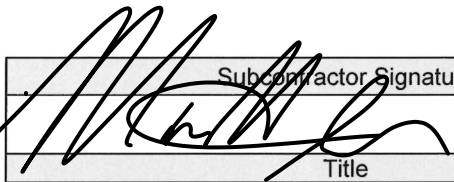
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1-A 237110	MIRAMAR PUMP STATION REHABILITATION WBS 19099 FURNISH AND INSTALL REINFORCING STEEL	\$63,366.68
DBE Certified By: <u>DOT</u> <u>SBA</u> Other: <u>DGS SBE/PW/micro 2020550</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.

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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Matthew shea
Title	Date
V.P. Operations	5/05/2022

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: 5/5/2022 12:39:19 PM

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



Office of Small Business & DVBE Services

Certification ID: 2020550

Legal Business Name:

Shea Reinforcing Steel Inc.

Doing Business As (DBA) Name 1:

Doing Business As (DBA) Name 2:

Address:

3082 Camino Del Zuro
THOUSAND OAKS
CA 91360

Email Address:

Lmenz2040@hotmail.com

Business Web Page:

Business Phone Number:

805/990-3963

Business Fax Number:

Business Types:

Construction , Service

Certification Type	Status	From	To
SB(Micro)	Approved	08/06/2020	08/31/2022
SB-PW	Approved	08/06/2020	08/31/2022

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



**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.

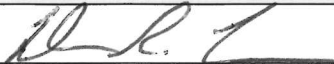
Subcontractor Name Nickolas Steel, Inc.		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Elan Mlagenovich	
Address 816 S. Cucamonga Ave. Ontario, CA 91761			
Telephone No. 714-738-4647		Email Address elan@nicksteelinc.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

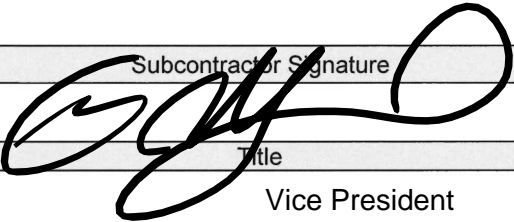
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1	Furnish Misc. Metal Equipment Supports	\$6,984.00
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: <u> MWD </u>		Meets/exceeds EPA certification standards? YES NO X 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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Elan Mlagenovich
Title	Date
Vice President	5/6/22

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: 169448

Mr. Nick Mlagenovich
Nickolas Steel
816 S. Cucamonga Ave
Ontario, CA 91761

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:

- 331491 - Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding**
- 332312 - Fabricated Structural Metal Manufacturing**
- 332321 - Metal Window and Door Manufacturing**
- 332323 - Ornamental and Architectural Metal Work Manufacturing**
- 332722 - Bolt, Nut, Screw, Rivet, and Washer Manufacturing**

SBE Certificate Effective Date: 07/14/21
SBE Certificate Expiration Date: 07/14/24

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.

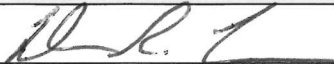
Subcontractor Name Halco Testing Services		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Nancy Dunn	
Address 5773 Venice Blvd, Los Angeles, Ca 90019			
Telephone No. (323) 933-9431		Email Address accounting@halco.net	
Prime Contractor Name Shimmick Construction Company		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
1-A 6-B	Electrical Testing	\$54,560
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: <u>DGS</u>		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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Joshua Courtney
Title	Date
Senior Estimator	5/6/2022

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)

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



Office of Small Business & DVBE Services

Certification ID: 2004825

Legal Business Name:

Halco Service Corporation

Doing Business As (DBA) Name 1:

Halco Testing Services

Doing Business As (DBA) Name 2:

Address:

5773 Venice Blvd.

Los Angeles

CA 90019

Email Address:

accounting@halco.net

Business Web Page:

www.halcotestingservices.com

Business Phone Number:

323/933-9431

Business Fax Number:

Business Types:

Construction , Service

Certification Type	Status	From	To
SB(Micro)	Approved	04/01/2022	03/31/2024

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



**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 Allison Mechanical		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known) N/A	Point of Contact Lisa Daniels	
Address 1968 Essex Court Redlands, CA 92373			
Telephone No. (909) 478-5633		Email Address Ldaniels@allison1.net	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

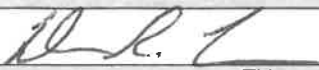
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1-A	HVAC	\$106,000
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: <u>DGS</u>		Meets/exceeds EPA certification standards? YES NO <u>Unknown</u>


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FORM 4500-3 (DBE Subcontractor Performance Form)

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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Brian Bonacic
Title	Date
Estimator	5/6/2022

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)

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



Office of Small Business & DVBE Services

Certification ID: 18104

Legal Business Name:

ALLISON MECHANICAL INC

Doing Business As (DBA) Name 1:

Doing Business As (DBA) Name 2:

Address:

1968 ESSEX CT

REDLANDS

CA 92373-8008

Email Address:

smoreno@allison1.net

Business Web Page:

www.allisonmechanical.com

Business Phone Number:

909.478.5633

Business Fax Number:

909.478.5637

Business Types:

Construction , Service

Certification Type	Status	From	To
SB	Approved	04/21/2022	04/30/2023

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



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

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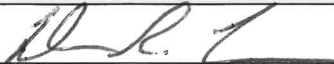
Subcontractor Name SOFFA Electric, Inc.		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Salib Mansour	
Address 5901 Corvette Street, Commerce, CA 90040			
Telephone No. (323)728-0230		Email Address sales@soffaelectric.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

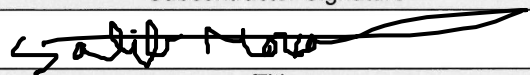
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1 (1-A)	I&C Package	\$145,344.00
DBE Certified By: <input type="checkbox"/> DOT <input checked="" type="checkbox"/> SBA Other: _____		Meets/exceeds EPA certification standards? <input checked="" type="radio"/> YES <input type="radio"/> NO <input type="radio"/> Unknown

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Prime Contractor Signature	Print Name
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Salib Mansour, PE
Title	Date
Vice President	5/6/2022

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FORM 4500-3 (DBE Subcontractor Performance Form)

SBA Profile**[Privacy Statement](#)**

([Back to Profile List](#), or use Back button)

Identification, Location & Contacts

This profile was last updated: 03/01/2022
 Status: Active

User ID: P2323312
 Name of Firm: SOFFA ELECTRIC INC.
 Trade Name ("Doing Business As ..."):
 UEI: FYCSA16N3MH1
 Address, line 1: 5901 CORVETTE ST
 Address, line 2:
 City: COMMERCE
 State: CA
 Zip: 90040-1601
 Phone Number: 323-728-0230
 Fax Number:
 E-mail Address: christy.catani@soffaelectric.com
 WWW Page:
 E-Commerce Website: <https://soffaelectric.com/>
 Contact Person: Christy Catani
 County Code (3 digit): 037
 Congressional District: 40
 Metropolitan Statistical Area: 4480
 CAGE Code: 0BTA4
 Year Established: 1974
 Accepts Government Credit Card?: Yes No
 GSA Advantage Contract(s):

(Note: Size information is now under "NAICS Codes with Size Determinations by NAICS", below.)

Organization, Ownership & Certifications

Legal Structure:
 Ownership and Self-Certifications: Self-Certified Small Disadvantaged Business, Economically Disadvantaged Women-Owned Small Business, Women-Owned Small Business, Woman Owned

Current Principals

1. Maryam Shams Amiri, OWNER
2. Masha M. Mahmoudi, OWNER

"Business Development Servicing Office" (for certifications)

SBA Federal Certifications

8(a) Certification:

SBA 8(a) Case Number:
SBA 8(a) Entrance Date:
SBA 8(a) Exit Date:

HUBZone Certification:

HUBZone Certified?: Yes No
HUBZone Certification Date:

8(a) Joint Venture Certification:

8(a) JV Entrance Date:
8(a) JV Exit Date:

Women Owned - SBA Certified:

WOSB Certified?: Yes No
WOSB Pending?: Yes No

Economically Disadvantaged Women Owned - SBA Certified:

EDWOSB Certified?: Yes No
EDWOSB Pending?: Yes No

Other Certifications

Non-Federal-Government Certifications:

(none given)

Products & Services

Capabilities Narrative:

Advanced Control System and Instrumentation Integrator

Special Equipment/Materials:

(none given)

Business Type Percentages:

Service (100 %)

Bonding Levels

Construction Bonding Level (per \$0 contract)
 Construction Bonding Level (aggregate) \$0
 Service Bonding Level (per contract) \$0
 Service Bonding Level (aggregate) \$0

NAICS Codes with Size Determinations by NAICS:

#	Primary?	Code	NAICS Code's Description	"Buy Green"? (1)	Small? (2)
1	Yes	335313	Switchgear and Switchboard Apparatus Manufacturing		Yes
2		238210	Electrical Contractors and Other Wiring Installation Contractors		Yes
3		238990	All Other Specialty Trade Contractors General \$15.00m Small Business Size Standard: [Yes] Special \$15.00m Building and Property Specialty Trade Services: [Yes] (4)		Yes
4		334290	Other Communications Equipment Manufacturing		Yes
5		334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables		Yes
6		334519	Other Measuring and Controlling Device Manufacturing		Yes
7		335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing		Yes

(1) By entering Yes for "Buy Green", the firm asserts that it obeys EPA guidelines for environmental friendliness for this NAICS code. Note, EPA guidelines do not exist for every NAICS code.
 (2) If Yes, the firm's revenues/number of employees do not exceed the NAICS code's small business size standard.
 (4) As seen above, the size standard can depend on subcategories within a NAICS code.

Keywords:

Control System, Instrumentation, System Integrator, Automation, Engineering Service, Water Treatment, Refinery, Gas, Oil

Miscellaneous:

Quality Assurance Standards: ISO-9000 Series
 Electronic Data Interchange [] Yes [] No
 capable?:

Export Profile (Trade Mission Online)

Exporter?: [] Yes [X] No [] Wants To Be
 Export Business Activities: (none given)
 Exporting to: (none given)

Desired Export Business Relationships: (none given)
Description of Export Objective(s): (none given)

Performance History (References)

(none given)

The structure of this page was last updated 02/01/2013, as part of SBSS 8.1.1.



**Disadvantaged Business Enterprise (DBE) Program
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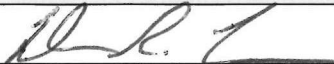
Subcontractor Name Alcorn Fence Company - DBE#50904		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2028-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact Paul Douglas	
Address 9901 Glenoaks Blvd., Sun Valley, CA 91352			
Telephone No. (323) 875-1342		Email Address paul@alcornfence.com	
Prime Contractor Name Shimmick Construction Company		Issuing/Funding Entity EPA/CASRF	

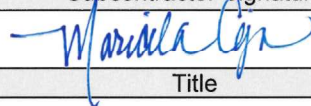
Contract Item Number	Description of Work Submitted from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
1	Chain Link Fence w/Barb Wire & (1) Gate	\$32,870.00
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA Other: <u>LA Metro</u>		Meets/exceeds EPA certification standards? YES NO <u>Unknown</u>

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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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

Subcontractor Signature	Print Name
	Maricela Ceja
Title	Date
Assistance Secretary	05/06/2022

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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

March 9, 2022

Metro File #9229

Mr. Gustavo A. Madrigal
ALCORN FENCE COMPANY
9901 Glenoaks Blvd
Sun Valley, CA 91352

Subject: Small Business Enterprise Certification

Dear Mr. Gustavo A. Madrigal:

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 Small Business Enterprise (SBE) as required under Metro's SBE Program. Your firm will be listed in Metro's SBE database of certified SBEs under the following specific areas of expertise:

NAICS 332323: ORNAMENTAL METALWORK MANUFACTURING

Your SBE certification is valid for five years from the date of this letter and applies only for the above NAICS code(s). Any additions and revisions must be submitted to Metro for review and approval.

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

After the five-year certification period, your entire file will be reviewed in order to ascertain continued SBE certification status. You will be notified of the pending SBE status review and any documentation updates necessary prior to the expiration date.

Also, should any changes occur that could affect your certification status prior to receipt of the annual update application, such as changes in your firm's name, business/ mailing address, ownership, management or control, or failure to meet the applicable business size standards or personal net worth standard, please notify Metro immediately.

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 SBE 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 Metro's SBE 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,

Ramon Ortiz
Manager, Certification
Diversity & Economic Opportunity Department



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

March 9, 2022

CUCP# 50904
Metro File #9229

Mr. Gustavo A. Madrigal
ALCORN FENCE COMPANY
9901 Glenoaks Blvd
Sun Valley, CA 91352

Subject: Disadvantaged Business Enterprise Certification

Dear Mr. Gustavo A. Madrigal:

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 332323: ORNAMENTAL METALWORK MANUFACTURING

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 <https://dot.ca.gov/programs/civil-rights/dbe-search>. 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/ mailing 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,

Ramon Ortiz

Manager, Certification

Diversity & Economic Opportunity Department



**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 Shimmick Construction Company		Project Name Miramar Reservoir Pump Station Improvement Project	
Bid / Proposal No. K-22-2058-DBB-3	Assistance Agreement ID No. (if known)	Point of Contact David Leonard	
Address 530 Technology Dr., Ste 300			
Telephone No. (949) 333-1500		Email Address dleonard@shimmick.com	
Issuing/Funding Entity EPA/CASRF			

I have identified potential DBE certified subcontractors. <input checked="" type="checkbox"/> 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?
	See Attached		

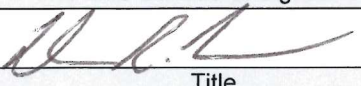
--Continue on back if needed--

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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.

Subcontractor Name/ Company Name	Company Address/Phone/Email	Estimated Dollar Amount	Currently DBE Certified?
SoCal Stormwater Runoff Solution Services Inc.	15030 Ventura Blvd #669 Sherman Oaks, CA 91403 310-343-8313 estimating@socalstormwatersolutions.com	\$2,485.00	Yes
CL Surveying and Mapping, Inc.	400 East Rincon Street, Suite 202, Corona CA 92879 909-484-4200 lam@cl-survey.com	\$25,300.00	Yes
Shea Reinforcing Steel Inc.	3082 Camino Del Zuro, Thousand Oaks, CA 91360 805-990-3963 m.shea@shearebar.com	\$63,366.68	Yes
Nickolas Steel Inc.	816 S. Cucamonga Ave. Ontario, CA. 91761 714-738-4647 elan@nicksteelinc.com	\$6,984.00	Yes
Halco Testing Services	5773 Venice Blvd Los Angeles, Ca 90019 323-933-9431 accounting@halco.net	\$54,560.00	Yes
Allison Mechanical, Inc.	1968 Essex Court Relands, CA 92373 909-478-5633 ldaniels@allison1.net	\$106,000.00	Yes
SOFFA Electric, Inc.	5901 Corvette St Commerce, CA 90040 323-728-0230 sales@soffaelectric.com	\$145,344.00	Yes
Alcorn Fence Company	9901 Glenoaks Blvd Sun Valley, CA 91352 323-875-1342 paul@alcornfence.com	\$32,870.00	Yes

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
	David Leonard
Title	Date
Estimating Manager	04/29/2022

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FORM 4500-4 (DBE Subcontractor Utilization Form)

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: Shimmick Construction Company, Inc.

Name and Title of Bidder’s Authorized Representative: W. Andrew Sloane, III - Executive Vice President

Signature of Bidder’s Representative:  Date: 5/3/22
(SIGN HERE)

City of San Diego

CITY CONTACT: Brittany Friedenreich, Senior Contract Specialist, Email: BFriedenreic@sandiego.gov
Phone No. (619) 533-3104

ADDENDUM A



FOR

MIRAMAR RESERVOIR PUMP STATION (MRPS) IMPROVEMENT PROJECT

BID NO.:	<u>K-22-2058-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>B-19099, B-17190</u>
CLIENT DEPARTMENT:	<u>2000</u>
COUNCIL DISTRICT:	<u>5</u>
PROJECT TYPE:	<u>BJ, BK, BO</u>

BID DUE DATE:

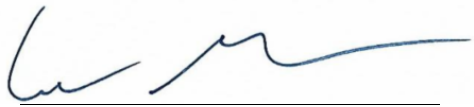
2:00 PM
May 6, 2022

CITY OF SAN DIEGO'S ELECTRONIC BIDDING SITE, PLANETBIDS

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

ENGINEER OF WORK

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



1) Registered Engineer

04/22/2022

Date

Seal:



2) For City Engineer

4/21/2022

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. For the 7' x 18' electrical equipment concrete pad shown on sheet 12, the dowels required are shown on drawing C-5 detail 3. Are these dowels required along the perimeter of the concrete pad only or are they required 12" on center each direction.
- A1. For the 7' x 18' electrical equipment concrete pad shown on sheet 12, dowels are only required on the perimeter of the concrete pad
- Q2. Please provide information on the type of existing material used to backfill around the 66" pipe that is to be demolished.
- A2. This information will be provided to the awarded bidder.
- Q3. On sheet E-2, Electrical Site plan, please provide the thickness for the existing concrete pad that will be getting new conduit installed below it.
- A3. City records indicate pad is 12". Contractor shall verify pad depth in the field.
- Q4. Bidding Documents, Whitebook, General Provisions (A) 7-3.1.2, it is 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. Further, please confirm that terrorism coverage is also provided by the Owner-provided Builders' Risk coverage.
- A4. No, this project is not subject to Public Contract Code Chapter, Contract Clauses -7105. (a). The City is not requiring the contractor to be responsible for acts of God. The OCIP builders risk policy does not provide terrorism coverage.

- Q5. 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."
- A5. The requested revision will not be incorporated.
- Q6. Will weather days be required to be carried in the CPM schedule? If so, how many days?
- A6. See Part 3 of Revised Specification 01 32 00 Construction Progress Documentation of this Addendum
- Q7. Will there be a site visit allowed for this project?
- A7. Site visit cannot be arranged before opening bids.
- Q8. Are there any electrical POC or spare breakers that may be utilized for temp power purposes?
- A8. No electrical POC or spare breakers are available that may be utilized for temporary power.

- Q9. Will the contractor be able to utilize any nearby Water POC?
- A9. A Construction Water connection is not available on-site.
- Q10. On Sheet D-1, Civil Site Demolition, there is a Demo and Removal of Concrete Pad, please provide dimensions of existing concrete pad.
- A10. The approximate dimensions for the existing concrete pad that is to be demolished and removed are 8 ft x 35 ft x 6" in. Contractor shall be responsible for verifying dimensions in the field.
- Q11. On Sheet C-2, Note 3 states 6" Drainpipe, on drawing the pipe then ties into catch basin as a 4" PVC, Please verify if the 6" pipe Transitions to 4" PVC.
- A11. The reference to 4" drainpipe is incorrect. The correct reference is 6" drainpipe. See updated sheet C-2 included in this Addendum.
- Q12. On Sheet D-1, please provide dimensions for the existing irrigation, shed, & Appurtenances.
- A12. The existing irrigation shed has dimensions of approximately 6ft x 10ft x 6ft. Contractor shall be responsible for verifying dimensions in the field.
- Q13. What is the allowed duration for testing and startup of the pumps as it is not stated in spec section 01 91 14 testing, integration, and startup?
- A13. There is no definitive limiting time for testing of the pumps. The Contractor shall submit a testing plan to be reviewed/approved by the City, this plan will include shutdown details.
- Q14. Can there be additional laydown areas allowed besides the laydown area called out on page G-6? Can we utilize the empty lot located to the left of CW2 as a laydown/stockpile area?
- A14. Empty lot located to the left of CW2 cannot be utilized as a laydown/stockpile area.
- Q15. On Sheet G-7, Note 3 states "Reference Bypass Memo for more information on 66-inch pipeline shutdown", but no memo is found. Please provide the bypass memo
- A15. See Bypass Memo in pages 119 through 127 of this Addendum.

- Q16. On Sheet D-1, it says "Demo & Remove EX irrigation, shed, and existing appurtenances", but there are no details for what appurtenances are inside the building. Please provide more information and details about what "appurtenances" are inside the building needing to be removed.
- A16. Equipment appears to be associated with site irrigation which may include, but are not limited to, valves, piping, and appurtenances. Further details are unavailable.
- Q17. On Sheet M-1, it says Note 3 is not used, but there are Note 3 callouts on each pump discharge pipeline. Please specify what this note is for.
- A17. Delete all construction note 3 references on plan and section view. See updated Drawing M-1 included in this Addendum.
- Q18. On Sheet M-1, to the left of the first pump discharge pipeline, there is a callout that the 20" check valve is existing, however Note 1 says to install a new check valve. Please clarify whether this should be a new check valve as specified in the notes, or if it is existing.
- A18. There is an existing check valve that shall be demolished in conformance with demolition note 1 on D-2. A new check valve shall be installed per construction note 1 M-1.
- Q19. On Sheet M-1, to the left of the 48" discharge header, there is a callout that the header drain is existing, however Note 8 says to install a new drain gate valve. Please clarify whether this should be a new a new drain header as specified in the notes, or if it is existing.
- A19. There is an existing header drain. The existing header drain valve shall be demolished per demolition note 6 on D-2. A new drain gate valve shall be installed per construction note 8 M-2.
- Q20. Drawing H-1 general note #6 states all ductworks shall be aluminum with PVC interior and exterior coating, but spec section 23 31 13 Metal Ducts and Accessories in paragraph 2.1.A.1 states ductwork shall be made of galvanized steel. Should general note #6 on drawing H-1 read all ductwork shall be galvanized steel?
- A20. General Note 6 on contract drawing sheet H-1 shall be edited to read as follows: "ALL DUCTWORK SHALL BE GALVANIZED STEEL PER THE CONTRACT SPECIFICATIONS. ALL VENTILATION FAN HOUSINGS SHALL BE ALUMINUM WITH BLADE ELEMENTS WITH FRP/EPOXY COATING. See revised plan sheet included in this Addendum."

- Q21. Regarding note: "Indicates DC Wiring Zone, Modules and Strings within this region to be connected to indicated DC Combiner and Inverter". Where are said Combiners located on the plans? Also, is there spec information and support racking relating to these combiners?
- A21. Referenced note to be removed. Inverters shall be mounted on manufacturer included sleepers. See revised drawing SO-3 included in this Addendum.
- Q22. Is there new duct bank work under Phase 2? Scope of work on SO-1 mentions "Duct banks from CW to PV Equipment Pad" in Phase 2, but it is unclear whether that falls under Phase 1.
- A22. No, all duct bank work was installed in Phase 1. Stub ups are present for Phase 2 work.
- Q23. How many Ballast Trays/Blocks are required per racking assembly?
*putting 2 per racking assembly for now
- A23. See racking sheets SO-13 through SO-51 for details on ballast trays and racking.
- Q24. On the Conduit and Wire Schedule please delineate between Phase 1 and Phase 2 conduit runs.
- A24. See left side for Sheet SO-6 for callouts delineating Phase 1 and Phase 2 notes for delineation.
- Q25. Is the conduit transition from EMT on the tank roof to PVC GRC in duct bank part of Phase 1 or Phase 2 scope of work?
- A25. Conduit transition described is in Phase 2.
- Q26. On page G-7, the flow schematic shows indication that the 84" pipeline will be acting as a bypass for the 66" line during the replacement of this line. Please confirm our interpretation.
- A26. Operation of the 84" line is not part of the scope of work. City operations will work to maintain service to the City through 84" pipeline.
- Q27. Specification 1.7 Section B and E-2. Is contractor required to provide backup generator during the demo and installation of new Stand By Generator?
- A27. Contractor is required to provide emergency power generation during the entire duration of demolition and installation of the new stand by generator as described in the front-end documents.

- Q28. Specification 43 01 50 Section 3.2 B. Should Contractors carry Access Assistant Cost for inspecting interior of 48" pipeline in the LS bid item or can this cost be considered part of BI -13 Field Order Allowance since one does not know if this work will actually be directed by Engineer.
- A28. Access for assistant cost for inspection to be carried in the 48" pipeline lump sum bid.
- Q29. Solicitation Document Paragraph 4. What scope of work should be completed within Intermediate Substantial Completion milestone and what scope of work is part of Substantial Completion milestone?
- A29. See Section 1, General, Terms, Definitions, Abbreviations, Units of Measure and Symbols, Subsection 1-2, Terms and Definitions, item 114, page 127. Intermediate Substantial Completion – The time at which the Project's operating facilities or systems are sufficiently complete to provide the Owner with uninterrupted operations and maintenance of the overall facility as required to perform full flow ramp up and tests of all pumps.
- Q30. Specification 40 80 01 Section 3.3 A. Please confirm that the leak test for the replaced 66" buried pipeline consist only of testing the pipe joint annular space between the fillet welds as described in section 40 80 01 3.3-A and that not hydrostatic testing (with water) of the buried 66" pipeline is required.
- A30. Confirmed. Only the new joints need to be tested.
- Q31. Specification 05 05 23 Welding and Nondestructive Testing mentions a specification for Structural Steel Framing 05 12 00. This specification is not part of the contract documents. Please provide specification 05 05 23.
- A31. Reference to structural steel framing removed from specifications. See new table (Section C of this Addendum) which shall replace existing welding and nondestructive testing table.
- Q32. Spec section 02 41 00 - 3.9 states that the final relocation of the existing generator shall be up to 20 miles from the project site max. Are we allowed to move the existing generator to a different location on the work site before the final relocation?
- A32. No exceptions taken to proposed.

