City of San Diego

CONTRACTOR'S NAME: Orion Construction Corporation
ADDRESS: 2185 La Mirada Drive, Vista, CA 92081
TELEPHONE NO.: 760-597-9660 **FAX NO.:** 760-597-9661
CITY CONTACT: Rosa Riego, **Contract Specialist, Email:** RRiego@sandiego.gov
Phone No. (619) 533-3426, **Fax No.** (619) 533-3633
R. Greek / R. W. Bustamante / cc

BIDDING DOCUMENTS

e - Bidding

FOR

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

BID NO.: **K-18-1433-DBB-3**
SAP NO. (WBS/IO/CC): **B-00501, B-14168**
CLIENT DEPARTMENT: **2000**
COUNCIL DISTRICT: **1, 2, 5**
PROJECT TYPE: **BP**

THIS CONTRACT WILL BE SUBJECT TO THE FOLLOWING:

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

BID DUE DATE:

2:00 PM
AUGUST 8, 2017
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

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

Sandra Russell 6/26/17
1) Registered Engineer Date

Seal:

6/26/2017
2) For City Engineer Date

Seal

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NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **Sewer Pump Stations 13, 14, 16, 25A & 85 Dual Force Mains & SPS 76 Generator.** For additional information refer to Attachment A.

2. **FULL AND OPEN COMPETITION:** This contract is open to full competition and may be bid on by Contractors who are on the City's current Prequalified Contractors' List. For information regarding the Contractors Prequalified list visit the City's web site: http://www.sandiego.gov.

3. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **$3,170,000.**

4. **BID DUE DATE AND TIME ARE: AUGUST 8, 2017** at **2:00 PM**

5. **PREVAILING WAGE RATES APPLY TO THIS CONTRACT:** Refer to Attachment D.

6. **LICENSE REQUIREMENT**: The City has determined that the following licensing classification is required for this contract: **A**

7. **SUBCONTRACTING PARTICIPATION PERCENTAGES**: Subcontracting participation percentages apply to this contract.

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

   1. SLBE participation **7.5%**
   2. ELBE participation **14.8%**
   3. Total mandatory participation **22.3%**

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

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

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

8. PRE-BID MEETING:

8.1. Prospective Bidders are **encouraged** to attend the Pre-Bid Meeting. The purpose of the meeting is to discuss the scope of the Project, submittal requirements, the pre-qualification process and any Equal Opportunity Contracting Program requirements and reporting procedures. To request a sign language or oral interpreter for this visit, call the Public Works Contracts Division at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. The Pre-Bid meeting is scheduled as follows:

Date: **JULY 20, 2017**
Time: **10:00 AM**
Location: **1010 Second Avenue, 14th Floor, (Large Conference Room) San Diego, CA 92101**

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

9. PRE-BID SITE VISIT: All those wishing to submit a bid are encouraged to visit the Work Site with the Engineer. The purpose of the Site visit is to acquaint Bidders with the Site conditions. To request a sign language or oral interpreter for this visit, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. The Pre-Bid Site Visit is scheduled as follows:

Time: **12:30 PM**
Date: **JULY 20, 2017**
Location: **3214 Bayside Walk, San Diego, CA 92109**

10. AWARD PROCESS:

10.1. 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.

10.2. Upon acceptance of a Bid, the City will prepare contract documents for execution within approximately 21 days of the date of the Bid opening. The City will then award the Contract within approximately 14 days of receipt of properly signed Contract, bonds, and insurance documents.

10.3. 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.

10.4. The low Bid will be determined by the Base Bid alone.

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

11. SUBMISSION OF QUESTIONS:

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

Public Works Contracts
1010 Second Avenue, 14th Floor
San Diego, California, 92101
Attention: Rosa Riego

OR:

RRiego@sandiego.gov

11.2. Questions received less than 14 days prior to the date for opening of Bids may not be considered.

11.3. 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.