- Q33. Spec section 26 32 13 - 1.1- A -7 (page 3 of the spec section) states that the contractor must obtain the San Diego Air Pollution Control District permit for the stationary generator but in Attachment E of the Supplementary Special Provisions 2-2 Permits, Fees, and Notices, it indicates that the City will obtain, at no cost to the Contractor, the Air Pollution Control District permit. Is this indicating that the City will be obtaining this permit for the generator or is this stating that there are two separate air pollution control district permits and one will be obtained by the Contractor while another will be obtained by the City? Please clarify.
- A33. City will obtain permit for the new generator. Technical Specifications Section 26 32 13 is modified in this Addendum.
- Q34. Spec section 01 31 13 - 1.6 states that several pre-scheduled temporary full pump station shutdowns will be taking place. Please state what those exact dates are.
- A34. Shutdowns described in spec section 01 31 13 subsection 1.6.8. refers to prescheduled shutdowns that are inherit in the work required for the project. This item does not refer to predetermined shutdowns outside of the scope of this project.
- Q35. See Drawing M-2 Detail 1, Steel Pipe Spools and Flexible Coupling. Here the 20" spools are referred to as cement mortar lined and epoxy coated, but in the Piping Schedule they are referred to as fusion bonded epoxy lined/polyurethane enamel coated. Please clarify the intended lining and coating for the 20" steel pipe.
- A35. Coating shall be per Spec Section 09 90 00.
- Q36. See Drawing M-1 Note 8. The note calls for a 2-1/2" flanged x threaded gate valve on the 48" discharge header, however the listed manufacturers for the gate valve have stated that they do not have this type of gate valve in this size. Please provide an optional drain gate valve size other than the 2-1/2" size that may fit the 48" discharge header.
- A36. The Contractor shall provide a steel threaded by flanged adapter to mate with a flanged-by-flanged valve.

- Q37. See Drawing M-1. On the Plan View, there are two Note 4 (Pressure Gauge and Switch Assembly) callouts on each pump discharge piping, however on Section A, there is one Note 4 (Pressure Gauge and Switch Assembly) and one Note 5 callout (Air Release Assembly). Please clarify the correct number of pressure gauge and switch assemblies and air release assemblies for each pump.
- A37. On section A, construction note 4 is not shown because the assembly is out view of the section cut. On the plan view, construction note 5 is missing on the discharge side of each pump. Each pump assembly shall have pressure gauge and pressure switch assembly on the discharge side per detail 2 M-2 and each pump assembly shall have an air release assembly per detail 3 on M-2.
- Q38. See Drawing M-1 and the P&ID on Drawing I-3. The P&ID shows one Pressure Gauge and Switch assembly before the pump and another one after the pump. Drawing M-1 only shows the Pressure Gauge & Switch assembly after the pump. Please confirm if we need to install two new Pressure Gauge & Switch assemblies or if one is exiting.
- A38. Each pump assembly shall have pressure gauge and pressure switch assembly on the discharge side per detail 2 M-2 and each pump assembly shall have an air release assembly per detail 3 on M-2.
- Q39. The "PLANS 41085-01-D through 41085-097-D" document indicates that the PV module shall be "400W rated". The 400W PV modules are no longer commercially available. Please provide clarification on what the substitutive PV module wattage should be.
- A39. As long as you stay below the Voc and Isc direct current source circuit requirements spelled out in NEC 690, you can select any module wattage available. Please provide supporting circuit calculations for string circuit sizes. Also, please ensure that the Vmp and Imp string ratings are in line with MPPT windows on the inverter input circuits.
- Q40. Please provide clarification on how bidders should approach the impact that the substituted PV module will have on the PV system design issued in the "for bid" set of plans. Will revised plans be issued via an Amendment?
- A40. As long as you stay below the Voc and Isc direct current source circuit requirements spelled out in NEC 690, you can select any module

wattage available. Please provide supporting circuit calculations for string circuit sizes. Also, please ensure that the Vmp and Imp string ratings are in line with MPPT windows on the inverter input circuits.

Q41. SO-5/ SO-3 Please specify where cable tray or conduit should be used for AC runs on the roof. e

A41. Cable tray and conduit use for AC on the roof shall be determined by the Contractor and shall be in conformance with the contract documents.

Q42. Spec section 40 27 00.03 only includes pipe up to 48", what specifications should we use for the 66" PCCP?

A42. Refer to Section 209- Pressure Pipe and subsections added to this Addendum.

Q43. DWG M-1 & Spec 09 90 00 Specification section 40 27 00 indicates that the 20" RW on DWG M-1 shall be FBE/PE lined and coated, but detail 1/M-2 calls out the steel spools as Cement Mortar lined and epoxy coated. Please indicate the correct lining and coating of the 20" RW steel pipe.

A43. Coating shall be per Spec Section 09 90 00.

Q44. SO-5/ SO-3 Please confirm that the solar module, solar inverters, and solar racking are not sole-sourced to the manufacturer on sheet SO-10.

A44. Solar module, solar inverters, and solar racking are not sole sourced to the manufacturer on sheet SO-10.

Q45. There is mention in the specs for the Pump Rehabilitation that the pump parts must be UL listed clean water compliant. Do the pumps themselves need to be UL listed clean water compliant?

A45. See specification section 43 01 20 for vertical turbine pump rehabilitation requirements.

Q46. Please provide a bolt connection detail for the re-install of the vertical turbine pumps and motors.

A46. See specification section 43 01 20 -10 for pump assembly installation instructions. No detail because the existing pumps and motors are being removed and reinstalled. Photo 1 on sheet D-2 shows the pump assembly for reference.

Q47. 01 31 13 - 1.2(B) - Please provide SDG&E Drawings for upgraded service.

A47. There are currently no SDGE upgraded service drawings available. Drawings will be available to the awarded bidder.

C. ATTACHMENTS

1. To Attachment D , Item 10, Wage Rates, pages 68 through 96, **DELETE** in their entirety and **SUBSTITUTE** with pages 37 through 72 of this Addendum.

D. SUPPLEMENTARY SPECIAL PROVISIONS

1. To **SECTION 209 – PRESSURE PIPE**, page 167, **ADD** the following:

209-2.1 General. To the GREENBOOK. DELETE in its entirety and SUBSTITUTE with the following:

This subsection specifies steel pipe and fittings up to 66-inch (1676 mm) diameter for the transmission and distribution of raw, potable, or recycled water under pressure. Steel pipe shall be of the size, type, and cylinder wall thickness or pressure class shown on the Plans or specified in the Special Provisions.

209-2.2 Fabricated Steel Pipe and Fittings. To the GREENBOOK, ADD the following:

All flanges shall be Class E.

209-2.2.1 Materials. To the "WHITEBOOK", Table 209-2.2.1, ADD the following:

CEMENT MORTAR COATING	<p>Cement shall be Type II, low alkali, conforming to the requirements of ASTM C150. Provide sand conforming to ASTM C33 provided that 100 percent of the sand shall pass a No. 4 sieve for cement mortar coating applied directly in contact with a dielectric coating.</p> <p>Water shall be free of organic materials and other impurities which might reduce the strength, durability or other quality of the cement mortar. Water shall have a pH of 7.0 to 9.0, a maximum chloride concentration of 500 mg/l (per Caltrans test method 422), and a maximum sulfate concentration of 500 mg/l (per Caltrans test method 417).</p> <p>Reinforcement for pipe diameters larger than 36 inches shall be Size W-1.2 welded wire fabric conforming to ASTM A185. Spacing shall be two inches center to center for longitudinal members and four inches center to center for transverse members (2x4-W1.2xW1.2). Crimped wire fabric reinforcement is not allowed. The wire need not be galvanized. Do not use excessively rusted fabric. Installed fabric shall be free from dirt and paint or other coating material.</p> <p>Steel wire conforming to ASTM A82 may be used as a reinforcement for mortar coatings for pipe diameter 36 inches or less, except for specials and fittings which by their shape are not suited for its use.</p> <ol style="list-style-type: none"> 1. Apply a one-inch thick reinforced cement mortar coating in accordance with AWWA C205. The cement mortar coating shall consist of not more than 4-1/2 cubic feet of sand to one sack of cement (94 pounds). 2. Leave an uncoated three-inch holdback from the end of the cold-applied plastic tape to the cement mortar coating at each pipe end to permit field tape coating of the joints. Allow sufficient length of holdback for other pipe coatings to provide clearance for coating joints in the field. 3. Apply the mortar coating in a one station operation with no lapse of time between application of adjacent mortar coating layers so that no sloughing will occur at any time during or following its application. If, for any reason, it is necessary to interrupt mortar placement for a sufficient length of time, whereby the material takes a permanent set (i.e., a construction joint is formed), form a shoulder by shooting the mortar against a backing strip, or cut back with a trowel or other suitable tool the irregular edges of the material last placed to a clean, unbroken surface perpendicular to the face to provide a suitable connection or construction joint between such material and the material to be subsequently placed. Do not shatter or disturb the material remaining in place nor disturb the embedded welded-wire fabric. Before placing fresh material against the surfaces of such joints, carefully clean and wet these surfaces to insure a good bond between the fresh material and that previously placed. Featheredged construction joints will not be permitted. As soon as the material has hardened sufficiently, in the opinion of the Engineer, thoroughly wet with water the exterior of the mortar coating and thereafter cure. 4. Place the wire reinforcement after application of a 3/8 inch thick layer of mortar over the pipe coating. The wire shall not be in contact with the pipe coating or the steel cylinder. Following the placement of wire reinforcement, moisten surface and apply a second layer of mortar 5/8
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	<p>inch thick over the wire to bring the total thickness of the mortar to the specified thickness.</p> <p>5. Provide suitable means for checking the thickness of the coating applied.</p> <p>CURING OF MORTAR COATING</p> <p>1. After the initial set has taken place, cure the mortar coating using the water-spray, steam, or sealing compound methods. Do not interchange methods without written approval from the Engineer.</p> <p>a) Water-spray method. Begin water-spray curing method as soon as the pipe or special can be sprinkled with water without damage to the coating. Keep the coating continually moist by intermittent or continuous spray for a minimum of 96 hours. Use the water-spray method only when the minimum ambient temperature exceeds 40 degrees F at all times during the curing period. No credit will be allowed for any curing time during which the temperature drops below 50 degrees F.</p> <p>b) Steam Curing Method. Begin the steam curing within four hours after completion of the coating operation. Keep the coating continually moist by intermittent or continuous spray until steam curing begins. Maintain the minimum relative humidity at 85 percent with a curing temperature not exceeding 90 degrees F for the first three hours. Increase the curing temperature to between 110 degrees F and 150 degrees F maintaining the minimum relative humidity at 85 percent for the next 20 hours. Do not exceed the maximum allowable temperature for dielectric coated pipe.</p> <p>c) Sealing compound method. The sealing compound shall conform with SSPWC. The mortar coating shall be kept continuously wet by means of an adequate water spray or sprinkling system during the interval of time elapsing before application of the sealing compound. When the sealing compound is dry, a dense coat of whitewash shall be applied thereon, except that whitewash will not be required on white-pigment compound. Whitewash material shall conform to the requirements of Section 2.7 of AWWA C203.</p> <p>STORAGE/HANDLING</p> <p>1. Protect the pipe coating from damage during transportation and installation of the pipe, and restore any damaged portions of the coating to a condition equal to that specified herein for the original work. At the fabrication plant use belt slings or padded forklifts to transport or handle the coated and/or lined pipe sections. In no event shall pipe be transported from the coating yard until after the exterior mortar coating has attained an age of seven days.</p>
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209-2.2.1 Materials. To Table 209-2.2.1, **“Lining and Exterior Coating (Required on exposed steel surfaces and ring joints)”, “Cold-Applied Tape Exterior Coatings”,** ADD the following:

<p>Lining and Exterior Coating (Required on exposed steel surfaces and ring joints)</p>	<p>Cold-Applied Tape Exterior Coatings</p>	<p>General</p> <ol style="list-style-type: none"> 1. Provide factory cold-applied plastic tape coating in accordance with AWWA C209, AWWA C214, and as specified herein. Furnish plant and field applied primer and plastic tape, and plant and field applied repair tape by a single manufacturer. Meet or exceed the physical properties of tape materials for plant and field application criteria listed when tested in accordance with the methods described in AWWA C209 and AWWA C214, Section 4.12, "Coating System Tests." 2. The tape coating systems consist of an exterior cold-applied plastic tape on the bare metal surface of steel pipe with a cement mortar coating applied over the tape system. Tape coating systems are specified for: <ol style="list-style-type: none"> a) normal plant cold-applied tape; b) plant cold-applied tape for special sections, connections and fittings, and plant repairs of cold-applied tape; and c) field joint, field coated fittings and repair of field cold-applied tape. <p>Primer</p> <ol style="list-style-type: none"> 1. Primer shall be comprised of 100 percent butyl rubber with resins for adhesion, cathodic disbonding and stress corrosion cracking inhibitors. The primer shall be Polyken #1039 primer with the following properties. <ol style="list-style-type: none"> a) Percent Solids: ≥ 18 percent b) Flash Point: $>+109$ degrees F c) Viscosity: Thin syrup <p>Storage Primer</p> <ol style="list-style-type: none"> 1. Storage primer on the exposed steel at the tape cutbacks shall be Polyken #924, with the following properties. <ol style="list-style-type: none"> a. Color: Black b. Base: Synthetic natural rubber and resin c. Solvent: Naphtha, toluene blend d. Total Solids: 19 percent by weight e. Viscosity: Thin syrup f. Flash Point: $>+10$ degrees F <p>Plant Cold-Applied Plastic Tape System</p> <ol style="list-style-type: none"> 1. Anti-corrosion inner layer tape shall be Polyken #989, with the following properties: <ol style="list-style-type: none"> a) Tape Color: Black b) Backing: Consist of a minimum 98 percent blend of high and low density polyethylene with the remaining portion a blend of colorants and
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		<p>stabilizers.</p> <ul style="list-style-type: none"> c) Adhesive: Consist of a 100 percent butyl based elastomers with resins for adhesion, cathodic disbonding, and long-term in-ground performance. d) Thickness: <ul style="list-style-type: none"> i. Total thickness: 20 mil ii. Backing: 9 mil iii. Adhesive: 11 mil iv. Tolerance: minus 5%, plus 10%. e) Tensile Strength at Break: ≥ 30 lb/in width f) Elongation at Break: ≥ 200 percent g) Adhesion to Steel: ≥ 100 oz/in width h) Adhesion to Primed Steel: ≥ 300 oz/in width i) Adhesion to Backing: \geq to 40 oz/in width j) Dielectric Strength: \geq to 20 kV k) Insulation Resistance: 1×10^{12} ohms l) Water Vapor Transmission: $< 0.2\text{gm}/100\text{in}^2/24$ hr at 70 degrees F m) Cathodic Disbonding at 68 degrees F, for 30 days: 0.2 in² (ASTM G8) n) Shear Resistance at 68 degrees F for four weeks: 0.2 mm/day o) Hydrolytic Stability, 200hrs at 98 degrees C H₂O, Adhesion: > 150 oz/in p) Thermal Stability, 2,000 hrs at 100 degrees C air, Adhesion: > 150 oz/in <p>2. First mechanical outer layer tape shall be Polyken # 955, with the following properties:</p> <ul style="list-style-type: none"> a) Tape Color: Gray b) Thickness: <ul style="list-style-type: none"> i. Total thickness: 30 mil ii. Backing: 25 mil iii. Adhesive: 5 mil iv. Tolerance: minus 5%, plus 10%. c) Tensile Strength: ≥ 45 lb/in width d) Elongation: ≥ 200 percent e) Adhesion to Backing: 40 oz/in width f) Water Vapor Transmission: $< 0.2\text{gm}/100\text{in}^2/24$ hr at 70 degrees F g) Dielectric Strength: ≥ 25 kV <p>3. Second mechanical outer layer tape shall be Polyken #956 UV1 having UV protection properties as follows. Provide certification of UV protection.</p> <ul style="list-style-type: none"> a) Tape Color: White b) Backing: Consist of a minimum 96 percent blend of high and low density polyethylene with the remaining portion a blend of colorants and
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		<p>stabilizers.</p> <p>c) Adhesive: Consist of a 100 percent butyl based elastomer with resins for adhesion, and long term in-ground performance.</p> <p>d) Thickness:</p> <p>i. Total thickness: 30 mil</p> <p>ii. Backing: 25 mil</p> <p>iii. Adhesive: 5 mil</p> <p>iv. Tolerance: minus 5%, plus 10%.</p> <p>e) Tensile Strength: ≥ 55 lb/in width</p> <p>f) Elongation: ≥ 200 percent</p> <p>g) Adhesion to Backing: 60 oz/in width</p> <p>h) Water Vapor Transmission: $< 0.2\text{gm}/100\text{in}^2/24$ hr at 70 degrees F</p> <p>i) Dielectric Strength: ≥ 25 kV</p> <p>4. Total coating system shall be the Polyken YGIII system, with the following properties:</p> <p>a) 100% Polyethylene based backings with colorants and stabilizers. 100% Butyl based elastomers.</p> <p>b) Adhesion to Steel: ≥ 100 oz/in</p> <p>c) Adhesion to Backing: ≥ 60 oz/in width</p> <p>d) Adhesion to Primed Steel: ≥ 300 oz/in</p> <p>e) Tensile Strength: ≥ 85 lb/in width</p> <p>f) Elongation: $> 200\%$</p> <p>g) Dielectric Strength: ≥ 20 kV</p> <p>h) Insulation Resistance: 1×10^{12} ohms</p> <p>i) Water Vapor Transmission: $\leq 0.25\text{gm}/100\text{in}^2/24$ hr at 70 degrees F</p> <p>j) Cathodic Disbonding at 68 degrees F for 30 days: 0.2 in² (ASTM G8)</p> <p>k) Shear Resistance at 68 degrees F for 4 weeks: 0.2 mm/day</p> <p>l) Impact: 90 in-lbs.</p> <p>m) Penetration: 11-15%</p> <p>Plant Cold-Applied Plastic Tape Coatings for Special Sections, Connections and Fittings, and Plant Repair</p> <p>1. Anti-corrosion inner layer shall be Polyken #932-50, with the following properties:</p> <p>a) Backing: Consist of a minimum 96 percent blend of high and low density polyethylene with the remaining portion a blend of colorants and stabilizers.</p> <p>b) Adhesive: Consist of a 100 percent butyl based elastomer with resins for adhesion, cathodic disbonding, and long-term in-ground performance.</p> <p>c) Thickness:</p> <p>i. Total Thickness: 50 mil</p>
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		<ul style="list-style-type: none"> ii. Backing: 40 mil iii. Adhesive: 10 mil iv. Tolerance: minus 5%, plus 10%. d) Tensile Strength: ≥ 25 lb/in width e) Elongation: $\geq 150\%$ f) Adhesion to Steel: 225 oz/in width g) Adhesion to Backing: 60 oz/in width h) Water Vapor Transmission: $< 0.2\text{gm}/100\text{in}^2/24$ hr at 70 degrees F i) Dielectric Strength: ≥ 28 kV <p>2. Mechanical layer outer tape for plant fittings and plant repair cold-applied plastic tape shall be Polyken #955, with the following properties:</p> <ul style="list-style-type: none"> a) Backing: Consist of a minimum 96 percent blend of high and low density polyethylene with the remaining portion a blend of colorants and stabilizers. b) Adhesive: Consist of a 100 percent butyl based elastomer with resins for adhesion, and long term in-ground performance. c) Thickness: <ul style="list-style-type: none"> i. Total thickness: 30 mil ii. Backing: 25 mil iii. Adhesive: 5 mil iv. Tolerance: minus 5%, plus 10%. d) Tensile Strength: ≥ 45 lb/in width e) Elongation: $\geq 200\%$ f) Adhesion to Backing: 40 oz/in width g) Water Vapor Transmission: $< 0.2\text{gm}/100\text{in}^2/24$ hr at 70 degrees F h) Dielectric Strength: ≥ 25 kv <p>Field Joint, Field Coated Fittings, and Field Repair Cold-Applied Plastic Tape</p> <p>1. Joint filler tape to be Polyken #939, with the following properties:</p> <ul style="list-style-type: none"> a) Tape Color: Black b) Thickness: 125 mil c) Elongation: $> 600\%$ d) Solids Content: 98% minimum e) Penetration Hardness: 85-105 DMM (300 GM moving load) f) Low Temperature Flexibility: No cracking when bent around a one-inch mandrel at minus 10 degrees F g) Chemical Resistance: No visible deterioration after 30 days immersion in the following solutions: 5% Caustic Potash; 5% HCL, 5% H2SO4; Saturated HS <p>2. Field joint, field fitting, and field repair outer layer tape shall be Polyken #932-50, as specified herein.</p>
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		<p style="text-align: center;">Cold-Applied Plastic Tape Coating</p> <ol style="list-style-type: none"> 1. Apply plastic tape coating in accordance with AWWA C214, C209, and as modified herein. 2. Certificate of Compliance: Prior to shipment of pipe, furnish a certificate of compliance stating that tape materials and work furnished hereunder will comply or have complied with the requirements of these specifications and AWWA C209 and C214. The certification shall be substantiated by the tape manufacturer's production quality control test results. The tape manufacturer shall supply test data on each batch used. 3. The tape manufacturer shall furnish a representative to provide assistance during the initial application of all tape materials to ensure proper installation. <ol style="list-style-type: none"> a) Retain the tape manufacturer representative for a minimum of five consecutive working days of tape coating for each project heading. At the completion of the five-day period, the tape material manufacturer's representative shall meet with the Contractor and Engineer to review and update the tape coating operation plan. If, in the opinion of the Engineer, significant modifications to the tape coating operations are identified in the initial five day inspection period, retain the tape material manufacturer's representative for an additional length of time, as necessary to correct all deficiencies in the application of the tape coating system. b) The tape manufacturer representative shall be retained by the Contractor for the duration of the work and shall respond to periodic field problems and questions from the Contractor and Engineer within a sufficient time period so as not to cause delay in the installation and backfill of pipe. Costs incurred for retention of the tape manufacturer's representative shall be borne by the Contractor. c) Properly document any modifications to the pipe manufacturer's tape coating operation and submit within three working days to the Engineer in accordance with shop drawing submittal procedures. <p style="text-align: center;">Straight Run Pipe Application</p> <ol style="list-style-type: none"> 1. For straight run pipe, plant applied conditions, the cold-applied plastic tapes shall be a four layer system consisting of: (1) primer; (2) corrosion prevention tape (inner layer); (3) mechanical protective tape (first outer layer); and (4) mechanical protective tape (second outer layer).
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		<ol style="list-style-type: none"> 2. Perform the entire coating operation as a one station operation where the pipe is supported at the ends in a manner which will permit the application of the primer, plastic tape, and cement mortar coating. Do not allow additional handling following the initial setup of the pipe section, from application of primer, tape coating, and cement mortar coating. No application involving rollers to support the pipe during the primer application, plastic tape, or cement mortar coating application will be permitted. 3. Perform the entire coating operation by experienced workers skilled in the application of cold-applied plastic tapes and cement mortar coating under qualified supervisors. The Engineer is to be immediately informed of any personnel changes associated with the pipe coating operation. 4. All equipment for blasting and application of the tape coating system shall be of such design and condition to comply with all the requirements of these specifications. Immediately repair or replace equipment which, in the opinion of the Engineer, does not produce the required results. Include equipment and a repair procedure for correcting defective tape application for use under this specification in the steel pipe fabrication plan. Make available for review a copy of this portion of the fabrication plan, and any updates, at the location of the coating operation, and a repair procedure for correcting defective tape application. 5. Remove the exterior weld bead along the entire exterior surface of the pipe. The exterior weld bead shall be flush with the exterior surface of the pipe with a tolerance of plus 1/64 inch. Removal of the weld bead is to be conducted in such a manner that no gouging or nicking of the plate surface will occur. This operation is to result in a smooth exterior surface with no ridges or valleys which may result in bridging or disbonding of the tape from the surface of the pipe. 6. Surface preparation shall conform to AWWA C214 and the following. <ol style="list-style-type: none"> a) Bare pipe shall be clean of all foreign matter such as mud, mill lacquer, wax, coal tar, asphalt, oil, grease, or any contaminants. Wash off any chemical solutions used in cutting or welding with hot water and allow the surface to dry. Remove welding slag or scale from all welds by wire-brushing, hammering, or other satisfactory means. Remove welding splash globules prior to priming. b) Prior to blast cleaning, inspect surfaces and, if required, preclean in accordance with the requirements of SSPC SP-1, Solvent Cleaning, to remove oil, grease, and all foreign deposits. Remove
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		<p>visible oil and grease spots by solvent wiping. Use only approved solvents that do not leave any residue. Include in the -manufacturer's fabrication plan the cleaning solvent applications procedure and safety precautions. Preheating to remove oil, grease, and mill scale will be permitted; provided, that the pipe is to be cement mortar lined in the field; and provided, all pipe is preheated in a uniform manner to avoid distortion. Do not exceed preheat temperatures of 500 degrees Fahrenheit.</p> <p>c) Use on all affected steel-plate work, suitable and effective measures for eliminating the inclusion of gas forming elements, or other detrimental conditions, in any of the shop or field welds which results in any condition found to be detrimental to the successful application and bonding of primer, plastic tape, and cement mortar coating. Said measures to include time-curing the pipe sufficiently, thoroughly neutralizing the gas forming elements, or other approved treatment.</p> <p>7. Blast cleaning shall conform to AWWA C214 and the following.</p> <p>a) Blast the pipe surface using a commercially available shot grit mixture to achieve a prepared surface equal to that which is specified in SSPC SP-6, Commercial Blast Cleaning.</p> <p>b) For plant mortar-lined pipe, perform blast cleaning of said exterior surfaces after the initial curing of the spun mortar lining. Perform the exterior blast cleaning in such a manner as not to endanger the mortar lining in the pipe. Completely remove corrosion and foreign substances from the exterior of the pipe in the blastcleaning operation, and apply primer immediately after completion of blast cleaning.</p> <p>c) The shot grit mixture shall not exceed 40 percent shot to 60 percent grit. The shot grit mixture is to be determined prior to the start of blast cleaning operations and this mixture ratio is not to be modified throughout the duration of the blast cleaning operations without the written approval of the Engineer.</p> <p>d) Achieve from abrasive blasting an anchor pattern profile a minimum of 1.0 mil, but not exceeding 2.0 mils. Provide anchor pattern standards in the form of a three-dimensional standard plate which depicts a commercial blast profile. Prepare a sample of the</p>
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		<p>blasted surface on a representative steel plate measuring six inches by six inches by 1/4 inch or purchase standard industry plate samples of various blast finishes for comparisons. Purchase standard plates from NACE, meeting NACE TM-01-75, and conforming to NACE No. 3 standard using grit. Establish by agreement with the Engineer the visual standards that meet the specified anchor pattern and degree of cleanliness. Upon the establishment of the said standards, seal the steel plate using a clear acrylic coating, moisture proof plastic bag, or other approved means to protect the plate from surface contamination or corrosion. Use this plate as a visual comparator during the blastcleaning and coating operations. Measure the anchor pattern or profile of the blasted surface using comparator tape as specified herein.</p> <ul style="list-style-type: none"> e) Inspect the blast cleaned exterior pipe surface for adequate surface preparation prior to application of the primer. Surface comparitor tapes are to be used by the manufacture in at least eight random areas, selected by the Engineer, along any given 40-foot length of pipe. The results of the surface comparator tapes are to be documented on the quality control sheet for each pipe section. f) Coat each pipe section with primer and tape within the same day of being blast cleaned. Do not allow blasted and/or blasted and primed pipe to sit overnight. All blasted and primed pipe must be coated by the end of the day. No coating will be permitted on pipe sections showing evidence of rust. <p>8. Primer application shall conform to AWWA C214 and the following.</p> <ul style="list-style-type: none"> a) Prior to primer application, clean the pipe surface free of foreign matter such as sand, grease, oil, grit, rust particles, and dirt. b) Apply the primer in a uniform thin film at the coverage rate recommended by the manufacturer. Meet the recommendations of the manufacturer for the state of dryness of the primer prior to the application of the inner layer of tape. Make available at all times, primed surfaces for inspection prior to the application of the inner layer tape. Maintain adequate safety precautions, as outlined in the manufacturer's fabrication plan, throughout the application of the primer.
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		<p>c) Limit the application of primer to that length of pipe which can be taped within the same work day. Pipe coated with primer which was not taped within the same work day shall be rejected at the discretion of the Engineer. The primer shall be removed and the surface shall be re-primed.</p> <p>d) Protect primer coated pipe sections from moisture, dirt, sand, and other potentially contaminating materials. Protect priming operations from, or suspended during, times of high wind. Sections not adequately protected shall be rejected by the Engineer. If rejection occurs due to contamination of the primer, completely remove the primer from the exterior of the pipe section and re-prime the surface.</p> <p>e) Thoroughly mix the primer by agitation using Jiffy Mixer or an approved equal powered by air or explosion proof electric motor. Continuously mix and agitate primer during application to prevent settling or lumping.</p> <p>f) Apply primer only to a dry pipe surface. Whenever the ambient air temperatures are cold enough to cause gelling of the primer, the use of heaters will not be permitted to return the primer back to a fully liquid state. Use new primer at a minimum of 40 degrees F.</p> <p>g) Apply storage primer to the exposed steel pipe at tape cutbacks to prevent oxidation of the cleaned metal surface. Spray apply minimum of 1-1/2 mils and maximum of 2-1/2 mils of storage primer to exposed steel per the manufacturer's recommendations. Do not place storage primer on the edge of the steel plate.</p> <p>h) Certify the solvent of the primer and storage primer by the manufacturer stating compliance with air pollution control rules and regulations and all requirements of agencies and other governmental bodies having jurisdiction. Include air pollution control rules and regulations regarding the application of the primer in the manufacturer's fabrication plan.</p> <p>9. Inner layer tape application:</p> <p>a) Apply the inner layer tape directly onto the primed surface using approved mechanical dispensing equipment to assure adequate, consistent tension on the tape as recommended by the tape manufacturer. Use rollers to apply</p>
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		<p>pressure on the tape as it comes in contact with the pipe. Make necessary adjustments to mechanical application equipment to assure a uniform, tight coating. Maintain a tight, smooth, mechanically induced, wrinkle-free coating throughout application process.</p> <ul style="list-style-type: none"> b) The application of tension shall be such that the width of tape will be reduced between 1-1/2 to 2 percent of tape width prior to the pull. Provide a pressure readout gauge and chart recorder, suitable to the Engineer, with the tape let-off machine to document the tape tension during application. c) Apply inner layer tape at a minimum roll temperature of 70 degrees F. Continuously monitor the temperature of the tape within 12 inches of the point of contact with the pipe surface. Use a chart recorder, suitable to the Engineer, to document the temperature of the tape during application. Sections where the tape application tension and temperature is not maintained within manufacturer's recommendations shall be rejected, and the tape removed from the entire pipe section and reapplied. d) Continuously electronically test the inner tape layer at 6,000 volts immediately following application of the tape by a holiday tester permanently mounted to the tape application station and equipped with an indicator light and audio buzzer, suitable to the Engineer to alert the workmen of the presence of holidays in the coating system. e) Spirally wrap the inner layer tape over longitudinally welded pipe; however, for spiral welded pipe, the angle of the inner layer tape shall be wrapped as parallel as practicable to the spiral weld of the pipe or as approved by the Engineer. Provide a one inch nominal tape overlap, minimum overlap 3/4 inch. f) Splice each new roll by overlapping the new tape over the end of the preceding roll by at least six inches. Perform this end lap splice by hand or by a mechanical applicator such that the splice is wrinkle free and maintains the continuity of the inner wrap coating. Maintain the wrapping angle of the new roll parallel to
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		<p>that of the previous roll.</p> <p>g) Provide cutbacks ten inches from and parallel to the end of the pipe. Perform cutbacks using a cutting device that is guided from the end of the pipe to insure a uniform, straight cutback.</p> <p>10. Mechanical outer layer tape application:</p> <p>a) Apply the first mechanical outer layer of tape over the inner layer tape using the same type of mechanical equipment used in the application of the inner layer tape. No overlap splice of the other layer coinciding with the overlap splice of the inner layer will be permitted. Provide a minimum six-inch separation between overlap of splices. Apply two mechanical outer layers of tape as specified herein. The inner layer tape shall be electrically tested, inspected, and approved prior to the application of the first mechanical outer layer tape and the first mechanical outer layer tape shall also be visually inspected and approved prior to the application of the second mechanical outer layer tape. Ensure that both mechanical outer layer tapes are smooth, tight, and wrinkle-free.</p> <p>b) Apply mechanical outer layer tapes in accordance with the requirements for the inner layer tape, except that the minimum tape roll application temperature shall be 90 degrees F. Monitoring for tension and temperature will be required for the mechanical outer layer tapes. The use of rollers to apply pressure on the tape is not required during application of the mechanical outer layer tapes. Holiday testing of the mechanical outer layer tapes is not required during tape application. Test the complete tape system prior to coating as specified herein.</p> <p>11. Storage primer application shall conform to AWWA C214 as modified herein:</p> <p>a) Prior to storage primer application, clean the pipe surface free from foreign matter such as sand, grease, oil, grit, rust particles, and dirt.</p> <p>b) Thoroughly mix the primer by agitation using Jiffy Mixer or an approved equal powered by air or explosion proof electric motor. Continuously mix and agitate primer during application to prevent settling or lumping.</p> <p>c) Apply primer only to a dry pipe surface. Whenever the ambient air temperatures are</p>
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		<p>cold enough to cause gelling of the primer, the use of heaters will not be permitted to return the primer back to a fully liquid state. Use new primer at a minimum of 40 degrees F.</p> <p>d) Apply storage primer to the exposed steel pipe at tape cutbacks to prevent oxidation of the cleaned metal surface. Spray apply minimum of 1-1/2 mils and maximum of 2-1/2 mils of storage primer to exposed steel per the manufacturer's recommendations. Do not place storage primer on the edge of the steel plate.</p> <p>e). Certify the solvent of the primer and storage primer by the manufacturer stating compliance with air pollution control rules and regulations and all requirements of agencies and other governmental bodies having jurisdiction. Include air pollution control rules and regulations regarding the application of the primer in the manufacturer's fabrication plan.</p> <p style="text-align: center;">Fittings Coated at the Plant</p> <ol style="list-style-type: none"> 1. Coat fittings which cannot be machine coated in accordance with AWWA C209 using materials as specified herein. Weld bead preparation, surface preparation, blast cleaning, primer and tape application shall be as specified for straight run pipe. Apply an inner layer tape of Polyken # 932-50 with a one-inch nominal, 3/4-inch minimum, tape overlap on all plant coated fittings. Apply an outer layer of cold-applied plastic tape as specified herein with a 55 percent overlap on all plant coated fittings. Provide a minimum thickness of 110 mils for the total tape coat system for plant coated fittings. 2. When more than 30 percent of the tape coating is removed from the circumference of the pipe for the installation of fittings, remove the tape coating system remaining on the pipe. Reprime and retape the fitting and pipe in accordance with these specifications. 3. Test all completed tape coated fittings in the presence of the Engineer with an electrical flaw detector prior to installation of cement mortar coating. Applied voltage shall be in the range of 11,000 to 15,000 volts. Repair any holidays found. 4. Follow the procedure described herein for tape coating repair for fittings and field joints. Repair cement mortar coating defects in accordance with these specifications. 5. Apply cement mortar coating in accordance with Section 209-2.2.1 modified within these SSPs, over the tape coated fittings immediately after completion of tape coating, testing, and inspections.
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		<p style="text-align: center;">Coating of Field Joints</p> <ol style="list-style-type: none"> 1. Field cold-applied plastic tape coating shall be in accordance with AWWA C209, as modified herein. 2. Prior to welding any field joints, wrap an 18 inch strip of heat resistant material over the entire coated pipe sections on each side of the joint to be welded to avoid damage to the plant applied coating by the hot weld spatter. Do not use the coated portion of the pipe for grounding. 3. Immediately prior to exterior welding of the pipe for double welded lap joints, remove storage primer and wire brush area to be welded per the manufacturer's recommendations. 4. No tape coating will be permitted until the welding has been completed and the pipe section has cooled sufficiently so as not to damage the integrity of the tape coating system. 5. Do not permit trapped air under the tape in the joint. 6. After joint welding, remove flash rusting by mechanical means such as a wire brush. Wire brush the weld, storage primed steel and all exposed steel. Remove all burrs and weld slags to achieve a smooth surface. 7. Clean the pipe surface free of mud, mill lacquer, wax, tar, grease, or any foreign matter. Remove visible oil or grease using an approved solvent that will not leave any residue on the pipe surface. The pipe surface shall be free of any moisture and all foreign matter prior to the application of primer. 8. Prior to the application of the field applied tape coating, test the plant applied tape coating in the presence of the Engineer with an electrical flaw detector. Repair all holidays and physical damage to the plant applied tape coating prior to application of the field applied tape coating. 9. Pack irregularities in joint with elastameric joint filler. 10. Apply primer by brush or roller (four mil wet, one mil dry). 11. After primer has dried, apply tape to the joint and extend a minimum of three inches onto the mill coat. End splices shall be a minimum of six inches and shall be staggered. The tape coating shall overlap at least three inches on the adjacent tape wrap. Maintain 55 percent overlap on all field joint tape to produce a minimum thickness of 100 mils. 12. Apply tape with sufficient tension to conform with the surface irregularities. The finished wrap shall produce a smooth, wrinkle-free surface. 13. Test the final applied tape coating in the presence of the Engineer with an electrical flaw detector. Repair all holidays and physical damage to the final applied tape coating prior to application of the mortar coating. 14. Apply mortar coating in accordance with with Section 209-2.2.1 modified within these SSPs over the tape coated joint
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		<p>immediately upon completion of tape wrapping, testing, and inspections.</p> <p style="text-align: center;">Inspection of Tape Coating</p> <ol style="list-style-type: none"> 1. Perform all coating work in the presence of the Engineer. Any coatings applied in the absence of the Engineer may be rejected. <ol style="list-style-type: none"> a) Provide the Engineer with reasonable facilities and space, at the Contractor's expense, for the inspection, testing, and obtaining of any information required to determine the characteristics of the material to be used. Furnish to the Engineer at least two electrical pipe coating flaw detectors at the plant, and one electrical pipe coating flaw detector per pipe installation heading in the field, to aid in the inspection of the tape coating. b) Provide free access to the Engineer to plants of the manufacturer furnishing the materials and to the worksite. 2. Holiday detection for tape coating: <ol style="list-style-type: none"> a) Prior to the application of the mechanical outer layer tapes, electrically test the inner layer tape for any flaws in the coating with a suitable holiday detector as approved by the Engineer. Test the total tape coating system a second time immediately prior to installing cement mortar coating. The detector for both tests shall impress a voltage conforming to NACE Standard RP-02. The voltage to be used to electrically test the tape shall be included in the manufacturer's fabrication plan. b) Clearly mark all holidays electrically or otherwise detected, due to flaws, or mishaps, upon discovery, and immediately repair. Discontinue wrapping of the first mechanical outer layer tape of any pipe section until the detected holiday has been repaired. Perform repairs using methods specified herein. After the repair, retest the affected areas with the holiday detector prior to the application of the outer layer wrap. This process will be done until the coating has successfully passed the test. <p style="text-align: center;">Tape Coating Repairs</p> <ol style="list-style-type: none"> 1. Furnish and install plant and field cold-applied plastic repair
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		<p>tapes in accordance with AWWA C209 using plant and field tape materials as specified herein. Provide the cold-applied plastic repair tapes from the same manufacturer as the plant applied plastic tape manufacturer. Repair tapes and primer shall be completely compatible with the tape system used for straight run pipe.</p> <p>2. Repair any damage in the form of holidays, flaws or mishaps found in the total coating system by removing the outer layer tapes and inner layer tape from the damaged area of the pipe. Thoroughly clean the damaged area using methods and materials approved by the Engineer. The methods and materials to be used in repairing the damaged areas will depend on the type and cause of damage. After cleaning, apply a suitable primer, followed by a patch of repair tape over the affected area. Overlap the patch repair tape over the undamaged coating a minimum of four inches in all directions. Retest the repaired area with a holiday detector. Wrap an outer layer tape over the repaired area. The outer layer tape shall be the same material as the "Second Mechanical Outer Layer Tape" as specified herein. Overlap by a minimum six inches past the repair tape area. At the discretion of the Engineer, depending on the extent of the repair area, wrap the outer layer tape around the entire circumference of the pipe.</p> <p>3. If the outer layer tapes are damaged and holidays or other flaws are not detected in the inner layer tape at the same area, the repair of the inner layer tape may not be necessary; however, if the damage is determined by the Engineer, to be severe enough to jeopardize the integrity of the inner layer tape, the Engineer will direct the Contractor to repair the inner layer tape. If such action is taken, remove the outer layer tapes up to the boundaries of the damaged area, taking care not to damage the inner layer tape any further. Before replacing the outer layer tapes, apply a holiday detector to the inner layer tape to determine that no damage has been made to this primary tape coating during the outer layer removal process. Perform the repair of the outer layer tapes in accordance with the requirements as described above. Overlap the repair tape over the undamaged coating a minimum of four inches in all directions.</p> <p>4. When the repair area tests showing no holiday, apply a notation to the area indicating the test is satisfactory. Apply cement mortar coating over the cold-applied plastic tape coating.</p> <p style="text-align: center;">Protecting Coated Pipe.</p> <p>1. Protect all coated surfaces from damage prior to and during</p>
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		<p>the pipe installation in accordance with these specifications. At the fabrication plant, handle the coated pipe sections only after application of the cement mortar coating using belt slings or padded forklifts.</p> <ol style="list-style-type: none"> 2. In transporting the coated pipe, rest the pipe in saddles not less than 36 inches wide shaped to the outside diameter of the coated pipe. The saddles shall be in contact with the bottom of the pipe along an arc of at least 60 degrees. Completely line saddles with not less than 5/8 inch thick rubber belting. This belting shall overlap the edges of the saddles not less than three inches. No nails nor any other fasteners that may damage the coated pipe will be permitted in installing the rubber belting on saddles. Any damaged pipe and coatings will be rejected. Rejected pipe may be repaired and retested when in the judgment of the Engineer an acceptable repair can be achieved, at no additional cost to the City. 3. Apply a storage wrap to the exposed tape ends to protect against ultraviolet exposure. Remove the storage wrap prior to completing the field joint. Any tape coated pipe, including exposed tape ends at the cement mortar hold-backs, subjected to ultraviolet exposure longer than 90 calendar days prior to installing cement mortar coating shall be physically inspected by the Engineer prior to installation of plant or field applied cement mortar coating. Ultraviolet degradation will not be accepted; except that if in the opinion of the Engineer, the degree of degradation will not affect the integrity of the coating.
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209-2.2.2 Submittals. To the GREENBOOK, ADD the following:

The Contractor shall submit calculations that are signed and sealed by a Civil Engineer licensed in the state of California confirming that the pipe to be installed is suitable for a design load of 16,000 pounds per linear foot of pipe. Calculations shall be prepared in accordance with AWWA M-11: Manual of Water Supply Practices.

The Contractor shall submit the following with regards to the tape coating system:

1. Certification of test results of physical and performance characteristics of each batch of primer and each tape material specified herein.

2. Tape application procedure approved by tape manufacturer.
3. Tape application method approved by tape manufacturer to minimize voids at weld seams.
4. The names and qualifications of the workers and supervisors to be employed on the coating operation a minimum of 14 days prior to the start of taping operations. Supervisors of tape coating operations with recent experience in the application of tape and coating systems for steel pipe shall be assigned.

2. **ADD:**

**SECTION 212 - WATER AND SEWER SYSTEM VALVES
AND APPURTENANCES**

212-2.7.1 Flange Gaskets. To the GREENBOOK, sentence two (2) DELETE in its entirety and SUBSTITUTE with the following:

All gaskets shall be 1/8 inch minimum EPDM, and bolts, nuts, and washers shall be ASTM A193 grade B7 for exposed locations and Type 316 stainless steel for buried locations.

3. To Attachment E, **TECHNICALS, DELETE** Section **01 29 00 Payment Procedures, DELETE** in its entirety (pages 180 through 189), and **SUBSTITUTE** with pages 73 through 83 of this Addendum.
4. To Attachment E, **TECHNICALS, DELETE** Section **01 32 00 Construction Progress Documentation,DELETE** in its entirety (pages 204 through 211) and **SUBSTITUTE** with pages 84 through 113 of this Addendum.
5. To Attachment E, **TECHNICALS, ADD** Section **01 33 22, Web Based Construction Document Management**, pages 114 through 118 of this Addendum.
6. To Attachment E, **TECHNICALS**, Section 01 33 00, SUBMITTAL PROCEDURES, Part 1 - General, Item **1.1 General**, page 212, **ADD** the following:
 - B. See Section 01 33 22 Web Based Construction Document Management for additional requirements.

7. To Attachment E, **TECHNICALS**, Section 05 05 23, WELDING, page 422, to Table, **“Welding and Nondestructive Testing”**, **DELETE** in its entirety and **SUBSTITUTE** with the following:

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
33 05 16.13 Precast Concrete Utility Structure	AWS D1.1/D1.1M, Structural Welding Code - Steel and AWS D1.4/D1.4M, Structural Welding Code - Reinforcing Steel	No	Yes	Yes	Yes	100% VT; also see Section 03 40 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
40 27.00 Welded Steel	ASME BPV Code, Section IX; and	Yes	Yes	Yes	Yes	100% VT; also see Section 33 05 01.01

8. To Attachment E, TECHNICALS, Section 26 24 13, SWITCHBOARDS – LOW VOLTAGE, PART 2 - Products, Item 2.9, Miscellaneous Devices, Subitem B, page 591, **DELETE** in its entirety and **SUBSTITUTE** with the following:

2.9 MISCELLANEOUS DEVICES

- B. For outdoor (NEMA 3R) installations, each section of the switchboard shall be provided with a thermostatically controlled space heater. An ammeter shall be installed in the switchboard to monitor space heater circuit health. Power for the space heaters shall be obtained from a source as indicated on the drawings.
9. To Attachment E, **TECHNICALS**, Section 26 32 13, STANDBY GENERATOR, Part 1 General, Item 1.1, Subitem 5, page 625, **DELETE** in its entirety and **SUBSTITUTE** with the following:
 5. The engine generator shall be equipped with the necessary devices to meet current SDAPCD regulations for the operation of the submitted diesel generator. Documentation shall list current tier requirements and particulate filter. The generator fuel fill system shall meet the requirements of the local fire department. The fuel tank vent (1.25" minimum) shall be routed outside of the enclosure 12' above the generator pad.