11.4. Only questions answered by formal written addenda shall be binding. Oral and other interpretations or clarifications shall be without legal effect. It is the Bidder's responsibility to be informed of any addenda that have been issued and to include all such information in its Bid.

1. PREQUALIFICATION OF CONTRACTORS:

1.1. Contractors submitting a Bid must be pre-qualified for the total amount proposed, including all alternate items, prior to the date of submittal. Bids from contractors who have not been pre-qualified as applicable and Bids that exceed the maximum dollar amount at which contractors are pre-qualified may be deemed **non-responsive** and ineligible for award. Complete information and links to the on-line prequalification application are available at:

http://www.sandiego.gov/cip/bidopps/prequalification.shtml

1.2. The completed application must be submitted online no later than 2 weeks prior to the bid opening. For additional information or the answer to questions about the prequalification program, contact David Stucky at 619-533-3474 or dstucky@sandiego.gov.

1.3. Due to the City's responsibility to protect the confidentiality of the contractors' information, City staff will not be able to provide information regarding contractors' prequalification status over the telephone. Contractors may access real-time information about their prequalification status via their vendor profile on PlanetBids™.

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

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

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

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

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

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

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

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

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

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

3. ELECTRONIC BID SUBMISSIONS CARRY FULL FORCE AND EFFECT

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

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

and is bound by the entire Contract Documents, including any addenda issued thereto, and incorporated by reference in the Contract Documents.

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

3.4. The Bidder agrees to the construction of the project as described in Attachment "A– Scope of Work" for the City of San Diego, in accordance with the requirements set forth herein for the electronically submitted prices. The Bidder guarantees the Contract Price for a period of 120 days (90 days for federally funded contracts and contracts valued at $500,000 or less) from the date of Bid opening. The duration of the Contract Price guarantee shall be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent.

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

5. **CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:**

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

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

5.2. The City may not award the contract until registration of all subcontractors and suppliers is complete. In the event this requirement is not met within the time frame specified in the Notice of Intent to Award letter, the City reserves the right to rescind the Notice of Award / Intent to Award and to make the award to the next responsive and responsible bidder / proposer.

6. **JOINT VENTURE CONTRACTORS:** Provide a copy of the Joint Venture agreement and the Joint Venture license to the City within 10 Working Days after receiving the Contract forms. See 7-6, "The Contractors Representative" in The GREENBOOK and 7-6.1 in The WHITEBOOK.

7. **PREVAILING WAGE RATES WILL APPLY:** Refer to Attachment D.

8. **SUBCONTRACTING PARTICIPATION PERCENTAGES**: Subcontracting participation percentages apply to this contract. Refer to Attachment E.

9. **INSURANCE REQUIREMENTS:**

9.1. All certificates of insurance and endorsements required by the contract are to be provided upon issuance of the City's Notice of Intent to Award letter.

9.2. Refer to sections 7-3, "LIABILITY INSURANCE", and 7-4, "WORKERS' COMPENSATION INSURANCE" of the Supplementary Special Provisions (SSP) for the insurance requirements which must be met.

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

Title	Edition	Document Number
Standard Specifications for Public Works Construction ("The GREENBOOK") http://www.greenbookspecs.org/	2015	PWPI070116-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")* https://www.sandiego.gov/publicworks/edocref/greenbook	2015	PWPI070116-02
City of San Diego Standard Drawings* https://www.sandiego.gov/publicworks/edocref/standarddraw	2016	PWPI070116-03
Citywide Computer Aided Design and Drafting (CADD) Standards https://www.sandiego.gov/publicworks/edocref/drawings	2016	PWPI092816-04
California Department of Transportation (CALTRANS) Standard Specifications – http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2015	PWPI092816-05
CALTRANS Standard Plans http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2015	PWPI092816-06
California Manual on Uniform Traffic Control Devices Revision 1 (CA MUTCD Rev 1) - http://www.dot.ca.gov/trafficops/camutcd/	2014	PWPIO92816-07
NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml		

11. **CITY'S RESPONSES AND ADDENDA:** The City, at its discretion, may respond to any or all questions submitted in writing via the City's eBidding web site in the **form of an addendum**. No other responses to questions, oral or written shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addenda are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda at the time of bid submission.

12. CITY'S RIGHTS RESERVED: The City reserves the right to cancel the Notice Inviting Bids at any time, and further reserves the right to reject submitted Bids, without giving any reason for such action, at its sole discretion and without liability. Costs incurred by the Bidder(s) as a result of preparing Bids under the Notice Inviting Bids shall be the sole responsibility of each bidder. The Notice Inviting Bids creates or imposes no obligation upon the City to enter a contract.

13. CONTRACT PRICING: This solicitation is for a Lump Sum contract with Unit Price provisions as set forth herein. The Bidder agrees to perform construction services for the City of San Diego in accordance with these contract documents for the prices listed below. The Bidder further agrees to guarantee the Contract Price for a period of 120 days from the date of Bid opening. The duration of the Contract Price guarantee may be extended, by mutual consent of the parties, by the number of days required for the City to obtain all items necessary to fulfill all contractual conditions.

14. SUBCONTRACTOR INFORMATION:

14.1. LISTING OF SUBCONTRACTORS. In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act" of the California Public Contract Code, the Bidder shall provide the **NAME** and **ADDRESS** of each Subcontractor who will perform work, labor, render services or who specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also state within the description, whether the subcontractor is a **CONSTRUCTOR**, **CONSULTANT** or **SUPPLIER**. The Bidder shall further state within the description, the **PORTION** of the work which will be performed by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement may result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3, “Subcontracts”, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors for which Bidders are seeking recognition towards achieving any mandatory, voluntary (or both) subcontracting participation goals.

14.2. LISTING OF SUPPLIERS. Any Bidder seeking the recognition of Suppliers of equipment, materials, or supplies obtained from third party Suppliers towards achieving any mandatory or voluntary (or both) subcontracting participation goals shall provide, at a minimum, the **NAME**, **LOCATION (CITY)** and the **DOLLAR VALUE** of each supplier. The Bidder will be credited up to 60% of the amount to be paid to the Suppliers for materials and supplies unless vendor manufactures or substantially alters materials and supplies, in which case, 100% will be credited. The Bidder is to indicate within the description whether the listed firm is a supplier or manufacturer.

If no indication is provided, the listed firm will be credited at 60% of the listed dollar value for purposes of calculating the Subcontractor Participation Percentage.

14.3. LISTING OF SUBCONTRACTORS OR SUPPLIERS FOR ALTERNATES. For subcontractors or suppliers to be used on additive or deductive alternate items, in addition to the above requirements, bidder shall further note "ALTERNATE" and alternate item number within the description.

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

16. AWARD:

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

16.2. Upon acceptance of a Bid, the City will prepare contract documents for execution within approximately 21 days of the date of the Bid opening and award the Contract approximately within 7 days of receipt of properly executed Contract, bonds, and insurance documents.

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

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

18. AVAILABILITY OF PLANS AND SPECIFICATIONS: Contract Documents may be obtained by visiting the City's website: http://www.sandiego.gov/cip/. Plans and Specifications for this contract are also available for review in the office of the City Clerk or Public Works Contracts.

19. ONLY ONE BID PER CONTRACTOR SHALL BE ACCCEPTED: No person, firm, or corporation shall be allowed to make, file, or be interested in more than one (1) Bid for the same work unless alternate Bids are called for. A person, firm or corporation who has submitted a sub-proposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or from submitting a Bid in its own behalf. Any Bidder who submits more than one bid will result in the rejection of all bids submitted.