E. ADDITIONAL CHANGES

1. The following are additional changes to the Line Items in the PlanetBids Tab:

For clarity where applicable, **ADDITIONS**, if any, have been **Underlined** and **DELETIONS**, if any, have been **~~Stricken out.~~**

Section	Item Code	Description	UoM	Quantity	Payment Reference	Extension
Main Bid (B-19099)	237110	Miramar Reservoir Pump Station Rehabilitation (1-A) Miramar Reservoir Pump Station Rehabilitation WBS 19099 (1-A)	LS	1	01 29 00	
Main Bid (B-19099)	237110	48-inch Discharge Pipeline Inspection and Rehabilitation (2-A)	LS	1	01 29 00	
Main Bid (B-19099)	237110	66-inch Pipeline Replacement (3-A) 66-inch Pipeline Replacement (2-A)	LS	1	01 29 00	
Main Bid (B-19099)	237110	Pump Barrel Inspection Assistance (4-A)	EA	6	01 29 00	
Main Bid (B-19099)	237110	Pump Barrel Rehabilitation (5-A)	EA	6	01 29 00	
Main Bid (B-19099)	237110	Additional Pump Barrel Rehabilitation (6-A)	SF	90	01 29 00	
Main Bid (B-19099)	237110	Mobilization and Demobilization (7-A) Mobilization and Demobilization (3-A)	LS	1	7-3.4.1 and 01 29 00	
Main Bid (B-19099)	524126	Bonds (Payment and Performance) (8-A) Bonds (Payment and Performance) (4-A)	LS	1	1-7.2.1	
Main Bid (B-19099)	236220	Building Permits (EOC Type I) (9-A) Building Permits (EOC Type I) (5-A)	AL	1	01 29 00	\$10000
Main Bid (B-19099)	541330	SWPPP Development (10-A) SWPPP Development (6-A)	LS	1	1001-3.7 and 01 29 00	
Main Bid (B-19099)	237310	SWPPP Implementation (11-A) SWPPP Implementation (7-A)	LS	1	1001-3.7 and 01 29 00	
Main Bid (B-19099)	541330	SWPPP Permit Fee (EOC Type I) (12-A) SWPPP Permit Fee (EOC Type I) (8-A)	AL	1	1001-3.7 and 01 29 00	\$10000

Section	Item Code	Description	UoM	Quantity	Payment Reference	Extension
Main Bid (B-19099)		Field Orders (EOC Type II) (13-A) Field Orders (EOC Type II) (9-A)	AL	1	7-3.9	697000
Main Bid (B-17190)	221114 237110	Miramar Clearwell Photovoltaic System Phase 2 (1-B) Miramar Reservoir Pump Station Rehabilitation WBS 17190 (1-B)	LS	1	01 29 00	
<u>Main Bid (B-17190)</u>	<u>237110</u>	<u>48-inch Discharge Pipeline Inspection and Rehabilitation (2-B)</u>	<u>LS</u>	<u>1</u>	<u>01 29 00</u>	
<u>Main Bid (B-17190)</u>	<u>237110</u>	<u>Pump Barrel Inspection Assistance (3-B)</u>	<u>EA</u>	<u>6</u>	<u>01 29 00</u>	
<u>Main Bid (B-17190)</u>	<u>237110</u>	<u>Pump Barrel Rehabilitation (4-B)</u>	<u>EA</u>	<u>6</u>	<u>01 29 00</u>	
<u>Main Bid (B-17190)</u>	<u>237110</u>	<u>Additional Pump Barrel Rehabilitation (5-B)</u>	<u>SF</u>	<u>90</u>	<u>01 29 00</u>	
<u>Main Bid (B-17190)</u>	<u>221114</u>	<u>Miramar Clearwell Photovoltaic System Phase 2 (6-B)</u>	<u>LS</u>	<u>1</u>	<u>01 29 00</u>	
Main Bid (B-17190)	237110	Mobilization and Demobilization (2-B) Mobilization and Demobilization (7-B)	LS	1	7-3.4.1 and 01 29 00	
Main Bid (B-17190)	524126	Bonds (Payment and Performance) (3-B) Bonds (Payment and Performance) (8-B)	LS	1	1-7.2.1	
Main Bid (B-17190)	236220	Building Permits (EOC Type I) (4-B) Building Permits (EOC Type I) (9-B)	AL	1	01 29 00	10000
Main Bid (B-17190)	541330	SWPPP Development (5-B) SWPPP Development (10-B)	LS	1	1001-3.7 and 01 29 00	
Main Bid (B-17190)	237310	SWPPP Implementation (6-B) SWPPP Implementation (11-B)	LS	1	1001-3.7 and 01 29 00	

Section	Item Code	Description	UoM	Quantity	Payment Reference	Extension
Main Bid (B-17190)	541330	SWPPP Permit Fee (EOC Type I) (7-B) SWPPP Permit Fee (EOC Type I)(12-B)	AL	1	1001-3.7 and 01 29 00	10000
Main Bid (B-17190)		Field Orders (8-B) Field Orders (EOC Type II)(13-B)	AL	1	7-3.9	1003000

F. PLANS

- To Drawing Numbers, **41085-1-D, 41085-11-D, 41085-20-D, 41085-22 and 41085-049-D DELETE** in their entirety and **REPLACE** with pages 128 through 132 of this Addendum.

Rania Amen, Director
Engineering & Capital Projects Department

Dated: *April 25, 2022*
San Diego, California

RA/AJ/la/na

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: CA20220001 04/01/2022

Superseded General Decision Number: CA20210001

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: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658.

Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered	. Executive Order 14026	
into on or after January 30,	generally applies to the	
2022, or the contract is	contract.	
renewed or extended (e.g., an	. The contractor must pay	
option is exercised) on or	all covered workers at	
after January 30, 2022:	least \$15.00 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 2022.	

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022: 	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.
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The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	01/14/2022
2	01/21/2022
3	02/11/2022
4	02/25/2022
5	04/01/2022

ASBE0005-002 09/01/2021

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems).....	\$ 47.25	24.45
Fire Stop Technician (Application of Firestopping Materials for wall openings and penetrations in walls, floors, ceilings and curtain walls).....	\$ 32.09	19.66

ASBE0005-004 07/05/2021

	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)....	\$ 22.40	13.07

BOIL0092-003 01/01/2021

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

BRCA0004-008 05/01/2021

	Rates	Fringes
BRICKLAYER; MARBLE SETTER.....	\$ 40.94	18.71

BRCA0018-004 06/01/2021

	Rates	Fringes
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MARBLE FINISHER.....	\$ 35.90	14.11
TILE FINISHER.....	\$ 30.47	12.52
TILE LAYER.....	\$ 43.09	18.31

 BRCA0018-010 09/01/2020

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

 CARP0213-003 07/01/2021

	Rates	Fringes
Drywall		
(1) Work on wood framed construction of single family residences, apartments or condominiums under four stories		
Drywall Installer/Lather....	\$ 32.14	16.28
Drywall Stocker/Scrapper....	\$ 22.16	8.62

 CARP0619-002 07/01/2021

	Rates	Fringes
Drywall		
(2) All other work		
Drywall Installer/Lather....	\$ 42.80	16.28
Drywall Stocker/Scrapper....	\$ 23.07	8.62

 CARP0619-003 07/01/2021

	Rates	Fringes
CARPENTER		
(1) Bridge.....	\$ 51.53	16.28
(2) Commercial Building....	\$ 46.30	16.28
(3) Heavy & Highway.....	\$ 51.40	16.28
(4) Residential Carpenter..	\$ 38.47	16.28
(5) Residential Insulation Installer.....	\$ 24.16	15.76
PILEDRIVERMAN.....	\$ 51.53	16.28

CARP0619-004 07/01/2021

	Rates	Fringes
Diver		
(1) Wet.....	\$ 831.20	16.28
(2) Standby.....	\$ 444.24	16.28
(3) Tender.....	\$ 436.24	16.28
(4) Assistant Tender.....	\$ 412.24	16.28

Amounts in "'Rates' column are per day

CARP0721-001 07/01/2021

	Rates	Fringes
Modular Furniture Installer.....	\$ 21.85	7.15

CARP1607-004 07/01/2021

	Rates	Fringes
MILLWRIGHT.....	\$ 51.90	16.48

ELEC0569-001 06/01/2021

	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 08/30/2021

	Rates	Fringes
ELECTRICIAN (Residential, 1-3 Stories).....	\$ 37.28	7.98

ELEC1245-001 01/01/2022

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer..	\$ 60.19	22.07
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution		

line equipment).....	\$ 48.08	20.86
(3) Groundman.....	\$ 36.76	20.46
(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 01/01/2022

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 61.34	36.885+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)		
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
	Rates	Fringes
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 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 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

 IRON0229-001 07/01/2021

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 38.08	24.91
Ornamental, Reinforcing and Structural.....	\$ 43.00	33.55

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; Kettleman, 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
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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 traking, 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 07/01/2021

	Rates	Fringes
LABORER (GUNITE)		
GROUP 1.....	\$ 46.50	20.42
GROUP 2.....	\$ 45.55	20.42
GROUP 3.....	\$ 42.01	20.42

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 07/01/2021

	Rates	Fringes
Laborers: (HORIZONTAL DIRECTIONAL DRILLING)		
(1) Drilling Crew Laborer...	\$ 38.89	17.10
(2) Vehicle Operator/Hauler.	\$ 39.06	17.10
(3) Horizontal Directional Drill Operator.....	\$ 40.91	17.10
(4) Electronic Tracking Locator.....	\$ 42.91	17.10
Laborers: (STRIPING/SLURRY SEAL)		
GROUP 1.....	\$ 40.10	20.12
GROUP 2.....	\$ 41.40	20.12
GROUP 3.....	\$ 43.41	20.12
GROUP 4.....	\$ 45.15	20.12

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

LAB01414-003 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 10/01/2021

	Rates	Fringes
DRYWALL FINISHER/TAPER		
(1) Building & Heavy Construction.....	\$ 37.14	20.90
(2) Residential Construction (Wood frame apartments, single family homes and multi-duplexes up to and including four stories).....	\$ 32.27	14.70

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 08/04/2021

	Rates	Fringes
PLASTERER.....	\$ 45.77	18.39

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	19.77
GROUP 2.....	\$ 27.99	19.77
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 09/01/2021

	Rates	Fringes
PLUMBER, PIPEFITTER, STEAMFITTER		
Camp Pendleton; Vandenberg Air Force Base.....	\$ 58.33	25.36
Work ONLY on new additions and remodeling of commercial buildings, bars, restaurants, and stores not to exceed 5,000 sq. ft. of floor space.....	\$ 52.20	24.38
Work ONLY on strip malls, light commercial, tenant improvement and remodel work.....	\$ 39.91	22.71
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.....	\$ 53.83	25.36

 PLUM0016-011 09/01/2021

	Rates	Fringes
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PLUMBER/PIPEFITTER		
Residential.....	\$ 42.74	21.28

PLUM0345-001 09/01/2021

	Rates	Fringes
PLUMBER		
Landscape/Irrigation Fitter..	\$ 36.85	24.75
Sewer & Storm Drain Work....	\$ 40.94	22.13

ROOF0045-001 07/01/2021

	Rates	Fringes
ROOFER.....	\$ 37.75	10.24

* SFCA0669-001 04/01/2022

	Rates	Fringes
SPRINKLER FITTER.....	\$ 44.99	25.16

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

	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
<https://www.dol.gov/agencies/whd/government-contracts>.

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
National Office because National Office has 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 DECISIO"

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Informational Submittals:
 - 1. Schedule of Values: Submit on Owner's form.
 - 2. Schedule of Estimated Progress Payments:
 - a. Submit with initially acceptable Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
 - 3. Application for Payment.
 - 4. Final Application for Payment.

1.2 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- B. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- D. Lump Sum Work:
 - 1. Reflect specified cash and contingency allowances and alternates, as applicable.
 - 2. List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
 - a. Mobilization includes, at minimum, items identified in Section 01 50 00, Temporary Facilities and Controls.
 - b. Include item(s) for monthly progress schedule update.
- E. An unbalanced or front-end loaded schedule will not be acceptable.
- F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- G. Submit Schedule of Values in a spreadsheet format compatible with latest version of MS Excel.

1.3 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.

- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.4 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 Engineer.
- 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 Engineer.

1.5 MEASUREMENT AND PAYMENT

- 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 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. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.

- C. Whenever pay quantities of material are determined by weight, weigh material on scales furnished by Contractor and certified accurate by state agency responsible. Obtain weight or load slip from weigher and deliver to Owner's representative at point of delivery of material.
- D. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- E. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- F. Haul materials that are specified for measurement by the cubic yard measured in the vehicle in transport vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Load vehicles to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- G. Quantities will be based on ground profiles shown. Field surveys will not be made to confirm accuracy of elevations shown.
- H. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.
- I. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
AL	Allowance
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer

Item	Method of Measurement
LS	Lump Sum
MFBM	Thousand Foot Board Measure—Field Measure by Engineer
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

- J. Payment for all Lump Sum (LS) 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.
- K. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specification sections as follows:
 - 1. Limits of Work are as shown on the Drawings.
 - 2. All Work shown on Drawings and in Specification section(s).
- L. Payment for lump sum price items covers all the labor, materials, and services necessary to furnish and install the following items.

1.6 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.

1.7 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to

Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.8 BID ITEMS (A LIST)

- A. Bid items under List A include but are not limited to improvements to the Miramar Reservoir Pump Station including civil improvements, replacement of the existing standby generator, rehabilitation of the electrical and instrumentation systems and building including HVAC, mechanical systems, and the replacement of approximately 200 linear feet of 66-inch PCCP.
1. Miramar Reservoir Pump Station Rehabilitation WBS 19099 (1-A)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. The work under this bid item includes removal and replacement of the existing standby generator with new skid-mounted generator (existing generator to be salvaged by the Owner per Section 02 41 00); construction of concrete pad and containment area for the new generator; upgrades to the pump station PLC, installation of harmonic filter, and other electrical improvements; installation of air conditioner unit for the existing electrical building.
 2. 66-inch Pipeline Replacement (2-A)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. Work under this bid item shall include all labor, equipment, and materials necessary to remove and dispose of the existing 66-inch prestressed concrete steel cylinder pipeline and install new 66-inch cement mortar lined and tape wrapped mortar coated steel pipe line as indicated on the plans and specifications. Work includes, but is not limited to: all labor, equipment, and materials necessary for excavations, shoring, dewatering, dechlorination, protection or relocation of existing utilities; required demolition and removal of existing pipe and appurtenances; furnish and installment of new steel pipeline, pipe access manway and access manhole, connections to existing pipeline, corrosion protection; furnish and installment of fill, slurry, compaction for restoration of site to existing or proposed conditions, disinfection of new and existing pipeline segment taken out of service; all necessary City coordination required to shutdown and bypass the existing pipeline between the Miramar WTP clearwells and the existing 2A vault, and all

other work as shown on the Drawings and described in the Specifications.

3. Mobilization and Demobilization (3-A)
 - a. No measurement shall be made for this item.
 - b. Payment is made for this item to include, but not limited to, office trailers, temporary sheds, temporary utilities, all temporary facilities, and all preparatory work prior to the commencement of productive work at the site required under this contract. Payment for this item also includes demobilization, removal of said temporary facilities and return of the Miramar Reservoir Pump Station and Miramar Water Treatment Plant to the conditions and requirements of the Contract Documents. Payment under this bid item shall be made as the lump sum price. The total amount listed under this Bid Item shall not exceed three (3%) percent of the total amount proposed for the project.
4. Bonds (Payment and Performance) (4-A)
 - a. No measurement shall be made for this Item.
 - b. 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 Section 1-7.2.1 for requirements.
5. Building Permits (EOC Type I) (5-A)
 - 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 perfect permits associated with the Work. Payment for this item shall be made for actual fees paid from the allowance amount named in the Bid Schedule.
6. SWPPP Development (6-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item for the preparation and development of the SWPPP measures required under this contract and shall be made as the lump sum price named in the Bid Schedule under Item No. 10-A. Payment for this item shall include the preparation of the final SWPPP as required for compliance with the permitting agency. Payment shall include preparation costs for the final SWPPP.
7. SWPPP Implementation (7-A)
 - a. No measurement shall be made for this Item.

- b. 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 under Item No. 11-A. Payment for this item shall include the implementation of the final SWPPP and shall include all necessary additional BMPs as required for compliance with the permitting agency. Payment shall include implementation, monitoring, upkeep and removal of all necessary BMPs as required in the approved SWPPP.
- 8. SWPPP Permit Fee (EOC TYPE I) (8-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards the SWPPP Permit Fee to the required permitting agency. Payment for this item shall be made as the allowance amount named in the Bid Schedule under Item No. 12-A.
- 9. Field Orders (EOC Type II) (9-A)
 - a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards field orders for 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 under Item No. 13-A. Field Order limits shall conform to Whitebook 7-3.9.

1.9 BID ITEMS (B LIST)

- A. Bid items under List B include but are not limited to rehabilitation and improvements to the 100 MGD Miramar Reservoir Pump Station (MRSP) including mechanical, electrical, and instrumentation, pump barrel inspection/rehabilitation, and 40” pipeline inspection/rehabilitation; installation of 1 commercial roof-mount solar photovoltaic power system (SPVPS) located at the Miramar Water Treatment Plant, including installation of panels, racking, DC combiners, and inverters at CW1, and mechanical pull boxes.
 - 1. Miramar Reservoir Pump Station Rehabilitation WBS 17190 (1-B)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. The work under this bid item includes: refurbishing six 200 HP pumps and motors, including pump removal, shipping to and from the service center, installation, and testing; demolition of existing supports, piping, valves, fittings, and appurtenances; installation of discharge piping check valves and restrained flex couplings; replacement air release valves, and small diameter mill piping, valves, gauges, pressure switches and

appurtenances; replacement of motor starter with VFD for one pump; and all other work as shown on the Drawings and described in the Specifications and not included in other bid items.

2. 48-inch Discharge Pipeline Inspection and Rehabilitation (2-B)
 - a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. The work under this bid item includes all labor, equipment, and materials necessary to inspect and rehabilitate the 48-inch discharge pipeline per specification Section 43 01 50, Inspection Assistance and Repair of 48-inch Discharge Pipeline and per the contract documents.
3. Pump Barrel Inspection Assistance (3-B)
 - a. Measurement shall be per each
 - b. Payment for this item shall be per each pump barrel inspected
 - c. The work of this unit cost item includes all labor, equipment, and materials necessary to provide access and confined space entry assistance and standby emergency rescue for inspection of each of the six pump barrels by the Engineer as specified in Section 43 01 40, Vertical Turbine Pump Rehabilitation, and for closing the pump barrel with a blind flange if repair work is not necessary.
4. Pump Barrel Rehabilitation (4-B)
 - a. Measurement shall be per each.
 - b. Payment for this item shall be per each pump barrel rehabilitated for up to 15 SF of replacement
 - c. Work of this unit cost item includes all labor, equipment and materials necessary to rehabilitate each pump barrel up to a maximum of 15 SF of replacement as directed by the Engineer. The nature of rehabilitation includes but not limited to additional cleaning and dewatering, removal and replacement of defective mortar liner, repairing corrosion damaged steel barrel by welding or welding patches to the barrel, cleaning debris from the barrel and providing confined space entry and standby emergency rescue assistance for the Engineer for inspection of the work, and closing the pump barrel with a blind flange following repair, all as specified in Section 43 01 40, Inspection Assistance and Repair of Pump Barrels. Some pump barrels may not require rehabilitation.
5. Additional Pump Barrel Rehabilitation (5-B)

- a. Measurement shall be per square foot
 - b. Payment for this item shall be per square foot of rehabilitation in a single pump barrel for area greater than the 15 SF covered in Bid Item No. 5-A
 - c. Work under this unit cost item includes all labor, equipment and materials necessary for additional pump barrel pump rehabilitation for the cement mortar linear removal and replacement and miscellaneous welding repairs when the replacement area exceeds 15 SF in any pump barrel.
6. Miramar Clearwell Photovoltaic System Phase 2 (6-B)
- a. Measurement shall be by the lump sum item.
 - b. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
 - c. Work under this bid item shall include all labor, equipment, and materials necessary to install a ballasted, rack-mounted, commercial solar Photovoltaic (PV) system at the Miramar Water Treatment Plant Clearwell 1 (Phase 2 herein). The PV System shall be complete and operable in accordance with the Contract Documents.
7. Mobilization and Demobilization (7-B)
- a. No measurement shall be made for this item.
 - b. Payment is made for this item to include, but not limited to, office trailers, temporary sheds, temporary utilities, all temporary facilities, and all preparatory work prior to the commencement of productive work at the site required under this contract. Payment for this item also includes demobilization, removal of said temporary facilities and return of the Miramar Reservoir Pump Station and Miramar Water Treatment Plant to the conditions and requirements of the Contract Documents. Payment under this bid item shall be made as the lump sum price. The total amount listed under this Bid Item shall not exceed three (3%) percent of the total amount proposed for the project.
8. Bonds (Payment and Performance) (8-B)
- a. No measurement shall be made for this Item.
 - b. 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 Section 1-7.2.1 for requirements.
9. Building Permits (EOC Type I) (9-B)

- 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 perfect permits associated with the Work. Payment for this item shall be made for actual fees paid from the allowance amount named in the Bid Schedule.
10. SWPPP Development (10-B)
- a. No measurement shall be made for this Item.
 - b. Payment is made for this item for the preparation and development of the SWPPP measures required under this contract and shall be made as the lump sum price named in the Bid Schedule under Item No. 5-B. Payment for this item shall include the preparation of the final SWPPP as required for compliance with the permitting agency. Payment shall include preparation costs for the final SWPPP.
11. SWPPP Implementation (11-B)
- a. No measurement shall be made for this Item.
 - b. 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 under Item No. 7-B. Payment for this item shall include the implementation of the final SWPPP and shall include all necessary additional BMPs as required for compliance with the permitting agency. Payment shall include implementation, monitoring, upkeep and removal of all necessary BMPs as required in the approved SWPPP.
12. SWPPP Permit Fee (12-B)
- a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards the SWPPP Permit Fee to the required permitting agency. Payment for this item shall be made as the allowance amount named in the Bid Schedule under Item No. 6-B.
13. Field Orders (EOC Type II) (13-B)
- a. No measurement shall be made for this Item.
 - b. Payment is made for this item as an allowance towards field orders for 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 under Item No. 8-B. Field Order limits shall conform to Whitebook 7-3.9.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The Contractor shall expressly understand and agree 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 re-submittals 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 the PAYMENT PROCEDURES Section 01 29 00, 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.

1.2 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 PAYMENT PROCEDURES Section 01 29 00 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 non-work 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.

13 SCHEDULER QUALIFICATIONS

- A. The Contractor shall employ or retain the services of a full-time, onsite Senior Project

Scheduler who shall have verifiable 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. Contractor's scheduler shall have experience on projects similar in size and total construction cost. Within seven (7) calendar days after Notice to Proceed, the Contractor shall submit to the City Representative for review and acceptance, in accordance with the SUBMITTAL PROCEDURES Section 01 33 00 and the WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT Section 01 33 22, the Project Scheduler's resume, including personal references from at least two (2) 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 thirty (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.

1.4 SCHEDULING CONFERENCES

A. PRE-CONSTRUCTION SCHEDULING CONFERENCE:

- 1. Within thirty (30) calendar days after Notice to Proceed, the City Representative shall schedule and conduct a pre-construction 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 ten (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 Pre-Construction Scheduling Conference the

Network Logic Diagram used in bid preparation. This will be used as a basis of discussion for the construction plan.

15 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 non-working 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.

16 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.

1.7 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 SUBMITTAL PROCEDURES Section (01 33 00), the Contractor shall submit all schedules and associated documentation directly into the City-furnished, web-based, document control system in accordance with the WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT Section (01 33 22). 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:
 - 1. 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:

1. 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:

1. 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.

18 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 the PAYMENT PROCEDURES Section 01 29 00. 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 non-labor 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 (1) labor unit = \$1 of labor
2. Material unit of \$1 for 1 unit
3. Equipment unit of \$1 for 1 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 the PAYMENT PROCEDURES Section 01 29 00 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 pre-construction 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 Supplementary Special Provision 6-2.2 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.

19 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 two (2) percent of the Prime Contract Value shall use the following resources:
 - 1. Labor
 - 2. Materials
 - 3. Installed Major Equipment (refer to Section 1.02 Definitions)
 - 4. Construction Equipment (refer to Section 1.02 Definitions)
 - 5. Manhours
- F. The Prime Contractor, and each of the subcontractors with a contract value greater than or equal to two (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, "MCN Standard 5-day with Holidays," "MCN 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 6-2.2 of the Supplementary Special Provisions.

PART 2 - PRODUCTS

2.1 180-DAY SCHEDULE

- A. Within thirty (30) calendar days after Notice to Proceed, the Contractor shall submit to the City the Preliminary Construction Schedule for all work in the first One Hundred Eighty (180) calendar days following NTP, as well as a general approach for the remainder of the Work.
- B. Within sixty (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 fourteen calendar days (14) of the submittal of the One Hundred Eighty (180) calendar day Construction Schedule to review and make any necessary adjustments or revisions. The Contractor shall submit the revised One Hundred Eighty (180) calendar day Construction Schedule within fourteen (14) calendar days after receiving comments. Such re-submittal shall be reviewed by the City Representative within seven calendar days (7) of receiving such re-submittal. The One Hundred Eighty (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 One Hundred Eighty (180) calendar days following NTP and is to be incorporated as the first One Hundred Eighty (180) days of the Contractor's Baseline Construction Schedule. The One Hundred Eighty (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.

22 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 one hundred eighty (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 & methods for construction. The City Representative shall accept or reject, in writing, the Contractor's Baseline Schedule within thirty (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 fourteen (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 non-measurable.
- 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% 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 Part 1.5 of 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 Pre-Commissioning, 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. 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.
- I. 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.
- J. 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.
- K. 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.

- L. 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.
- M. No construction activity shall be more than 20 working days duration. Exceptions may be approved by the City.
- N. SUBMITTAL REVIEW TIME:
 - 1. Include in the schedule the review times indicated in the SUBMITTAL PROCEDURES Section 01 33 00. 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.

23 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:

MCN Baseline 01 Dec18 DD123118

Where:

MCN = the code for the project, in this case Morena Conveyance North
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

24 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 Pre-Construction 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 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 MCN, for example, use the Code Value of "MCN" with a Description of "Morena Conveyance North (MCN)"
(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
(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 PAYMENT PROCEDURES Section (01 29 00)

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.

25 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 Morena Conveyance North project is 'MCN-'.
- 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.

26 SCHEDULE SUBMITTALS

- A. In accordance with the SUBMITTAL PROCEDURES Section 01 33 00 and the WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT Section 01 33 22, submit all required schedule submittals in the following format:
 - 1. One (1) electronic copy of the Oracle Primavera P6 XER file including all project layouts.
 - 2. One (1) PDF copy of all reports, bar-charts, time-scaled diagrams, histograms, s-curves and narrative.
- B. VARIANCE REPORT:
 - 1. 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 Section 2.02.A
2. Critical and Near Critical Path Gantt Chart as further described in Section 2.02.A
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).

2.7 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.

2.8 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 the PAYMENTS PROCEDURES Section 01 29 00 Subsection 1.8 Item A, will be reduced by 10% 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 the PAYMENTS PROCEDURES Section 01 29 00, will be reduced by 10% of the specified amount.

29 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 statused 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% 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% 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 statusing

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 two 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 the PAYMENT PROCEDURES Section 01 29 00 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 thirty (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 (two 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 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.

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.

B. 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.

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 fourteen (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 (1) 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 rationale 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 fragnet into the next monthly progress schedule update.

PART 3 - WEATHER

3.1 ANTICIPATED WEATHER DAYS

A. TIME ALLOWANCE FOR INCLEMENT WEATHER:

- 1. 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 thirteen (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 thirteen (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.

3.2 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.

33 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 ten percent (10%) of the monthly Progress Payment, but not more than three percent (3%) 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.

PART 4 -- PROJECT RECORD SCHEDULE

4.1 FINAL PROGRESS SCHEDULE

- A. 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 statused at one hundred percent (100%) 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.
- B. 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 22

WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. The Owner, Construction Manager, 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 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, 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 Construction Manager 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 after clearance by security check.

- 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

2.1 DESCRIPTION

- A. PMWeb project management application (no or-equal).

PART 3 - EXECUTION

3.1 PMWEB UTILIZATION

- A. The Owner, Construction Manager, 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 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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 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

MEMORANDUM

TO: Mahyar Navizi; Margaret Llagas | City of San Diego

FROM: Bryan Webb; Trevor Shackelford | Kleinfelder

DATE: July 13, 2018

SUBJECT: MIRAMAR RESERVOIR PUMP STATION CONSTRUCTION BYPASS

PURPOSE

The purpose of this Memorandum is to describe the need and recommendations for bypasses during the rehabilitation of the Miramar Reservoir Pump Station (MRPS)

NEED FOR BYPASSES

Miramar Pipeline Replacement. The 66" Prestressed Concrete Cylinder Pipe (PCCP) section of the Miramar Pipeline that passes through the MRPS site will be replaced with a 66" Cement Mortar Lined and Coated (CML&C) Steel pipe. A large mobile maintenance crane will be spotted over this section of the Miramar Pipeline to pull the pumps for rehabilitation and later for ongoing maintenance. The 66" PCCP pipeline in this area is buried at a shallow depth and its structural integrity could not be determined. This replacement will be performed as one of the first steps of the pump station rehabilitation. During this period, the section of the Miramar Pipeline between the Clearwell 1 and 2 connections and the 2A Valve Vault will be out of service.

Pump Rehabilitation. All six pumps at the pump station will be removed and refurbished during the rehabilitation of the pump station. This will be performed in two stages with three pumps being replaced at each stage. The first set of three pumps will be removed, rehabilitated, and reinstalled before the remaining set of three pumps are removed. This phased rehabilitation will maintain continuity of the pump station with capacity reduced to three pumps. No pump bypassing will be required during pump rehabilitation.

Upgrades to the Electrical System. The upgrades to the pump electrical system will be performed on a phased basis, coordinated with pump rehabilitation, and, at all times, will maintain the pumping capability of at least 3 pumps. Several short duration total power outages may be required to perform switch over of the main incoming switchgear/disconnect. These can be scheduled to occur during normal pump station off periods and should not last more than 4 to 6 hours. No bypassing is required for electrical system upgrades.



Figure 1: Miramar Water Treatment Plant Vicinity Map

MIRAMAR PIPELINE BYPASS PLAN

General. During replacement of the Miramar Pipeline section at the MRPS, the portion of the Miramar Pipeline south of the clearwells to the 2A Valve Vault will be out of service as shown in Attachments 1, 2 and 3. Potable water from the Miramar WTP will be directed from Clearwell No. 2 to Pipeline 2A and then to the 2A Valve Vault, where connection to all transmission lines are possible. The in-service and out-of-service portion of the pipelines and valve alignments for isolating this section pipeline are shown on Attachment 1,2 and 3. The connection to the San Diego County Water Authority (SDCWA) Pump Station is located at the east end of the Miramar Pipeline. This section will be out of service, thus providing potable water to CWA during the duration of the shutdown will not be possible. This function is intermittently used, and outage periods can be coordinated with SDCWA as was done during the recent reconstruction of the Miramar Pipeline in this area. Disinfection of the Miramar Pipeline from the SDCWA connection to the 2A Valve Vault will be required following the replacement of the 66" Miramar Pipeline Section.

Disruption to Customers. Except for the SDCWA pump station connection, all transmission lines and distribution system connections occur at or downstream of the 2A Valve Vault. Scheduled coordination with SDCWA will allow the SDCWA Pump Station outages to occur without disruption to their customers.

Schedule. Prior to the start of the MRPS construction, the Miramar Clearwell Improvements Project construction needs to progress to the point that Clearwell No. 2 is complete and on line. New Clearwell No 2. is scheduled to be placed online by January 2019, thus this should not be a constraint.

As stated previously, replacement of the Miramar Pipeline section at the MRPS will be one of the first activities of the pump station rehabilitation contractor. The duration of this activity is expected to be 3 to 4 months.

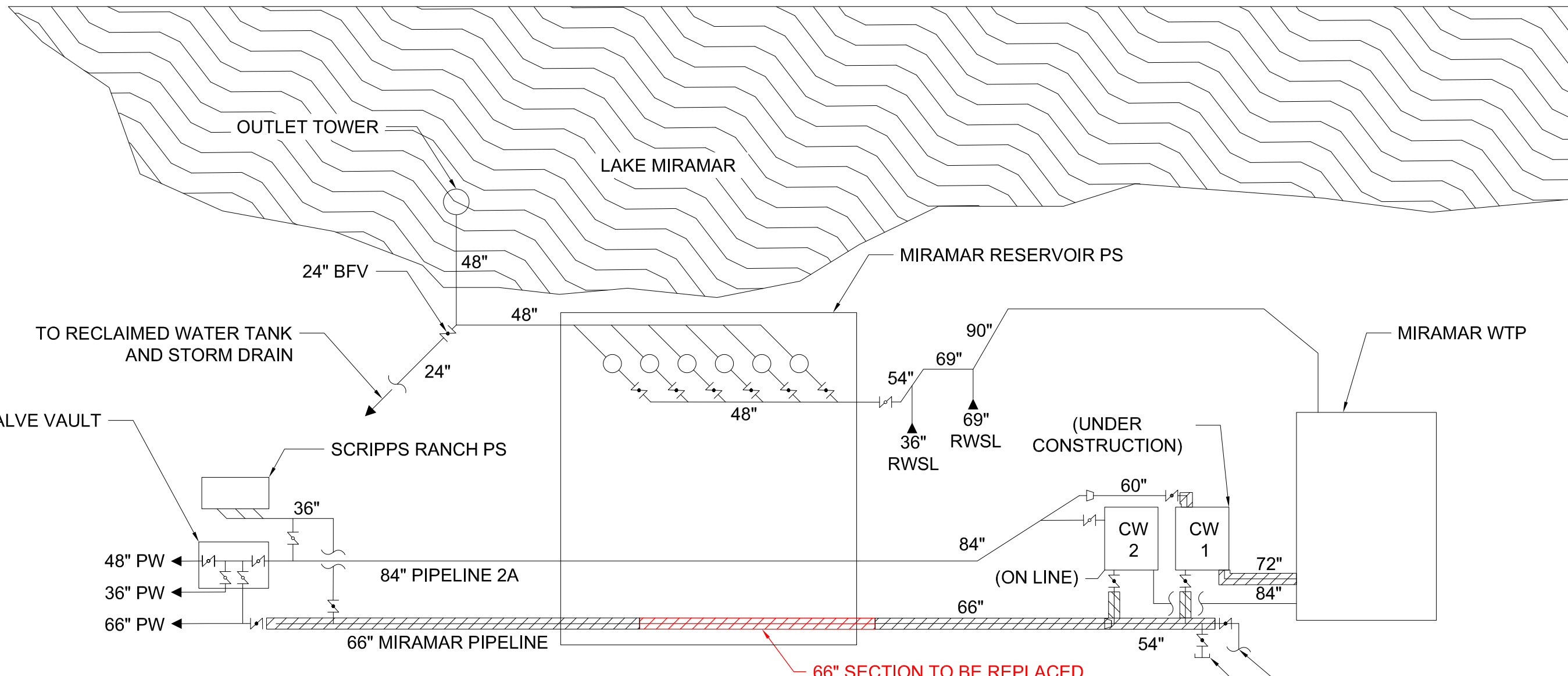
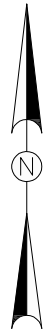
Attachment 1 illustrates the schematic plan of the bypassing scenario to allow for replacement of the Miramar Pipeline 66-inch PCCP Pipeline section running through MRPS.

COORDINATION WITH OTHER PROJECTS AND ENTITIES

Coordination of the of the Miramar Pump Station Rehabilitation activities, especially the replacement of the section of the Miramar Transmission Pipeline will require coordination with the following entities:

- Miramar Water Treatment Plant Operations
- Miramar Clearwell Improvement Project
- San Diego Water Transmission System Operations
- San Diego County Water Authority
- San Diego Pure Water Program
- San Diego Gas and Electric

ATTACHMENT 1 – MIRAMAR RESERVOIR PUMP STATION BYPASS SCHEMATIC



LEGEND	
	PIPELINE IN SERVICE
	PIPELINE OUT-OF-SERVICE
	SECTION TO BE REPLACED



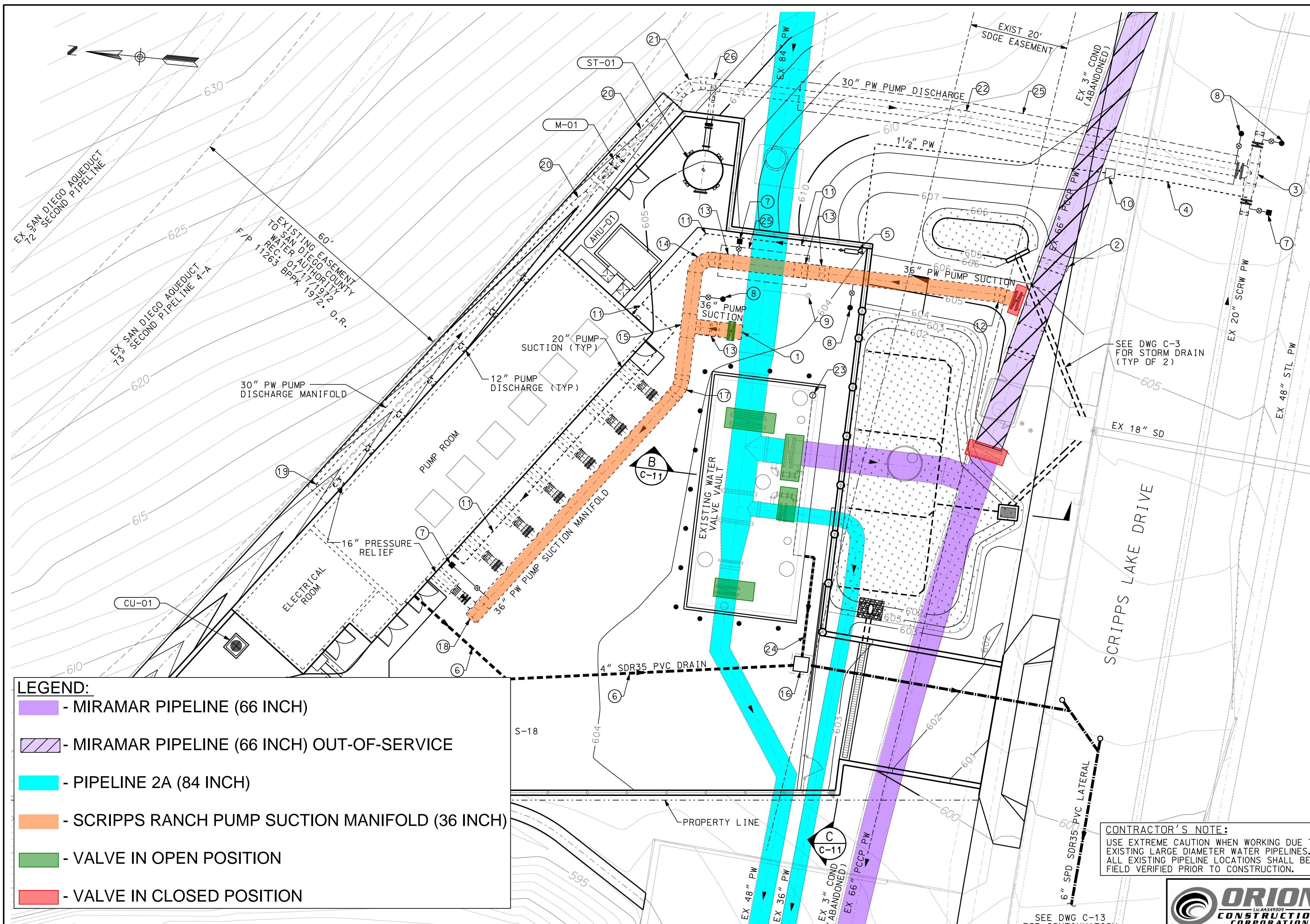
PROJECT NO. 20180474
 DRAWN BY TS
 CHECKED BY Checked
 DATE: 07-07-2018
 REVISED: 00-00-0000

MIRAMAR RESERVOIR PUMP STATION
 BYPASS PLAN
 MIRAMAR RPS CONDITION ASSESMENT
 MIRAMAR WATER TREATMENT PLANT
 SAN DIEGO, CA

FIGURE
01
 Page 123 of 132 of 01

ATTACHMENT 2 – SCRIPPS RANCH PUMP STATION YARD PIPING PLAN_C-5

P:\Projects\San Diego Water Dept. City of (CA)\141845 - Scripps Ranch Pump Station DB\CADD\2-SHEETS\C-CIVIL\36605-C05.dgn
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LEGEND:

- MIRAMAR PIPELINE (66 INCH)
- MIRAMAR PIPELINE (66 INCH) OUT-OF-SERVICE
- PIPELINE 2A (84 INCH)
- SCRIPPS RANCH PUMP SUCTION MANIFOLD (36 INCH)
- VALVE IN OPEN POSITION
- VALVE IN CLOSED POSITION

- MATERIALS LIST:**
- ① SEE CONNECTION DETAIL 1, DWG C-6
 - ② SEE CONNECTION DETAIL 2, DWG C-6
 - ③ SEE CONNECTION DETAIL 3, DWG C-7
 - ④ 1 1/2" WATER SERVICE CONNECTION PER SDRSD WS-02
 - ⑤ 2" BACKFLOW PREVENTER PER SDRSD WR-01
 - ⑥ 4" SDR35 PVC DRAIN PIPE TO DRAINAGE BOX, SEE DWG C-14 FOR PROFILE
 - ⑦ 4" COMBINATION AIR RELEASE/AIR VACUUM VALVE PER SDRSD WA-04
 - ⑧ TYPE "B" 6" BLOW-OFF ASSEMBLY PER SDRSD WB-03
 - ⑨ ADJUST EXISTING BLOW-OFF ASSEMBLY VALVE CAN AND HANDHOLE CAN TO MEET NEW GRADE
 - ⑩ WATER METER BOX PER SDRSD SDW-135 AND SDW-137
 - ⑪ 1 1/2" UTILITY WATER PIPELINE, FIELD ROUTE TO EQUIPMENT AND HOSE BIBBS
 - ⑫ 36" CMLC&TW STEEL 3 PIECE, PE BEND HORIZ ANGLE = 12°40'
 - ⑬ 36" CMLC&TW STEEL 3 PIECE, PE 22 1/2° BEND
 - ⑭ 36" CMLC&TW STEEL 5 PIECE, PE 90° BEND
 - ⑮ 36"x36" CMLC&TW STEEL, PE TEE
 - ⑯ DRAINAGE BOX PER DETAIL 2, DWG C-20
 - ⑰ 36" CMLC&TW STEEL 3 PIECE, PE BEND HORIZ ANGLE = 35°14'
 - ⑱ 36" CMLC&TW STEEL DISHED HEAD
 - ⑲ 30" CMLC&TW STEEL DISHED HEAD
 - ⑳ 30"x18" CMLC&TW STEEL, PE ECCENTRIC REDUCER, FOT
 - ㉑ 30" CMLC&TW STEEL 4 PIECE, PE BEND HORIZ ANGLE = 55°
 - ㉒ 30" CMLC&TW STEEL PE BEND HORIZ ANGLE = 03°54'
 - ㉓ INSTALL SUMP PUMP IN EXIST VALVE VAULT SUMP PER DETAIL 1, DWG M-9
 - ㉔ 2" SUMP PUMP DISCHARGE PIPELINE TO VAULT
 - ㉕ PIPE PROTECTION PAD PER DETAIL 7, DWG C-19
 - ㉖ 30"x12" CMLC&TW STEEL TEE
- GENERAL NOTES:**
1. FOR SITE PLAN SEE DWG C-1.
 2. FOR ELECTRICAL CONDUITS SEE DWG E-3.
 3. SEE CATHODIC PROTECTION DWGS FOR CORROSION CONTROL REQUIREMENTS.
 4. FOR HVAC EQUIPMENT LAYOUT SEE DWGS H-4 AND H-5.
 5. ALL BURIED VALVES SHALL HAVE A VALVE CAN PER SDRSD WV-01.
 6. FOR VALVE CALL-OUTS SEE DWGS M-1, C-6, C-7, I-3, I-4, I-5, AND I-8.
 7. ALL BURIED PIPE SHALL BE CMLC&TW STEEL UNLESS NOTED OTHERWISE.
 8. CONTRACTOR SHALL FIELD VERIFY VERTICAL AND HORIZONTAL LOCATION OF EXISTING PIPELINES PRIOR TO PIPE FABRICATION.

CONTRACTOR'S NOTE:
 USE EXTREME CAUTION WHEN WORKING DUE TO EXISTING LARGE DIAMETER WATER PIPELINES. ALL EXISTING PIPELINE LOCATIONS SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

CIP NO. 73-263.7		SPEC. NO. 5006		C-5
SCRIPPS RANCH PUMP STATION PROJECT				
CIVIL YARD PIPING PLAN				
CITY OF SAN DIEGO, CALIFORNIA			W.B.S. WATER S-12019	
SHEET 13 OF 117 SHEETS				
APPROVED:	FOR CITY ENGINEER	DATE	SUBMITTED BY: ANH NGUYEN PROJECT MANAGER	
	DESCRIPTION	BY	APPROVED	DATE
	ORIGINAL	BC		
	MANUEL FLORES MEZA PROJECT ENGINEER		6292407-1910444 NAD83 COORDINATES	
	270-1731 LAMBERT COORDINATES		36605-13-D	
CONTRACTOR ORION CONST. CORP. DATE STARTED			DATE COMPLETED	
INSPECTOR				

DRAWING STATUS		CONSULTANT				
NO.	DATE	REVISION DESCRIPTION	DWN	CKD	RVD	PE

Brown AND Caldwell

ENGINEER OF WORK

DES: VCH
DWN: RMK
CKD: GCS

NAME: _____ DATE: _____

City of San Diego
PUBLIC WORKS PROJECT

ORION CONSTRUCTION CORPORATION

SCALE: _____

VERT: N/A

HOR: 1" = 10'

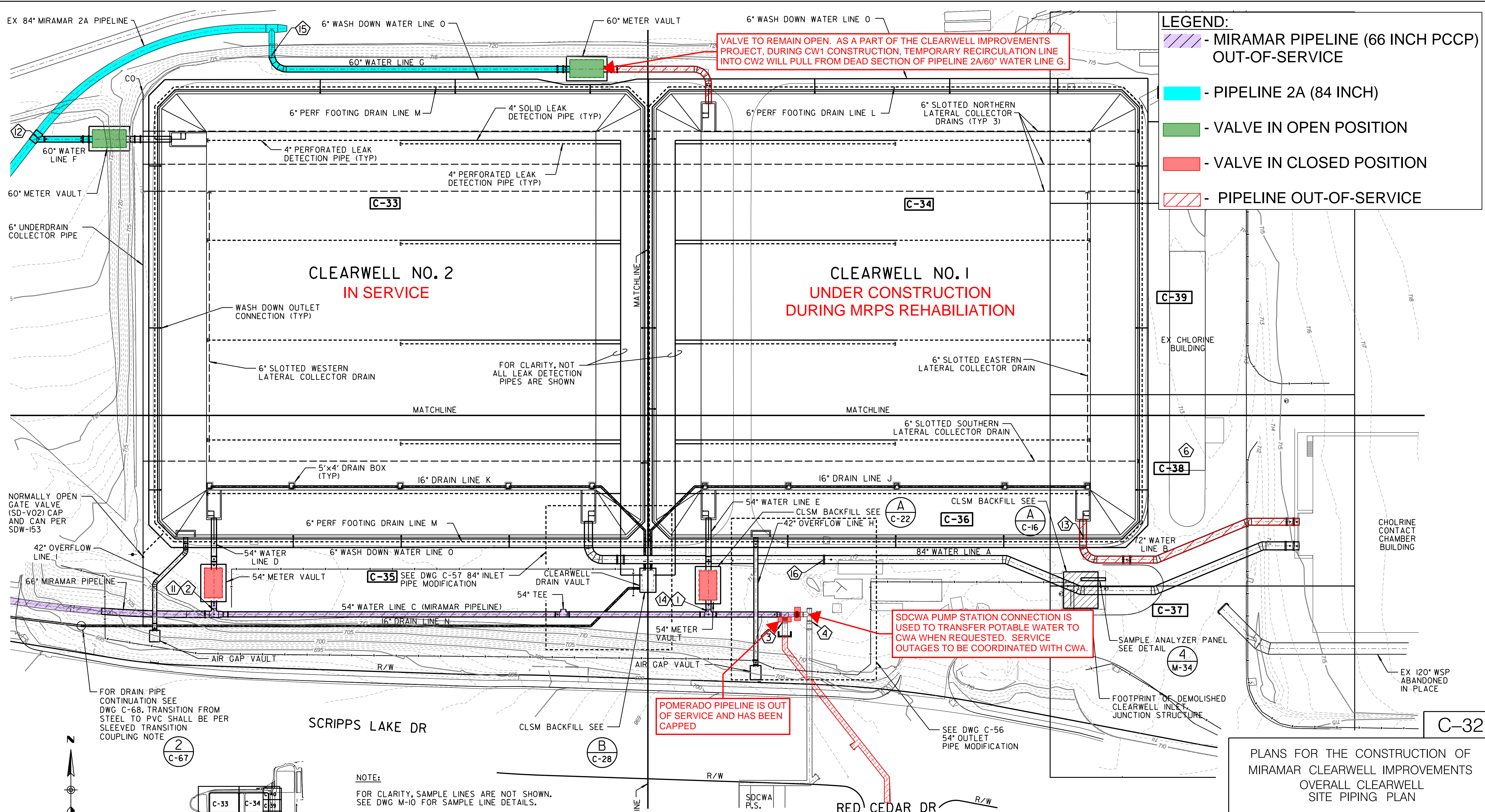
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EQUALS ONE INCH LENGTH ON ORIGINAL DRAWING



CIVIL YARD PIPING PLAN

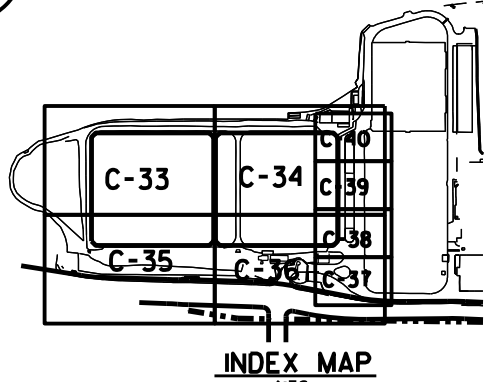
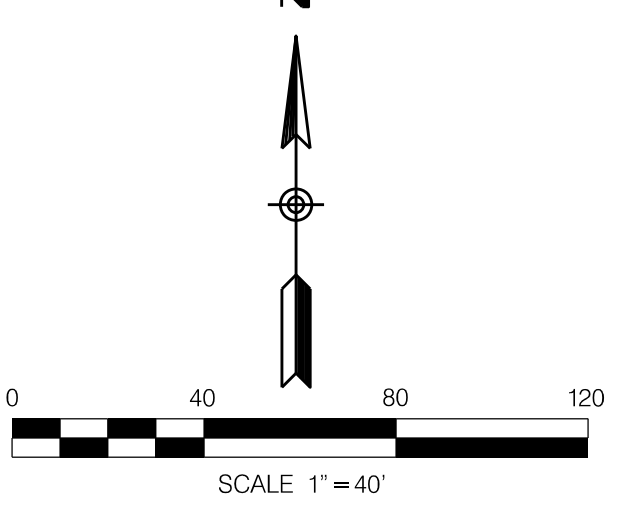
**ATTACHMENT 3 – MIRAMAR CLEARWELL IMPROVEMENTS OVERALL SITE
PIPING PLAN_C-32**



LEGEND:

- MIRAMAR PIPELINE (66 INCH PCCP) OUT-OF-SERVICE
- PIPELINE 2A (84 INCH)
- VALVE IN OPEN POSITION
- VALVE IN CLOSED POSITION
- PIPELINE OUT-OF-SERVICE

FOR DRAIN PIPE CONTINUATION SEE DWG C-68. TRANSITION FROM STEEL TO PVC SHALL BE PER SLEEVED TRANSITION COUPLING NOTE



NOTE:
FOR CLARITY, SAMPLE LINES ARE NOT SHOWN. SEE DWG M-10 FOR SAMPLE LINE DETAILS.