20. SAN DIEGO BUSINESS TAX CERTIFICATE: The Contractor and Subcontractors, not already having a City of San Diego Business Tax Certificate for the work contemplated shall secure the appropriate certificate from the City Treasurer, Civic Center Plaza, First floor and submit to the

Contract Specialist upon request or as specified in the Contract Documents. Tax Identification numbers for both the Bidder and the listed Subcontractors must be submitted on the City provided forms within these documents.

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

21.1. For bids $250,000 and above, bidders shall submit Bid Security at bid time. Bid Security shall be in one of the following forms: a cashier's check, or a properly certified check upon some responsible bank; or an approved corporate surety bond payable to the City of San Diego for an amount of not less than 10% of the total bid amount.

21.2. This check or bond, and the monies represented thereby, will be held by the City as a guarantee that the Bidder, if awarded the contract, will in good faith enter into the contract and furnish the required final performance and payment bonds.

21.3. The Bidder agrees that in the event of the Bidder's failure to execute this contract and provide the required final bonds, the money represented by the cashier's or certified check will remain the property of the City; and the Surety agrees that it will pay to the City the damages, not exceeding the sum of 10% of the amount of the Bid, that the City may suffer as a result of such failure.

21.4. At the time of bid submission, bidders must upload and submit an electronic PDF copy of the aforementioned bid security. Whether in the form of a cashier's check, a properly certified check or an approved corporate surety bond payable to the City of San Diego, the bid security must be uploaded to the City's eBidding system. Within twenty-four (24) hours after the bid due date and time, the first five (5) apparent low bidders must provide the City with the original bid security.

21.5. Failure to submit the electronic version of the bid security at the time of bid submission AND failure to provide the original within twenty-four (24) hours may cause the bid to be rejected and deemed **non-responsive**.

22. AWARD OF CONTRACT OR REJECTION OF BIDS:

22.1. This contract may be awarded to the lowest responsible and reliable Bidder.

22.2. Bidders shall complete ALL eBid forms as required by this solicitation. Incomplete eBids will not be accepted.

22.3. The City reserves the right to reject any or all Bids, to waive any informality or technicality in Bids received, and to waive any requirements of these specifications as to bidding procedure.

22.4. Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City within 3 Working Days of the bid opening,

written notice from the Bidder which shows proof of honest, credible, clerical error of a material nature, free from fraud or fraudulent intent; and of evidence that reasonable care was observed in the preparation of the Bid.

22.5. A bidder who is not selected for contract award may protest the award of a contract to another bidder by submitting a written protest in accordance with the San Diego Municipal Code.

22.6. The City of San Diego will not discriminate in the award of contracts with regard to race, religion creed, color, national origin, ancestry, physical handicap, marital status, sex or age.

22.7. Each Bid package properly signed as required by these specifications shall constitute a firm offer which may be accepted by the City within the time specified herein.

22.8. The City reserves the right to evaluate all Bids and determine the lowest Bidder on the basis of the base bid and any proposed alternates or options as detailed herein.

23. BID RESULTS:

23.1. The availability of the bids on the City's eBidding system shall constitute the public announcement of the apparent low bidder. In the event that the apparent low bidder is subsequently deemed non-responsive or non-responsible, a notation of such will be made on the eBidding system. The new ranking and apparent low bidder will be adjusted accordingly.

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

24. THE CONTRACT:

24.1. The Bidder to whom award is made shall execute a written contract with the City of San Diego and furnish good and approved bonds and insurance certificates specified by the City within 14 days after receipt by Bidder of a form of contract for execution unless an extension of time is granted to the Bidder in writing.

24.2. If the Bidder takes longer than 14 days to fulfill these requirements, then the additional time taken shall be added to the Bid guarantee. The Contract shall be made in the form adopted by the City, which includes the provision that no claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.

24.3. If the Bidder to whom the award is made fails to enter into the contract as herein provided, the award may be annulled and the Bidder's Guarantee of Good Faith will be subject to forfeiture. An award may be made to the next lowest responsible and reliable Bidder who shall fulfill every stipulation embraced herein as if it were the party to whom the first award was made.