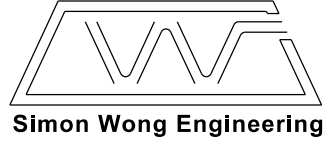
LEGEND:
 APPROX TIE-IN LOCATION SEE SPEC SEC 0115 AND TABLE 0115-A

CONSTRUCTION CHANGE/ADDENDUM		
CHANGE DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

**CITY OF SAN DIEGO
PUBLIC WORKS PROJECT**



KLEINFELDER
Bright people. Right Solutions.
550 West C Street, Suite 1200 San Diego, CA 92101
Tel. (619) 831 4600



Infrastructure
14271 Danielson Street
Poway, California 92064
T 858.413.2400 F 858.413.2440
www.iecorporation.com



**PLANS FOR THE CONSTRUCTION OF
MIRAMAR CLEARWELL IMPROVEMENTS
OVERALL CLEARWELL
SITE PIPING PLAN**

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 057 OF 389 SHEETS		WATER WBS S-11024 SEWER WBS NONE
APPROVED FOR CITY ENGINEER _____ DATE _____	PROJECT MANAGER ANH NGUYEN	PROJECT ENGINEER JACOB RIVERA
DESCRIPTION	BY	APPROVED
ORIGINAL	MM/TS	
ADDENDUM F	AE/TS	272-1739
CONFORMED	AE/TS	1912-6301
CONTRACTOR	DATE STARTED	CCS27 COORDINATE
INSPECTOR	DATE COMPLETED	CCS83 COORDINATE
37634-057-D		3-25-2016

MIRAMAR CLEARWELL IMPROVEMENTS

CONTRACTOR'S RESPONSIBILITIES

- PURSUANT TO SECTION 4216 OF THE GOVERNMENT CODE, AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION, YOU MUST CONTACT THE REGIONAL NOTIFICATION CENTER (E.G. UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA) AND OBTAIN AN INQUIRY IDENTIFICATION NUMBER.
- NOTIFY SDG&E AT LEAST 10 WORKING DAYS PRIOR TO EXCAVATING WITHIN 10' OF SDG&E UNDERGROUND HIGH VOLTAGE TRANSMISSION POWER LINES. (I.E., 69 KV & HIGHER)
- THE LOCATIONS OF EXISTING BUILDINGS, EQUIPMENT AND UTILITIES AS SHOWN ON THE DRAWINGS ARE FROM BEST AVAILABLE INFORMATION BUT ARE NOT GUARANTEED. CONTRACTOR SHALL FIELD CHECK AND MEASURE ALL CRITICAL DIMENSIONS.
- STORM DRAIN INLETS SHALL REMAIN FUNCTIONAL AT ALL TIMES DURING CONSTRUCTION.
- UNLESS OTHERWISE NOTED AS PREVIOUSLY POTHOLED (PH), ELEVATIONS SHOWN ON THE PROFILE FOR EXISTING UTILITIES ARE BASED ON A SEARCH OF THE AVAILABLE RECORD INFORMATION ONLY AND ARE SOLELY FOR THE CONTRACTOR'S CONVENIENCE. THE CITY DOES NOT GUARANTEE THAT IT HAS REVIEWED ALL AVAILABLE DATA. THE CONTRACTOR SHALL POTHOLE AND SURVEY ALL EXISTING UTILITIES EITHER SHOWN ON THE PLANS OR MARKED IN THE FIELD IN ACCORDANCE WITH THE SPECIFICATIONS SECTION 402-UTILITIES.
- EXISTING UTILITY CROSSING AS SHOWN ON THE PLANS ARE APPROXIMATE AND ARE NOT REPRESENTATIVE OF ACTUAL LENGTH AND LOCATION OF CONFLICT AREAS. SEE PLAN VIEW.
- ALL ADVANCE METERING INFRASTRUCTURE (AM) DEVICES ATTACHED TO THE WATER METER OR LOCATED IN OR NEAR WATER METER BOXES, COFFINS, OR VAULTS SHALL BE PROTECTED AT ALL TIMES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

CONSTRUCTION STORM WATER PROTECTION NOTES

- TOTAL SITE DISTURBANCE AREA (ACRES) 0.1
HYDROLOGIC UNIT & WATERSHED PENASQUITOS/LOS PENASQUITOS
HYDROLOGIC SUBAREA NAME & NO. MIRAMAR RESERVOIR (906J0)
 - THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE
 MINOR WPCP
THE PROJECT IS SUBJECT TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100
 WPCP
THE PROJECT IS SUBJECT TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100
 SWPPP
THE PROJECT IS SUBJECT TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 AND CONSTRUCTION GENERAL PERMIT (CGP) ORDER 2009-0009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ
TRADITIONAL RISK LEVEL 1 2 3
LUP RISK TYPE 1 2 3
 - CONSTRUCTION SITE PRIORITY
 ASBS HIGH MEDIUM LOW
- PERMANENT STORM WATER BMP CATEGORY:**
 PRIORITY DEVELOPMENT PROJECT
 STANDARD DEVELOPMENT PROJECT
 PDP EXEMPT
 NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SHEET INDEX

SHEET NO.	DISCIPLINE CODE	TITLE	WATER PIPE		
			SIZE (IN)	MATERIAL	LENGTH (LF)
1	G-1	COVER SHEET			
2	G-2	GENERAL NOTES, LEGEND, AND ABBREVIATIONS			
3	G-3	GENERAL MITIGATION MONITORING AND REPORTING I			
4	G-4	GENERAL MITIGATION MONITORING AND REPORTING II			
5	G-5	GENERAL MITIGATION MONITORING AND REPORTING III			
6	G-6	OVERALL PROJECT SITE PLAN & HORIZONTAL CONTROL PLAN			
7	G-7	MRPS, SRPS, AND MWTP FLOW SCHEMATIC			
8	D-1	CIVIL SITE DEMOLITION PLAN			
9	D-2	MECHANICAL DEMOLITION PLAN			
10	C-1	66-INCH PIPE REPLACEMENT	66	CML&TCMC	200
11	C-2	GRADING AND DRAINAGE PLAN			
12	C-3	CIVIL IMPROVEMENT PLAN			
13	C-4	SPILL CONTAINMENT BASIN			
14	C-5	CIVIL DETAILS I			
15	C-6	CIVIL DETAILS II			
16	C-7	CIVIL DETAILS III			
17	C-8	CIVIL DETAILS IV			
18	C-9	BMP MAP FOR STANDARD DEVELOPMENT PROJECT			
19	S-1	ELECTRICAL BUILDING ROOF PLAN AND DETAILS			
20	M-1	MRPS MECHANICAL PLAN & SECTION			
21	M-2	MECHANICAL DETAILS			
22	H-1	HVAC PLAN AIRFLOW DIAGRAM			
23	H-2	HVAC SECTIONS & DETAILS			
24	E-1	STANDARD ELECTRICAL SYMBOLS AND ABBREVIATIONS			
25	E-2	ELECTRICAL SITE PLAN			
26	E-3	EXISTING SINGLE LINE DIAGRAM			
27	E-4	MODIFIED SINGLE LINE DIAGRAM			
28	E-5	ELEVATIONS			
29	E-6	ELECTRIC BUILDING PLAN			
30	E-7	ELECTRICAL PUMP STATION AREA PLAN			
31	E-8	CONTROLS DIAGRAM 1			
32	E-9	CONTROLS DIAGRAM 2			
33	E-10	CONTROLS DIAGRAM 3			
34	E-11	SCHEDULES 1			
35	E-12	SCHEDULES 2			
36	E-13	DETAILS			
37	E-14	PHOTOS 1			
38	E-15	PHOTOS 2			
39	I-1	P&ID LEGEND AND ABBREVIATIONS			
40	I-2	P&ID 1			
41	I-3	P&ID 2			
42	I-4	P&ID 3			
43	I-5	NETWORK DIAGRAM			
44	CP-1	CATHODIC PROTECTION DETAILS I			
45	CP-2	CATHODIC PROTECTION DETAILS II			
46	CP-3	CATHODIC PROTECTION DETAILS III			
47	SO-1	PV SYSTEM ELECTRICAL NOTES, ABBREVIATIONS, AND LEGEND			
48	SO-2	SOLAR PV SYSTEM - SYSTEM SITE PLAN			
49	SO-3	PV SYSTEM LAYOUT PLAN - CLEARWELL 1			
50	SO-4	PV SYSTEM LAYOUT PLAN - CLEARWELL 2			
51	SO-5	PV SYSTEM LAYOUT PLAN - EQUIPMENT PAD DETAIL			
52	SO-6	PV SYSTEM SINGLE LINE DRAWING			
53	SO-7	PV SYSTEM CONDUIT SCHEDULE DETAIL			
54	SO-8	DATA ACQUISITION SYSTEM SCHEMATIC			
55	SO-9	PV SYSTEM MV WIRE PULL PLAN			
56	SO-10	PV SYSTEM - MANUFACTURER SPECIFICATIONS			
57	SO-11	PV STRUCTURAL NOTES			
58	SO-12	OVERALL PV STRUCTURAL PLAN AT RESERVOIR ROOF			
59	SO-13	PV STRUCTURAL DETAILS			
60	SO-14	PV STRUCTURAL DETAILS			
61	SO-15	RACKING COVER SHEET			
62	SO-16	RACKING ARRAY SITE MAP			
63	SO-17	TYPICAL ARRAY DIMENSIONS			
64	SO-18	ASSEMBLIES			
65	SO-19	RACKING COMPONENTS			
66	SO-20	BALLAST LEGEND			
67-97	SO-21-SO-51	SUB-ARRAY PLANS 1 THRU 31			

TOTAL WATER = 200 LF

DISCIPLINE CODE

- G GENERAL
- D DEMOLITION
- C CIVIL
- M MECHANICAL
- S STRUCTURAL
- H HVAC
- E ELECTRICAL
- CP CATHODIC PROTECTION
- SO SOLAR PHOTOVOLTAIC

SITE ADDRESS

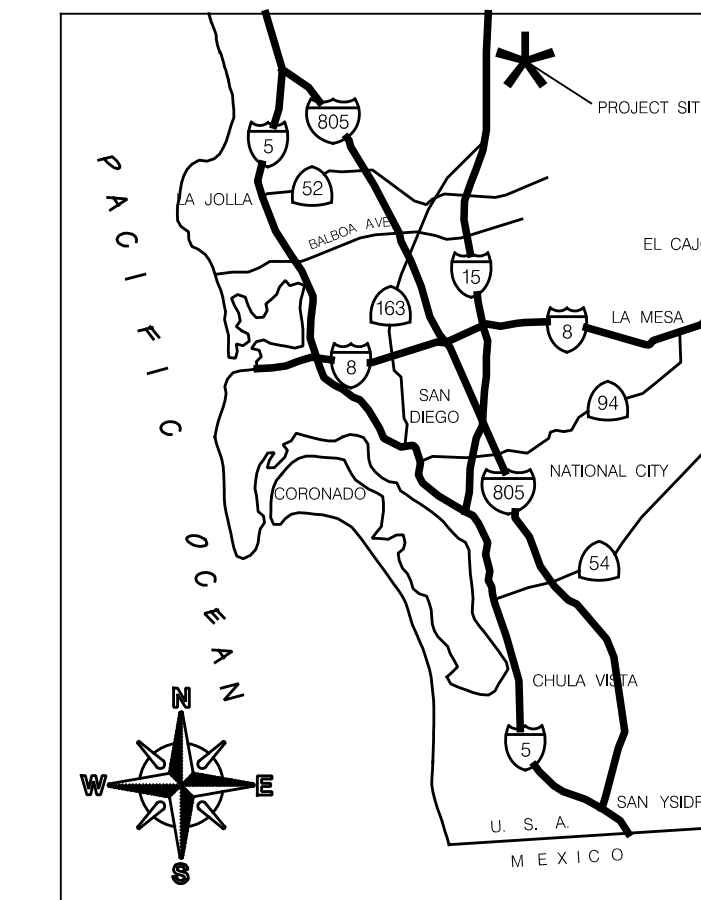
10710 SCRIPPS LAKE DRIVE
SAN DIEGO, CA 92131

FIELD DATA

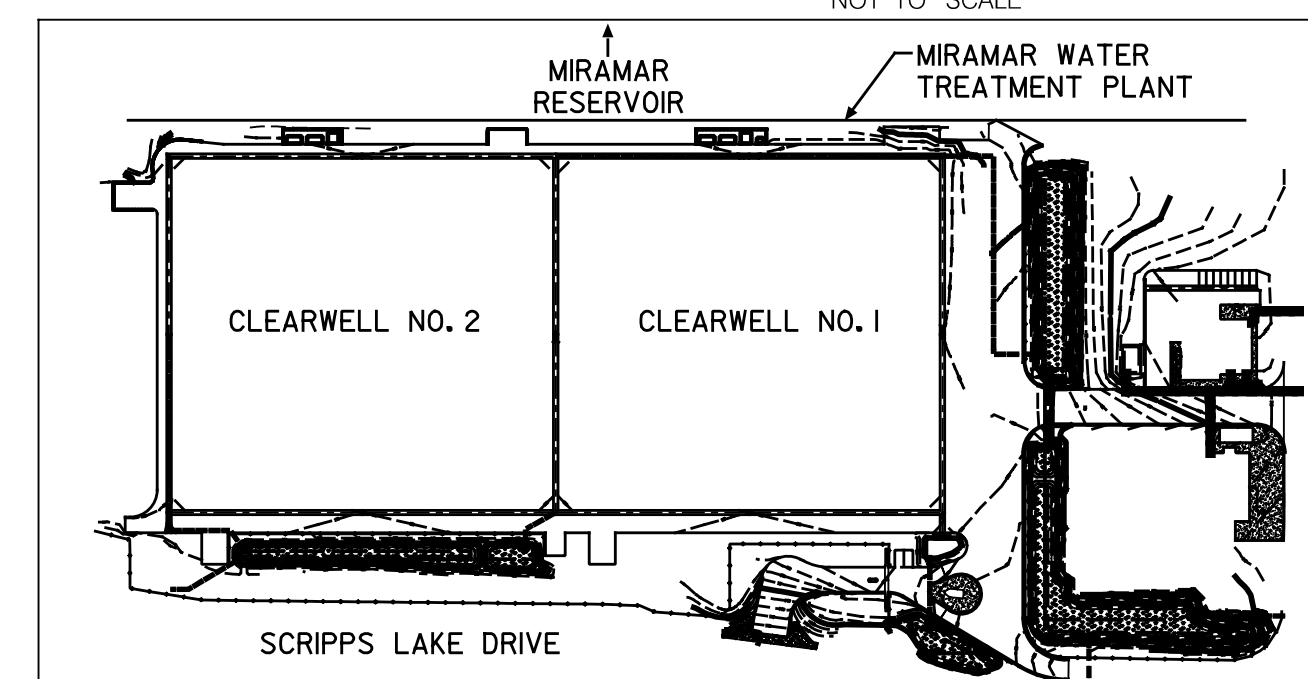
BASIS OF BEARINGS/COORDINATES:
THE BASIS OF BEARINGS FOR THIS DRAWING IS GEODETIC NORTH WAS DERIVED FROM NETWORK RTK SMARTNET, LEICA GEOSYSTEMS.
BEARING: SOUTH 24° 20' 05" EAST.

THE BASIS OF COORDINATES FOR THIS DRAWING IS AT SAID POINT 127. THE COORDINATES ARE BASED ON THE NORTH AMERICAN DATUM OF 1983 (EPOCH 1991.35), CALIFORNIA COORDINATE SYSTEM, ZONE 6, US SURVEY FEET.
N. 1912924.46 FT
E. 6298962.70 FT
VERTICAL DATUM IS BASED ON THE NATIONAL VERTICAL DATUM OF 1929 (NGVD29).

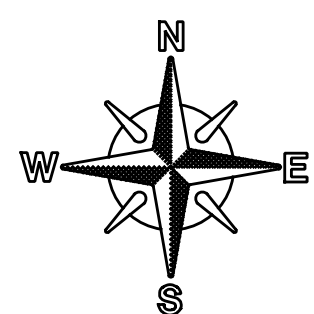
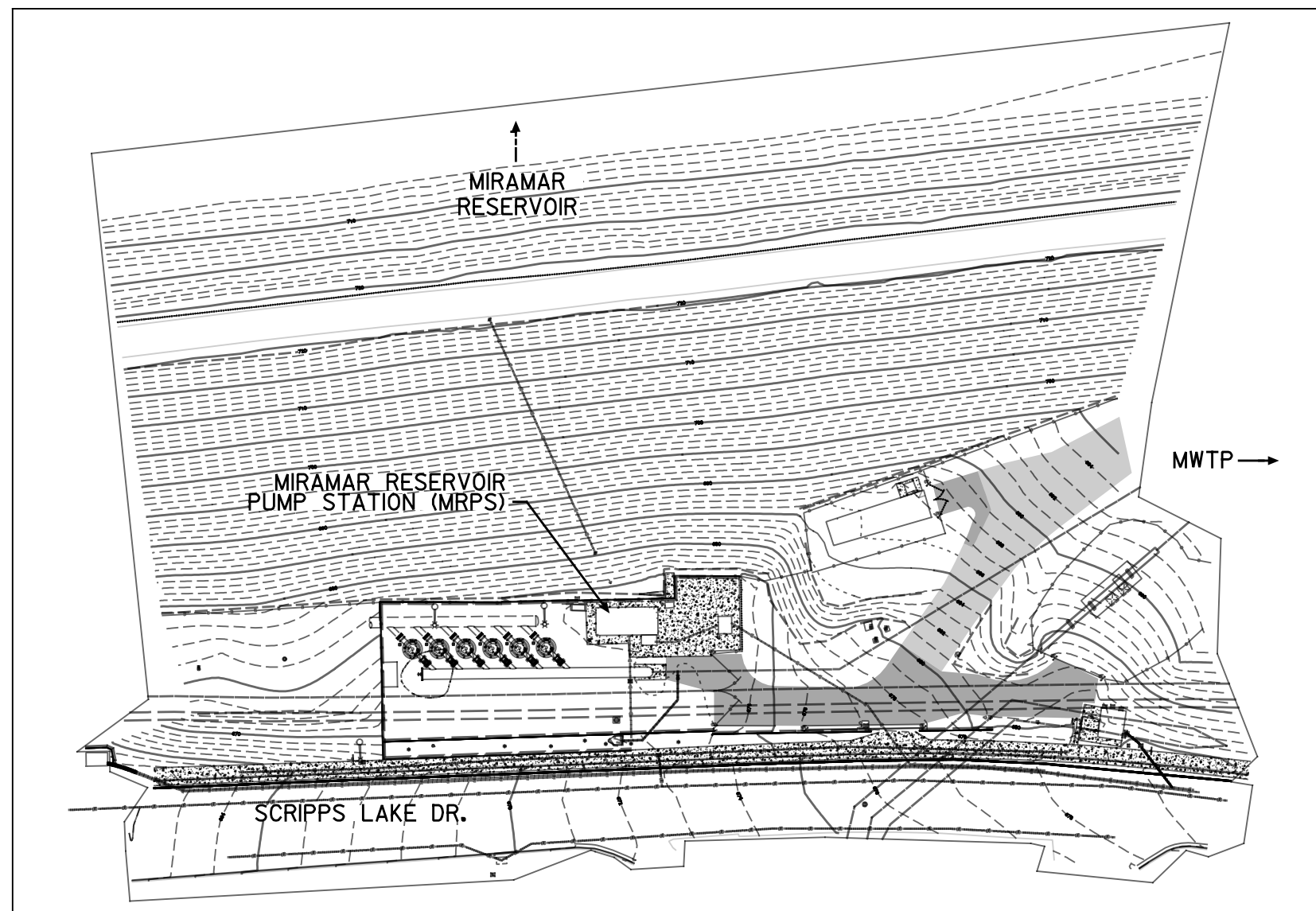
BENCH:
BEARING 5
CNPT MAG NAIL
N. 1912689.02 FT
E. 6299696.31 FT
ELEV=680.51



VICINITY MAP
NOT TO SCALE



PHOTOVOLTAIC LOCATION MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

WORK TO BE DONE

REHABILITATION AND IMPROVEMENTS TO THE (100 MGD) MIRAMAR RESERVOIR PUMP STATION (MRSP) INCLUDING CIVIL, MECHANICAL, HVAC, ELECTRICAL, INSTRUMENTATION. THE IMPROVEMENT WORK ALSO INCLUDES THE REPLACEMENT OF APPROX. 200 LF OF 66-INCH PCCP AND INSTALLATION OF 1.24 MW-AC PHOTOVOLTAIC (PV) SYSTEM AT THE MIRAMAR WATER TREATMENT PLANT (ON CLEARWELL NO. 1). REFER TO SPECIFICATION SECTION 01100.

STANDARD SPECIFICATIONS

DOCUMENT NO.	DESCRIPTION
ECPIO10122-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2021 EDITION
ECPIO10122-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION 2021 EDITION (WHITEBOOK),
PWPIO1019-04 DRAFTING	CITYWIDE COMPUTER AIDED DESIGN AND (CADD) STANDARDS, 2018 EDITION
PWPIO60121-10 DEVICES	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL (REVISION 6), 2014 EDITION
PWPIO3019-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S. CUSTOMARY STANDARD SPECIFICATIONS, 2021 EDITION

STANDARD DRAWINGS

DOCUMENT NO.	DESCRIPTION
ECPIO10122-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2021 EDITION
PWIO3019-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S. CUSTOMARY STANDARD PLANS, 2018 EDITION

DECLARATION OF RESPONSIBLE CHARGE

* I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT AND 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.

[Signature]
ARTURO E. GARCIA R.C.E. NO. 82672 DATE OF SIGNING 01/28/2022

MONUMENTATIONSURVEY NOTES

THIS MAP WAS CREATED FROM A PARCEL LAYER AND DOES NOT DEPICT THE ACTUAL LOCATION OF THE PROPERTY LINES. NO BOUNDARY ANALYSIS WAS PERFORMED. THE SURVEY MONUMENTS HAVE BEEN LOCATED BY SURVEY GRADE MEASUREMENTS, AND ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY.

THE CITY OF SAN DIEGO LAND SURVEYORS SHALL REPLACE SUCH MONUMENTS WITH APPROPRIATE MONUMENTS. WHEN SETTING SURVEY MONUMENTS USED FOR RE-ESTABLISHMENT OF THE DISTURBED CONTROLLING SURVEY MONUMENTS AS REQUIRED BY SECTIONS 6730.2 AND 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA, A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED WITH THE COUNTY SURVEYOR.