24.4. Pursuant to the San Diego City Charter section 94, the City may only award a public works contract to the lowest responsible and reliable Bidder. The City will require the Apparent Low Bidder to (i) submit information to determine the Bidder's responsibility and reliability, (ii) execute the Contract in form provided by the City, and (iii) furnish good and approved bonds and insurance certificates specified by the City within 14 Days, unless otherwise approved by the City, in writing after the Bidder receives notification from the City, designating the Bidder as the Apparent Low Bidder and formally requesting the above mentioned items.

24.5. The award of the Contract is contingent upon the satisfactory completion of the above-mentioned items and becomes effective upon the signing of the Contract by the Mayor or designee and approval as to form the City Attorney's Office. If the Apparent Low Bidder does not execute the Contract or submit required documents and information, the City may award the Contract to the next lowest responsible and reliable Bidder who shall fulfill every condition precedent to award. A corporation designated as the Apparent Low Bidder shall furnish evidence of its corporate existence and evidence that the officer signing the Contract and bond for the corporation is duly authorized to do so.

25. EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK: The Bidder shall examine carefully the Project Site, the Plans and Specifications, other materials as described in the Special Provisions, Section 2-7, and the proposal forms (e.g., Bidding Documents). The submission of a Bid shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of Work, the quantities of materials to be furnished, and as to the requirements of the Bidding Documents Proposal, Plans, and Specifications.

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

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

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

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

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

26.5. Sections 1777.5, 1777.6, and 1777.7 of the State of California Labor Code concerning the employment of apprentices by contractors and subcontractors performing public works contracts.

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

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

27. PRE-AWARD ACTIVITIES:

27.1. The contractor selected by the City to execute a contract for this Work shall submit the required documentation as specified in the herein and in the Notice of Award. Failure to provide the information as specified may result in the Bid being rejected as **non-responsive.**

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

EXECUTED IN TRIPLICATE

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

Orion Construction Corporation, a corporation, as principal, and Western Surety 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 **Three Million Three Hundred Seventy Four Thousand Dollars and Zero Cents ($3,374,000.00)** for the faithful performance of the annexed contract, and in the sum of **Three Million Three Hundred Seventy Four Thousand Dollars and Zero Cents ($3,374,000.00)** for the benefit of of laborers and material men 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.

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

Dated 2/27/18

Approved as to Form

Mara W. Elliott, City Attorney

By _____

Deputy City Attorney

Approved:

By _____

Stephen Samara
Principal Contract Specialist
Public Works Department

Orion Construction Corporation

Principal

By _____

Richard Dowsing, President

Printed Name of Person Signing for Principal

Western Surety Company

Surety

By _____

Maria Guise

Attorney-in-fact

1455 Frazee Road, Suite 300

Local Address of Surety

San Diego, CA 92108

Local Address (City, State) of Surety

(619) 682-3510

Local Telephone No. of Surety

Premium $27,681.00

Premium subject to adjustment based on final contract price.

Bond No. 30021062

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT **CIVIL CODE § 1189**

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

State of California)
County of Orange)

On OCT 19 2017 before me, LeKim H. Luu, Notary Public,
Date *Here Insert Name and Title of the Officer*

personally appeared Maria Guise
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.

LEKIM H. LUU
Commission # 2135634
Notary Public - California
Orange County
My Comm. Expires Dec 3, 2019

Signature _____
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is 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: _____

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Michael D Parizino, Rhonda C Abel, James A Schaller, Jeri Apodaca, Maria Guise, Rachelle Rheault, Kim Luu, Individually

of Newport Beach, CA, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 7th day of January, 2016.