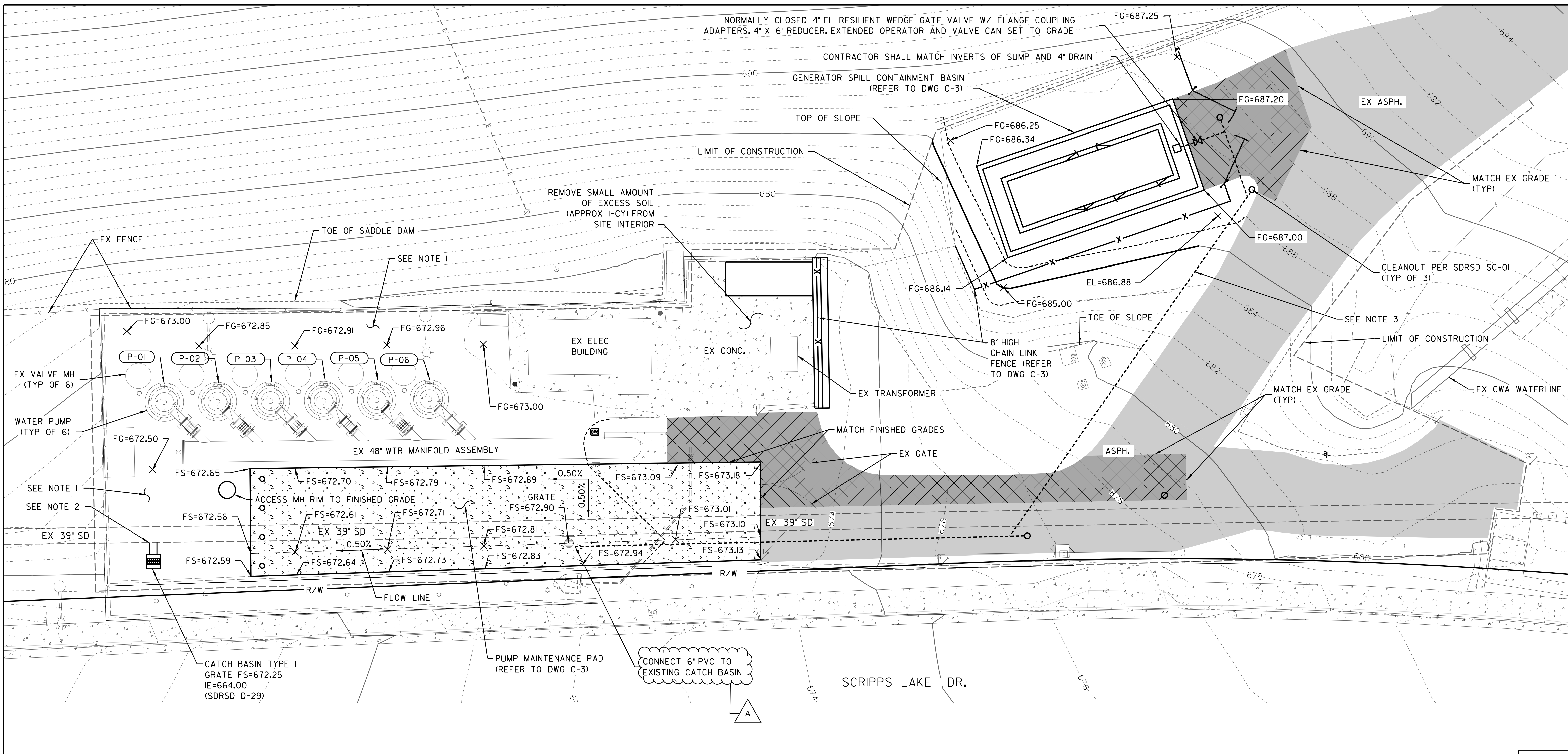
IF ANY HORIZONTAL OR VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION SHALL BE NOTIFIED IN WRITING AT LEAST 7 DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ANY HORIZONTAL CONTROL AND VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION IF THE CITY OF SAN DIEGO SURVEY SECTION IS NOT NOTIFIED PRIOR TO CONSTRUCTION. THE FILING OF A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE SHALL BE FILED WITH COUNTY SURVEYOR. A COPY OF THE FILED DOCUMENT SHALL BE FURNISHED TO THE CITY OF SAN DIEGO SURVEY SECTION.

G-1

PLANS FOR THE CONSTRUCTION OF
MIRAMAR RESERVOIR PUMP STATION
IMPROVEMENTS
COVER SHEET

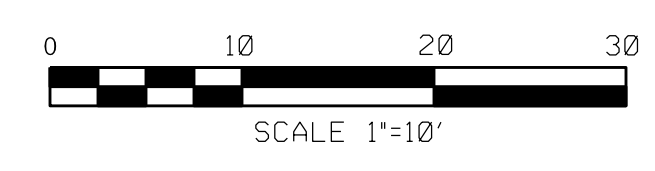
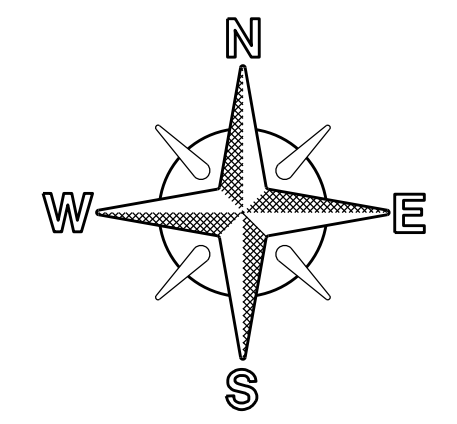
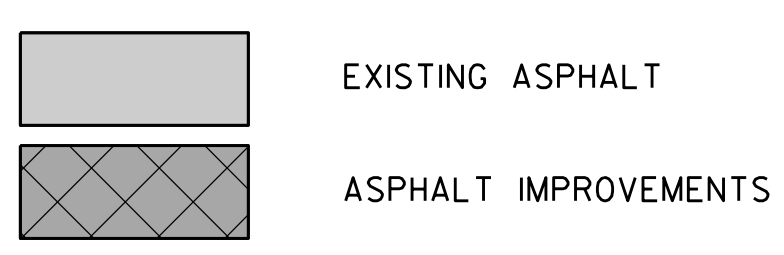
CONSTRUCTION CHANGE / ADDENDUM				<p>WARNING</p> <p>IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.</p>		AS-BUILT INFORMATION		<p>550 WEST C STREET, SUITE 1200, SAN DIEGO, CA 92101 Tel. (619) 831-4600 kleinfelder.com</p>		<p>CITY OF SAN DIEGO, CALIFORNIA ENGINEERING & CAPITAL PROJECTS DEPARTMENT SHEET 1 OF 97 SHEETS</p>	<p>WATER WBS B-17190 WATER WBS B-19099</p>
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.			MATERIALS	MANUFACTURER				
A	4/19/2022	C-2,M-1,H-1,SO-3		PIPE CL 235 (WATER)	-						
				PIPE SDR 35 (SEWER)	-						
				GATE VALVES	-						
				FIRE HYDRANTS	-						
				SEWER MANHOLES	-						
				REHABILITATE SEWER MANHOLES	-						
				REHABILITATE SEWER MAIN	-						

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS



CONTRACTOR'S NOTES:

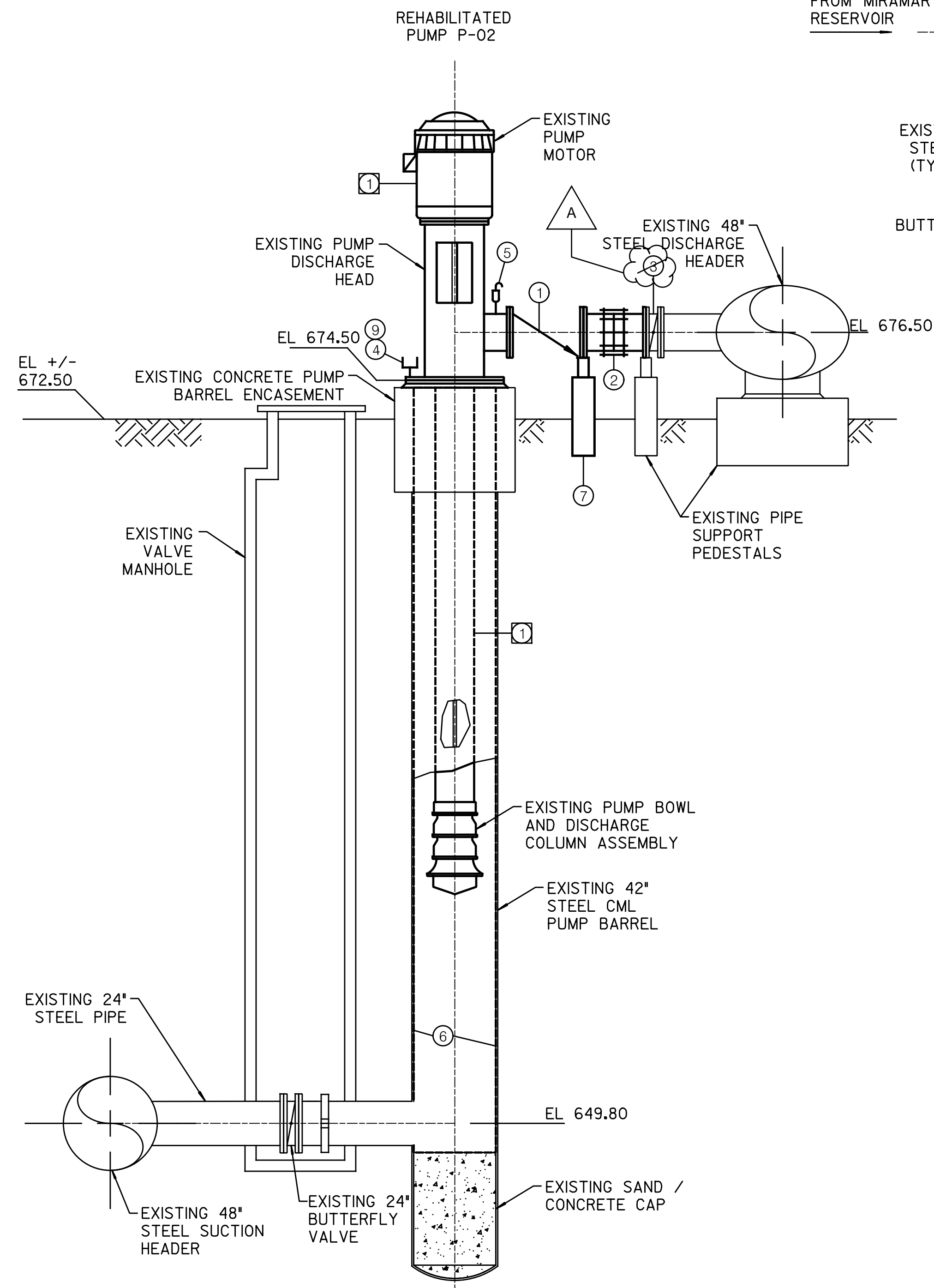
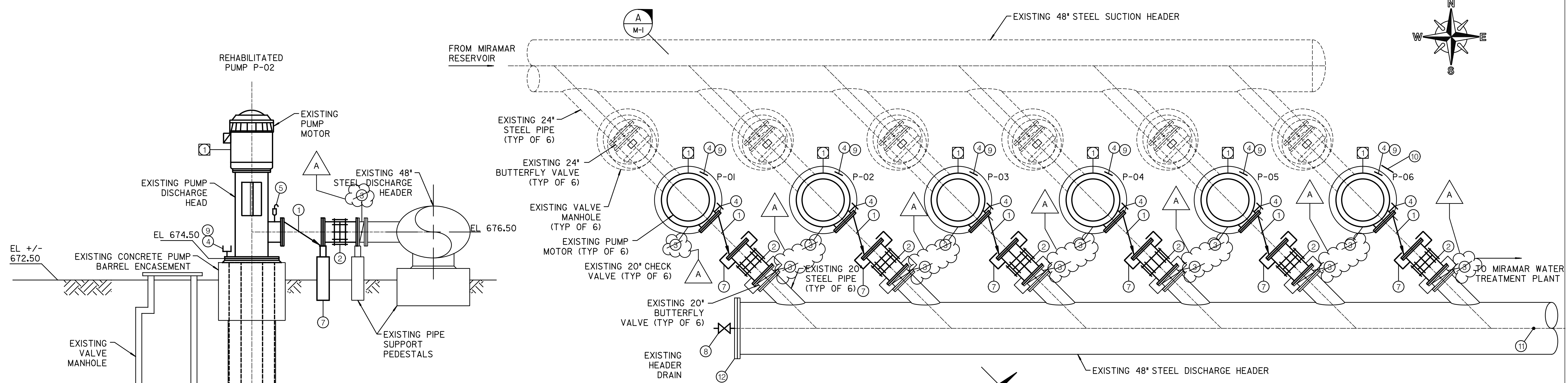
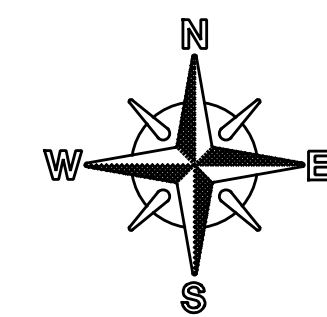
1. CONTRACTOR SHALL PLACE AN EVEN DENSE LAYER OF 3/4\"/>



C-2

**MIRAMAR RESERVOIR PUMP
STATION IMPROVEMENTS**
GRADING AND DRAINAGE PLAN

SPEC. NO. 2058	CITY OF SAN DIEGO, CALIFORNIA ENGINEERING & CAPITAL PROJECTS DEPARTMENT SHEET II OF 97 SHEETS	WATER WBS B-17190 WATER WBS B-19099		
	APPROVED: <i>[Signature]</i> DATE: 2/18/2022	SUBMITTED BY: FABIOLA AMARILLAS PROJECT MANAGER		
	FOR CITY ENGINEER & ENGINEER OF WORK: ALICE ALTES PRINT DOC NAME: RCEP	CHECKED BY: MARIA CORAZON VENTURA PROJECT ENGINEER		
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
A	KLF	<i>[Signature]</i>	4/21/22	
CONTRACTOR INSPECTOR				
NTP DATE NOC DATE				
41085- 11 -D				



PLAN VIEW
SCALE: 1/4" = 1'-0"

SECTION
SCALE: 1/4" = 1'-0"

CONSTRUCTION NOTES

- ① INSTALL 20" NEW RUBBER FLAPPER CHECK VALVE WITH LIMIT SWITCH.
- ② INSTALL 20" FLANGED PIPE SPOOLS AND FLEXIBLE COUPLING PER DETAIL 1
M-2
- ③ NOT USED
- ④ INSTALL NEW PRESSURE GAUGE AND PRESSURE SWITCH ASSEMBLY PER DETAIL 2
M-2
- ⑤ INSTALL NEW AIR RELEASE ASSEMBLY PER DETAIL 3
M-2
- ⑥ INSPECT AND REHABILITATE INTERIOR OF PUMP BARREL PER SPECIFICATION SECTION 43 0140. MEASUREMENT AND PAYMENT OF THIS WORK IS DESCRIBED IN SPECIFICATION SECTION 0129 00 (BID ITEM 3). INITIAL ALLOWANCE FOR THIS WORK IS DEFINED IN THE CONTRACT BID SCHEDULE. ADDITIONAL WORK REQUIRED WILL BE TIME AND MATERIALS.
- ⑦ CONSTRUCT CONCRETE PIPE SUPPORT PEDESTAL AND SUPPORT SADDLE PER DETAIL 5
M-2
- ⑧ NEW 2 - 1/2" DRAIN GATE VALVE AND WITH HANDWHEEL OPERATOR, FLANGED X THREADED (FEMALE).
- ⑨ DRILL AND TAP PUMP BARREL FLANGE FOR SUCTION GAGE / SWITCH.
- ⑩ REPLACE EXISTING SUCTION HEADER PRESSURE TRANSMITTER AND GAUGE PER DETAIL 4
M-2
- ⑪ REPLACE PRESSURE TRANSMITTER PER DETAIL 6
M-2
- ⑫ REPLACE EXISTING GASKET ON 48" BLIND FLANGE

RE-INSTALLATION NOTES

- ① RE-FURBISH AND RE-INSTALL PUMP AND MOTOR PER SPEC SECTION 43 0140.

NOTES:

- 1. ALL ABOVE GRADE STEEL PIPING AND PIPING COMPONENTS SHALL BE COATED OR RE-COATED PER SPECIFICATION SECTION 09 90 00.
- 2. ALL NUTS, BOLTS, WASHERS, AND GASKETS FOR RE-ASSEMBLED FLANGES SHALL BE NEW, TYPE 316 SS.
- 3. PUMP CAN IS NORMALLY SURCHARGED, ISOLATION UTILIZING THE 24" BUTTERFLY VALVE IS REQUIRED FOR REHABILITATION.

M-1

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
MRPS MECHANICAL PLAN & SECTION

SPEC. NO. 2058	CITY OF SAN DIEGO, CALIFORNIA ENGINEERING & CAPITAL PROJECTS DEPARTMENT SHEET 20 OF 97 SHEETS	WATER WBS B-17190 WATER WBS B-19099															
	APPROVED: <i>[Signature]</i> DATE: 2/18/2022 FOR CITY/ENGINEER & ENGINEER OF WORK: ALICE ALTES PRINT NAME: ALICE ALTES PRINT DCE NAME: ALICE ALTES DATE: 2/18/2022 DATE: 01/28/2022	SUBMITTED BY: FABIOLA AMARILLAS PROJECT MANAGER CHECKED BY: MARIA CORAZON VENTURA PROJECT ENGINEER															
<table border="1"> <thead> <tr> <th>DESCRIPTION</th> <th>BY</th> <th>APPROVED</th> <th>DATE</th> <th>FILMED</th> </tr> </thead> <tbody> <tr> <td>ORIGINAL</td> <td>CP/KLF</td> <td></td> <td></td> <td></td> </tr> <tr> <td>A</td> <td>KLF</td> <td><i>[Signature]</i></td> <td>4/21/22</td> <td></td> </tr> </tbody> </table>	DESCRIPTION	BY	APPROVED	DATE	FILMED	ORIGINAL	CP/KLF				A	KLF	<i>[Signature]</i>	4/21/22		SEE EACH SHEET CCS27 COORDINATE SEE EACH SHEET CCS83 COORDINATE	CONTRACTOR INSPECTOR NTP DATE NOC DATE
DESCRIPTION	BY	APPROVED	DATE	FILMED													
ORIGINAL	CP/KLF																
A	KLF	<i>[Signature]</i>	4/21/22														
41085-20-D																	

MRPS MECHANICAL PLAN & SECTION

WORK TO BE COMPLETED:

1. REMOVE EXISTING MOTOR CONTROL CENTER SUPPLY AIR FAN MLPS-FAN-01 AND REPLACE WITH AC SPLIT SYSTEM FAN / COIL UNIT.
2. INSTALL OUTDOOR CONDENSER UNIT CD-01 WEST OF STRUCTURE ALONG NORTH RETAINING WALL / FENCE (SEE PLAN THIS SHEET) AND INSTALL CONDENSATE FRENCH DRAIN (DETAIL I, SHEET H-2).
3. RELOCATE INTERIOR LIGHTING TO ACCOMMODATE FC-01.
4. REMOVE AND REINSTALL MLPS-FAN-02 ON WEST SIDE OF STRUCTURE AS INDICATED ON THIS SHEET.
5. HVAC CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ELECTRICAL / CONTROL WIRING & ASSOCIATED PANELS, INCLUDING ELECTRICAL LIGHTING PANEL.

GENERAL NOTES:

1. ALL DUCT DIMENSIONS ARE CLEAR DIMENSIONS TO THE INSIDE OF DUCT.
2. THE MECHANICAL EQUIPMENT, DUCT SIZING AND DUCTWORK LOCATIONS ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE FIELD CONDITIONS AND SUBMIT INSTALLATION DRAWINGS FOR REVIEW PRIOR TO INSTALLATION IN ACCORDANCE WITH THE SPECIFICATIONS.
3. FINAL DIMENSIONS, OUTDOOR CONDENSER CONCRETE PAD SIZE, AND LOCATIONS SHALL BE COORDINATED BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT SUPPLIED BY THE CONDENSER SUPPLIER.
4. FINAL SIZES OF OPENINGS, DUCT PLENUM, TRANSITIONS AND PIPING CONNECTIONS TO ALL EQUIPMENT SHALL BE DETERMINED BY THE CONTRACTOR FOR EQUIPMENT FURNISHED BY THE CONTRACTOR.
5. DUCTWORK TRANSITION PIECES SHALL BE MANUFACTURED TO ALLOW TO THE EXTENT POSSIBLE DUCT INSTALLATION AND SUPPORT TO WITHIN 5 INCHES OF THE SUPPORTING WALL.
6. ALL DUCTWORK SHALL BE GALVANIZED STEEL PER THE CONTRACT DOCUMENTS. ALL VENTILATION FAN HOUSINGS SHALL BE ALUMINUM WITH BLADE ELEMENTS WITH FRP/EPOXY COATING.

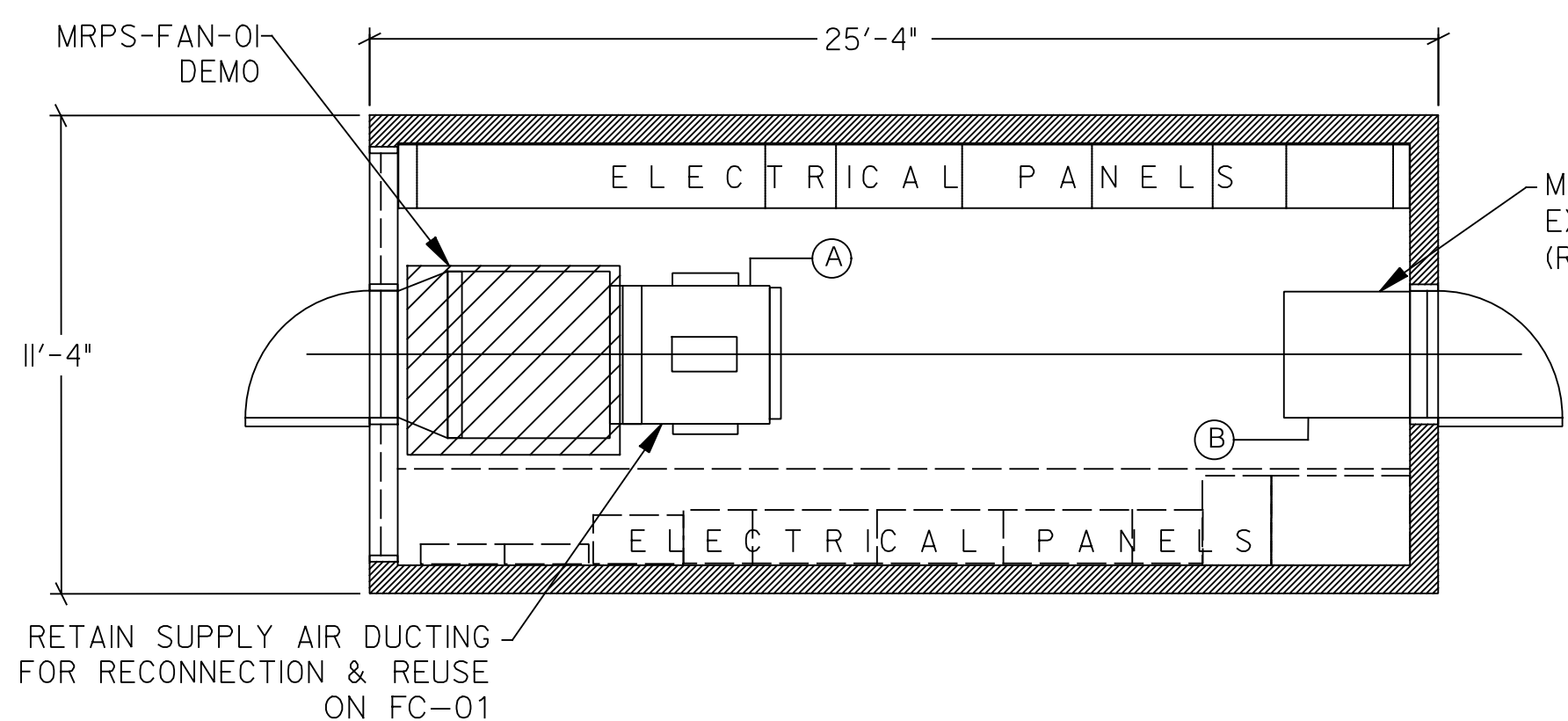
DEMOLITION NOTES:

1. CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF THE EXISTING HVAC COMPONENTS AS IDENTIFIED ON THE CONTRACT DRAWINGS.
2. CONTRACTOR SHALL REMOVE ALL ANCILLARY EQUIPMENT ASSOCIATED WITH THE REMOVED FAN.

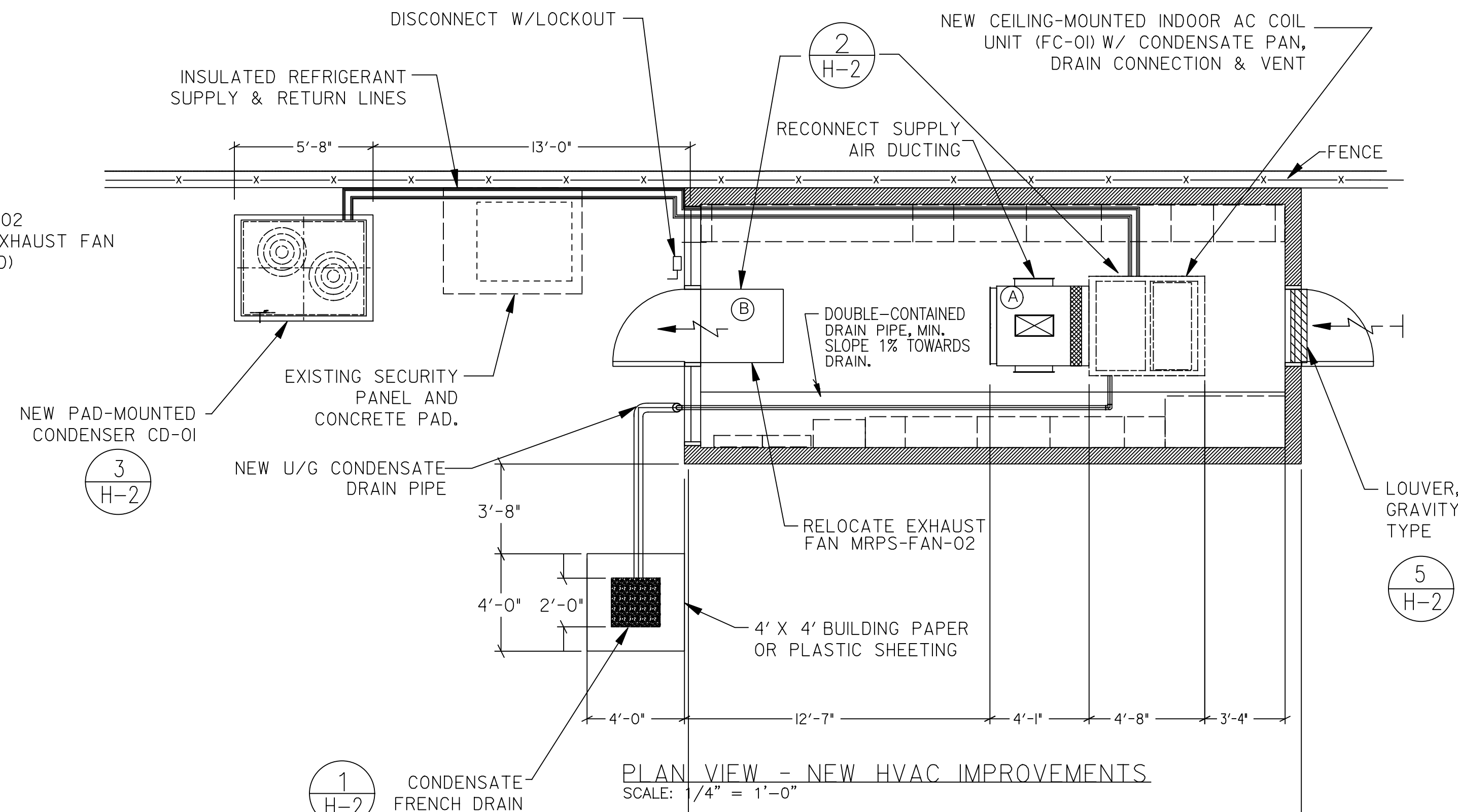
HVAC SCHEDULE

HVAC EQUIPMENT												
CD-01	CONDENSER / OUTDOOR	CARRIER 38 AUZ	92,000	0	N/A	480/3/60	SEE ELECTRICAL DRAWINGS	391	11.8	ON WHEN FC CALLS FOR COOLING	0	N/A
FC-01	FAN COIL UNIT / INDOOR	CARRIER 40 RU	92,000	0	3,000	480/3/60	SEE ELECTRICAL DRAWINGS	579		T-STAT > 80° F	0-3,000	COARSE/MEDIUM FILTER

HVAC SCHEDULE NOTES:
 *SEER UNITS = BTU/SEASON, EER UNITS = BTU/HOUR
 HVAC SIZING BY CITY DIRECTION.



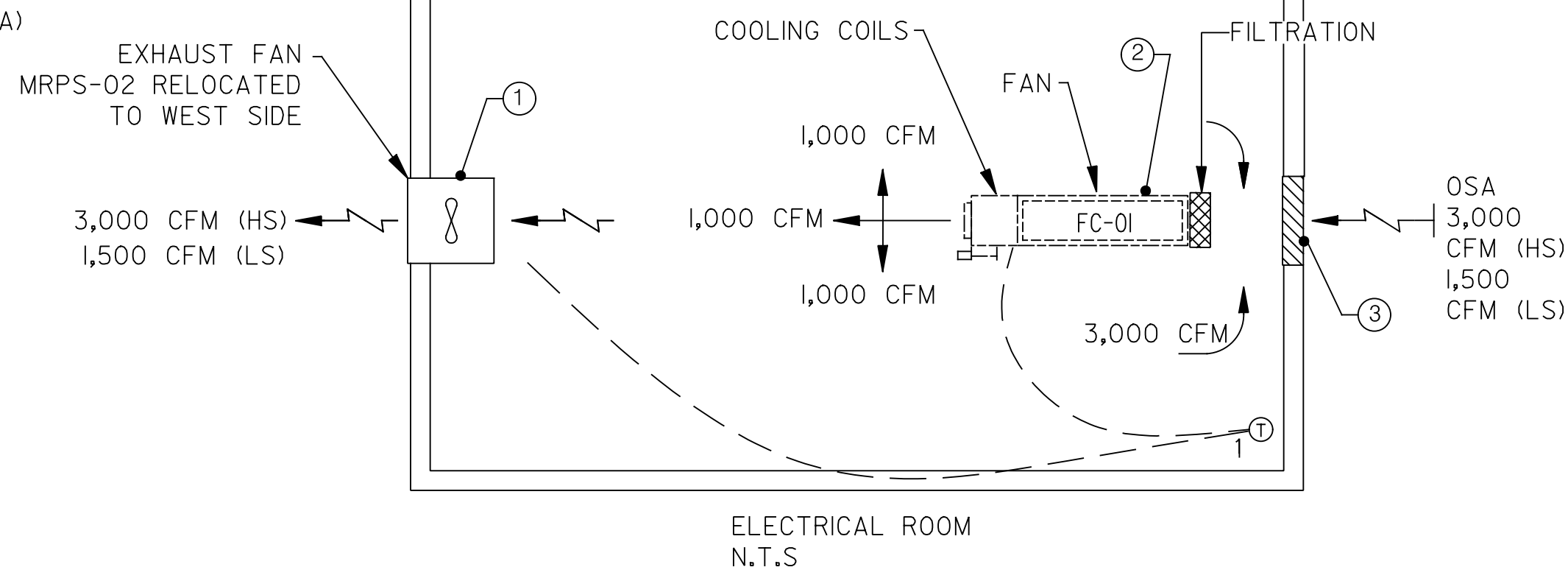
DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"



PLAN VIEW - NEW HVAC IMPROVEMENTS
 SCALE: 1/4" = 1'-0"

LEGEND:

- DUCTWORK & AIR FLOW DIRECTION
- OUTSIDE SUPPLY AIR (OSA)
- CONTROL LOGIC
- THERMOSTAT
- AXIAL FAN
- AC COIL (NEW)
- HS HIGH SETTING
- LS LOW SETTING



		1	2	3
<80° F	A	LOW	OFF	OPEN GRAVITY
>80° F & <90° F	B	OFF	ON	CLOSE GRAVITY
>90° F	C	HIGH	ON	OPEN GRAVITY

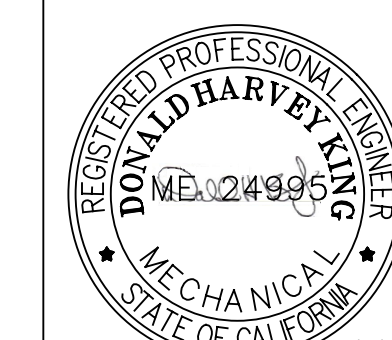
AIR FLOW DIAGRAM, CONTROL LOGIC AND LEGEND

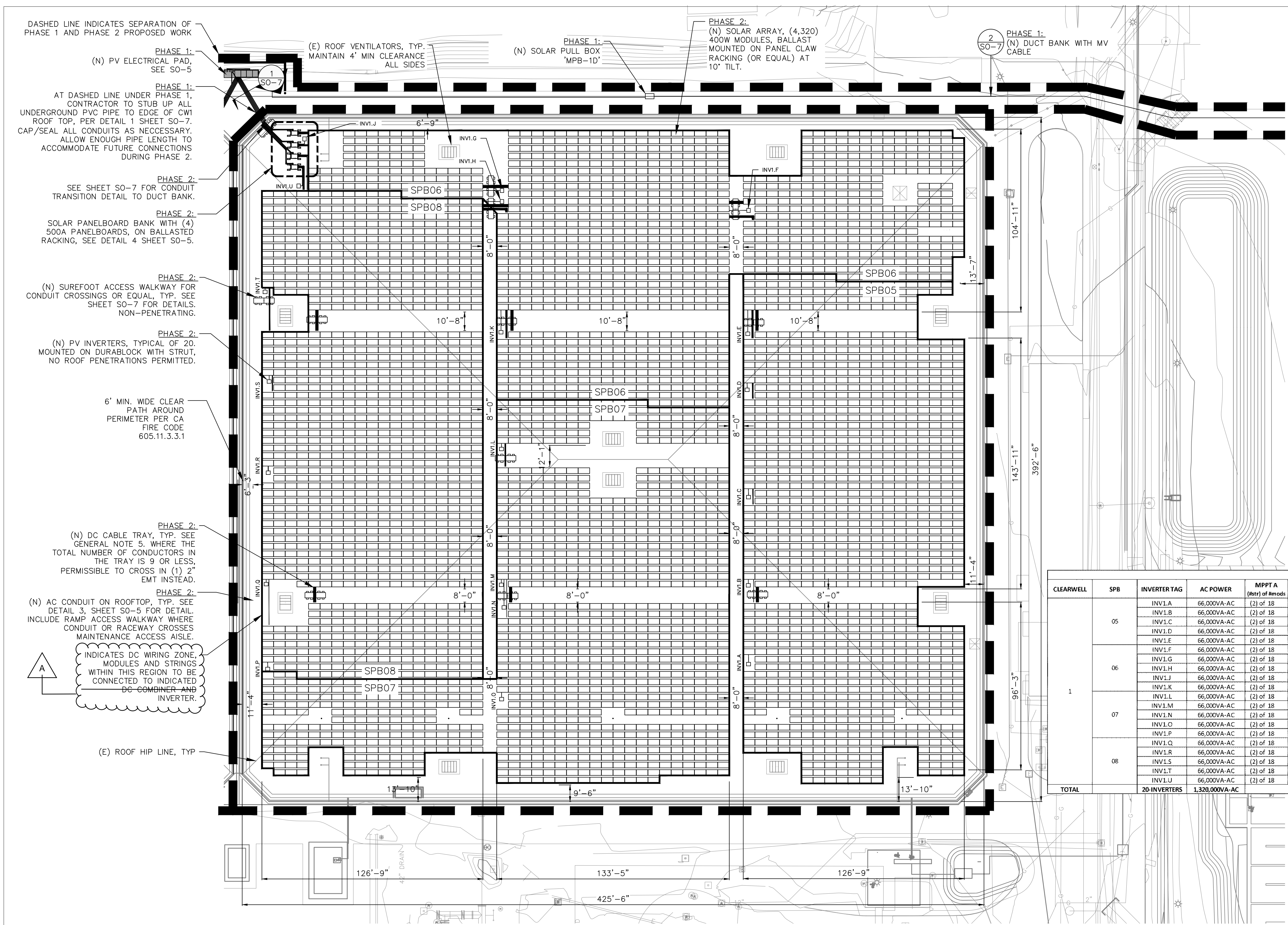
HVAC SECTIONS AND DETAILS

H-1

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS
 HVAC SECTIONS AND DETAILS

SPEC. NO. 2058	CITY OF SAN DIEGO, CALIFORNIA ENGINEERING & CAPITAL PROJECTS DEPARTMENT SHEET 22 OF 97 SHEETS	WATER WBS B-17190 WATER WBS B-19099		
APPROVED: <i>[Signature]</i> FOR CITY/ENGINEER & ENGINEER OF WORK ALICE ALTES PRINT DCE NAME	DATE: 2/18/2022 DATE: 06/28/2022 RCE#	SUBMITTED BY: FABIOLA AMARILLAS PROJECT MANAGER CHECKED BY: MARIA CORAZON VENTURA PROJECT ENGINEER		
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	DKK			
△	KLF	<i>[Signature]</i>	4/21/22	
CONTRACTOR INSPECTOR	NTP DATE	NOC DATE	41085- 22 -D	





- GENERAL NOTES:**
- SEE SINGLE LINE DRAWING SO-6 FOR CONDUIT AND CONDUCTOR SIZES AND SO-7 FOR WIRE AND CONDUIT SCHEDULE.
 - MAINTAIN ALL REQUIRED WORKING CLEARANCES AROUND ELECTRICAL EQUIPMENT PER NEC.
 - VERIFY DIMENSIONS OF PROPOSED ELECTRICAL EQUIPMENT PRIOR TO INSTALLATION. PREPARE CONDUIT ROUTING, CONCRETE PADS, ETC. ACCORDING TO MANUFACTURER SPEC SHEETS AND SHOP DRAWINGS. EQUIPMENT TO BE APPROVED BY ENGINEER-OF-RECORD PRIOR TO PROCUREMENT.
 - CONDUIT ROUTING SUBJECT TO CHANGE TO ACCOMMODATE FIELD CONDITIONS. CONTRACTOR TO SUBMIT ALL CHANGES TO ENGINEER-OF-RECORD FOR APPROVAL PRIOR TO INSTALLATION.
 - PER NEC 690.31(C)(2), CABLES IN DC CABLE TRAYS MUST BE SUPPORTED EVERY 12 INCH MAX AND SECURED AT INTERVALS OF 4.5 FEET MAX.

ALL WORK SHOWN ON CW1 IS CONSIDERED PART OF PHASE 2 EXPANSION UNLESS OTHERWISE NOTED.

SYMBOL LEGEND:

- VENTILATOR
- ROOF HATCH
- SAMPLING STATION
- VALVE STEM
- SUREFOOT PATHWAY (OR EQUAL)
- DC CABLE TRAY
- PV PANELBOARD (TYP OF 4)
- PV INVERTER (TYP OF 16)
- PV MODULE W/ BALLASTED RACKING

CLEARWELL	SPB	INVERTER TAG	AC POWER	STRING INVERTER SCHEDULE						TOTAL STRINGS	MODULE QUANTITY	DC POWER	DC:AC RATIO
				MPPT A (Nstr) of #mods	MPPT B (Nstr) of #mods	MPPT C (Nstr) of #mods	MPPT D (Nstr) of #mods	MPPT E (Nstr) of #mods	MPPT F (Nstr) of #mods				
1	05	INV1.A	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.B	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.C	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.D	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.E	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.F	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
	06	INV1.G	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.H	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.J	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.K	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
	07	INV1.L	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.M	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.N	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.O	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
	08	INV1.P	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.Q	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.R	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.S	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.T	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
		INV1.U	66,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	12	216	86,400W-DC	1.38
TOTAL		20-INVERTERS	1,320,000VA-AC	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	(2) of 18	240-STRINGS	4320-MODS	1,728,000W-DC	1.38

DASHED LINE INDICATES SEPARATION OF PHASE 1 AND PHASE 2 PROPOSED WORK

PHASE 1: (N) PV ELECTRICAL PAD, SEE SO-5

PHASE 1: AT DASHED LINE UNDER PHASE 1, CONTRACTOR TO STUB UP ALL UNDERGROUND PVC PIPE TO EDGE OF CW1 ROOF TOP, PER DETAIL 1 SHEET SO-7. CAP/SEAL ALL CONDUITS AS NECESSARY. ALLOW ENOUGH PIPE LENGTH TO ACCOMMODATE FUTURE CONNECTIONS DURING PHASE 2.

PHASE 2: SEE SHEET SO-7 FOR CONDUIT TRANSITION DETAIL TO DUCT BANK.

PHASE 2: SOLAR PANELBOARD BANK WITH (4) 500A PANELBOARDS, ON BALLASTED RACKING, SEE DETAIL 4 SHEET SO-5.

PHASE 2: (N) SUREFOOT ACCESS WALKWAY FOR CONDUIT CROSSINGS OR EQUAL, TYP. SEE SHEET SO-7 FOR DETAILS. NON-PENETRATING.

PHASE 2: (N) PV INVERTERS, TYPICAL OF 20. MOUNTED ON DURABLOCK WITH STRUT, NO ROOF PENETRATIONS PERMITTED.

6' MIN. WIDE CLEAR PATH AROUND PERIMETER PER CA FIRE CODE 605.11.3.3.1

PHASE 2: (N) DC CABLE TRAY, TYP. SEE GENERAL NOTE 5. WHERE THE TOTAL NUMBER OF CONDUCTORS IN THE TRAY IS 9 OR LESS, PERMISSIBLE TO CROSS IN (1) 2" EMT INSTEAD.

PHASE 2: (N) AC CONDUIT ON ROOFTOP, TYP. SEE DETAIL 3, SHEET SO-5 FOR DETAIL. INCLUDE RAMP ACCESS WALKWAY WHERE CONDUIT OR RACEWAY CROSSES MAINTENANCE ACCESS AISLE.

INDICATES DC WIRING ZONE. MODULES AND STRINGS WITHIN THIS REGION TO BE CONNECTED TO INDICATED DC COMBINER AND INVERTER.

(E) ROOF HIP LINE, TYP



SPEC. NO. 2058

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING & CAPITAL PROJECTS DEPARTMENT
SHEET 49 OF 97 SHEETS

WATER WBS B-17190
WATER WBS B-19099

APPROVED: *[Signature]* DATE: 2/18/2022
FOR CITY ENGINEER & ENGINEER OF WORK
ALICE ALTES PROJECT MANAGER
PRINT DCE NAME: C68286 RCF#

CHECKED BY: MARIA CORAZON VENTURA PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL				
	KLF	<i>[Signature]</i>	4/21/22	

CONTRACTOR: NTP DATE: 01/28/2022
INSPECTOR: NOC DATE:

SEE EACH SHEET CCS27 COORDINATE
SEE EACH SHEET CCS83 COORDINATE
41085-049-D

MIRAMAR RESERVOIR PUMP STATION IMPROVEMENTS

SO-3

Bid Results

Bidder Details

Vendor Name Shimmick Construction Company, Inc.
Address 530 Technology Dr. Suite 300
Irvine, California 92618
United States
Respondee Jolynn Buresh
Respondee Title Senior Pursuit Specialist
Phone 949-333-1500
Email jburesh@shimmick.com
Vendor Type CADIR, PQUAL
License # 594575
CADIR 1000001063

Bid Detail

Bid Format Electronic
Submitted 05/06/2022 1:58 PM (PDT)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 290070

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
B. Contractors Certification of Pending Actions SIGNED 5-3-22.pdf	B. Contractors Certification of Pending Actions SIGNED 5-3-22.pdf	CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS
C. Mandatory Disclosure of Business Interests Form SIGNED 05-3-22.pdf	C. Mandatory Disclosure of Business Interests Form SIGNED 05-3-22.pdf	MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM
D. Debarment and Suspension Certification (Prime) SIGNED 05-3-22.pdf	D. Debarment and Suspension Certification (Prime) SIGNED 05-3-22.pdf	DEBARMENT AND SUSPENSION CERTIFICATION (PRIME CONTRACTOR)
E. Debarment and Suspension Certification (Subs Supplier Mfg) UPLOADED 5-6-22 rev.pdf	E. Debarment and Suspension Certification (Subs Supplier Mfg) UPLOADED 5-6-22 rev.pdf	DEBARMENT AND SUSPENSION CERTIFICATION (SUBCONTRACTORS/SUPPLIERS/MANUFACTURERS)
F. Disclosure of Lobbying Activities SIGNED 05-3-22.pdf	F. Disclosure of Lobbying Activities SIGNED 05-3-22.pdf	DISCLOSURE OF LOBBYING ACTIVITIES
4500-3s Combined 2.pdf	4500-3s Combined 2.pdf	FORM 4500-3: DBE SUBCONTRACTOR PERFORMANCE FORM
H. Form 4500-4 DBE Sub Utilization UPLOADED 05-03-22.pdf	H. Form 4500-4 DBE Sub Utilization UPLOADED 05-03-22.pdf	FORM 4500-4: DBE SUBCONTRACTOR UTILIZATION FORM
I. Commitment to Comply with Skilled and Trained Workforce Requirements SIGNED 05-3-22.pdf	I. Commitment to Comply with Skilled and Trained Workforce Requirements SIGNED 05-3-22.pdf	COMMITMENT TO COMPLY WITH SKILLED AND TRAINED WORKFORCE REQUIREMENTS
A. Bid Bond Executed 5-3-2022.pdf	A. Bid Bond Executed 5-3-2022.pdf	Bid Bond

Subcontractors

Showing 4 Subcontractors

Name & Address	Desc	License Num	CADIR	Amount	Type
Allison Mechanical, Inc. 1968 Essex Ct. Redlands, California 92373	Constructor - HVAC	679866	1000002213	\$106,000.00	CADIR, FEM, CAU
HALCO SERVICE CORPORATION 5773 VENICE BLVD. LOS ANGELES, California 90019	Consultant - Electrical Testing	342752	1000025646	\$54,560.00	
Shea Reinforcing Steel Inc 3082 Camino Del Zuro Thousand Oaks, California 91360	Constructor - Reinforcing Steel	1067182	1000840847	\$63,366.68	WOSB, FEM, DTSe
Soffa Electric Inc 5901 Corvette Street Commerce, California 90040	Supplier - Instrumentation & Control	291825	1000414922	\$145,344.00	FEM, DBE, MBE, SDB, WBE, WOSB

Line Items

Discount Terms No Discount

Item #	Item Code	Type	Item Description	UOM	QTY	Unit Price	Line Total	Response	Comment
Main Bid (WBS 19099)							\$5,315,315.92		
1	237110		Miramar Reservoir Pump Station Rehabilitation WBS 19099 (1-A)	LS	1	\$3,329,815.92	\$3,329,815.92	Yes	
2	237110		66-inch Pipeline Replacement (2-A)	LS	1	\$1,003,000.00	\$1,003,000.00	Yes	
3	237110		Mobilization and Demobilization (3-A)	LS	1	\$160,000.00	\$160,000.00	Yes	
4	524126		Bonds (Payment and Performance) (4-A)	LS	1	\$38,000.00	\$38,000.00	Yes	
5	236220		Building Permits (EOC Type I) (5-A)	AL	1	\$10,000.00	\$10,000.00	Yes	
6	541330		SWPPP Development (6-A)	LS	1	\$2,500.00	\$2,500.00	Yes	
7	237310		SWPPP Implementation (7-A)	LS	1	\$65,000.00	\$65,000.00	Yes	
8	541330		SWPPP Permit Fee (EOC Type I) (8-A)	AL	1	\$10,000.00	\$10,000.00	Yes	
9			Field Orders (EOC Type II) (9-A)	AL	1	\$697,000.00	\$697,000.00	Yes	
Main Bid (WBS 17190)							\$7,376,684.08		
10	237110		Miramar Reservoir Pump Station Rehabilitation WBS 17190 (1-B)	LS	1	\$1,803,434.08	\$1,803,434.08	Yes	
11	237110		48-inch Discharge Pipeline Inspection and Rehabilitation (2-B)	LS	1	\$65,000.00	\$65,000.00	Yes	
12	237110		Pump Barrel Inspection Assistance (3-B)	EA	6	\$3,325.00	\$19,950.00	Yes	
13	237110		Pump Barrel Rehabilitation (4-B)	EA	6	\$15,000.00	\$90,000.00	Yes	
14	237110		Additional Pump Barrel Rehabilitation (5-B)	SF	90	\$320.00	\$28,800.00	Yes	
15	221114		Miramar Clearwell Photovoltaic System Phase 2 (6-B)	LS	1	\$4,040,000.00	\$4,040,000.00	Yes	
16	237110		Mobilization and Demobilization (7-B)	LS	1	\$220,000.00	\$220,000.00	Yes	
17	524126		Bonds (Payment and Performance) (8-B)	LS	1	\$53,000.00	\$53,000.00	Yes	
18	236220		Building Permits (EOC Type I) (9-B)	AL	1	\$10,000.00	\$10,000.00	Yes	
19	541330		SWPPP Development (10-B)	LS	1	\$2,500.00	\$2,500.00	Yes	
20	237310		SWPPP Implementation (11-B)	LS	1	\$31,000.00	\$31,000.00	Yes	
21	541330		SWPPP Permit Fee (EOC Type I) (12-B)	AL	1	\$10,000.00	\$10,000.00	Yes	
22			Field Orders (EOC Type II) (13-B)	AL	1	\$1,003,000.00	\$1,003,000.00	Yes	

Line Item Subtotals

Section Title	Line Total
Main Bid (WBS 19099)	\$5,315,315.92
Main Bid (WBS 17190)	\$7,376,684.08
Grand Total	\$12,692,000.00