WESTERN SURETY COMPANY

Paul T. Bruflat, Vice President

State of South Dakota
County of Minnehaha } ss

On this 7th day of January, 2016, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires
June 23, 2021

J. MOHR
NOTARY PUBLIC
SOUTH DAKOTA

J. Mohr, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this _____ day of OCT 19 2017, _____.

WESTERN SURETY COMPANY

L. Nelson, Assistant Secretary

Form F4280-7-2012

ATTACHMENTS

ATTACHMENT A

SCOPE OF WORK

SCOPE OF WORK

1. **SCOPE OF WORK:** The project will install a diesel emergency generator set, an emergency storage tank, secondary force mains and appurtenances work for the purpose of improved redundancy and reliability of six existing sewer pump stations (SPS) 13, 14, 16, 25A, 76 & 85.

1.1. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and Plans numbered **38545-01-D** through **38545-49-D**, inclusive.

2. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **$3,170,000.**

3. **LOCATION OF WORK:** See Appendix E - Location Map.

4. **CONTRACT TIME:** The Contract Time for completion of the Work, shall be **250 Working Days**.

5. **LICENSE CLASSIFICATION:** In accordance with the provisions of California Law, the Contractor shall possess valid, appropriate license at the time that the Bid is submitted. Failure to possess the specified license may render the Bid as **non-responsive** and ineligible for award.

5.1. The City has determined that the following licensing classification is required for this contract:

- **CLASS A**

ATTACHMENT B

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ATTACHMENT C

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ATTACHMENT D

PREVAILING WAGES

PREVAILING WAGES

1. PREVAILING WAGE RATES: Pursuant to San Diego Municipal Code section 22.3019, construction, alteration, demolition, repair and maintenance work performed under this Contract is subject to State prevailing wage laws. For construction work performed under this Contract cumulatively exceeding $25,000 and for alteration, demolition, repair and maintenance work performed under this Contract cumulatively exceeding $15,000, the Contractor and its subcontractors shall comply with State prevailing wage laws including, but not limited to, the requirements listed below.

1.1. Compliance with Prevailing Wage Requirements. Pursuant to sections 1720 through 1861 of the California Labor Code, the Contractor and its subcontractors shall ensure that all workers who perform work under this Contract are paid not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations (DIR). This includes work performed during the design and preconstruction phases of construction including, but not limited to, inspection and land surveying work.

1.1.1. Copies of such prevailing rate of per diem wages are on file at the City and are available for inspection to any interested party on request. Copies of the prevailing rate of per diem wages also may be found at http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm. Contractor and its subcontractors shall post a copy of the prevailing rate of per diem wages determination at each job site and shall make them available to any interested party upon request.

1.1.2. The wage rates determined by the DIR refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, then the published rate of wage shall be in effect for the life of this Contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the DIR, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this Contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this Contract, each successive predetermined wage rate shall apply to this Contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this Contract, such wage rate shall apply to the balance of the Contract.

1.2. Penalties for Violations. Contractor and its subcontractors shall comply with California Labor Code section 1775 in the event a worker is paid less than the prevailing wage rate for the work or craft in which the worker is employed.

1.3. Payroll Records. Contractor and its subcontractors shall comply with California Labor Code section 1776, which generally requires keeping accurate payroll records,

verifying and certifying payroll records, and making them available for inspection. Contractor shall require its subcontractors to also comply with section 1776. Contractor and its subcontractors shall submit weekly certified payroll records online via the City's web-based Labor Compliance Program. Contractor is responsible for ensuring its subcontractors submit certified payroll records to the City.

1.3.1. For contracts entered into on or after April 1, 2015, Contractor and their subcontractors shall furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.

1.4. **Apprentices.** Contractor and its subcontractors shall comply with California Labor Code sections 1777.5, 1777.6 and 1777.7 concerning the employment and wages of apprentices. Contractor is held responsible for the compliance of their subcontractors with sections 1777.5, 1777.6 and 1777.7.

1.5. **Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on design professionals and subcontractors of $25 per worker per day for each day the worker works more than 8 hours per day and 40 hours per week in violation of California Labor Code sections1810 through 1815.

1.6. **Required Provisions for Subcontracts.** Contractor shall include at a minimum a copy of the following provisions in any contract they enter into with a subcontractor: California Labor Code sections 1771, 1771.1, 1775, 1776, 1777.5, 1810, 1813, 1815, 1860 and 1861.

1.7. **Labor Code Section 1861 Certification.** Contractor in accordance with California Labor Code section 3700 is required to secure the payment of compensation of its employees and by signing this Contract, Contractor certifies that "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract."

1.8. **Labor Compliance Program**. The City has its own Labor Compliance Program authorized in August 2011 by the DIR. The City will withhold contract payments when payroll records are delinquent or deemed inadequate by the City or other governmental entity, or it has been established after an investigation by the City or other governmental entity that underpayment(s) have occurred. For questions or assistance, please contact the City of San Diego's Equal Opportunity Contracting Department at 619-236-6000.

1.9. **Contractor and Subcontractor Registration Requirements.** This project is subject to compliance monitoring and enforcement by the DIR. As of March 1, 2015, no

contractor or subcontractor may be listed on a bid or proposal for a public works project unless registered with the DIR pursuant to Labor Code section 1725.5. As of April 1, 2015, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, or enter into any contract for public work, unless currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. By submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the DIR in compliance with Labor Code sections 1771.1 and 1725.5, and Contractor shall provide proof of registration to the City upon request.

1.9.1. A Contractor's inadvertent error in listing a subcontractor who is not registered pursuant to Labor Code section 1725.5 in response to a solicitation shall not be grounds for filing a bid protest or grounds for considering the bid non-responsive provided that any of the following apply: (1) the subcontractor is registered prior to bid opening; (2) within twenty-four hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5; or (3) the subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

ATTACHMENT E

SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

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

1. The **2015 Edition** of the Standard Specifications for Public Works Construction (The "GREENBOOK").
2. The **2015 Edition** of the City of San Diego Standard Specifications for Public Works Construction (The "WHITEBOOK"), including the following:
   a) General Provisions (A) for all Contracts.

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

1-2 **TERMS AND DEFINITIONS.** To the "WHITEBOOK", item 54, "Normal Working Hours", ADD the following:

Unless noted otherwise on Plans, the Normal Working Hours are 7:30 AM to 3:30 PM.

SECTION 2 - SCOPE AND CONTROL OF WORK

2-3.2 **Self Performance.** To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall perform, with your own organization, Contract Work amounting to at least 50% of the base Bid **AND** 50% of any alternates awarded.

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

4. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:
   a) Final Report of Geotechnical Investigation Sewer Pump Stations 13, 14, 16, 25A & 85 Dual Forecemains, City of San Diego, dated November 23, 2015, prepared by Allied Geotechnical Engineers, Inc.
5. The reports listed above are available for review by contacting the Contract Specialist or visiting: Appendix H

2-14.3 **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 SPS 14 West Mission Bay Drive. See Appendix "E" for the approximate location. Coordinate the Work with the adjacent projects as listed below:

   a) Pacific Beach Pipeline South, Roberto Vejar-Parra 619-533-5402

2-16 CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM. To the "WHITEBOOK", item 1, DELETE in its entirety.

SECTION 3 – CHANGES IN WORK

3-5.1 Claims. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

ADD:

3-5.1 Claims.

1. A Claim is a written demand by you that seeks an adjustment in the Contract Price, Contract Time, or other relief associated with a dispute arising under or relating to the Contract, including a breach of any provision thereof. A voucher, invoice, or other routine request for payment is not a Claim.
2. A Claim shall conform to these specifications and may be considered after the City has previously denied a request by you for a Change Order seeking the demanded relief.
3. You shall submit a Claim to the Engineer if a dispute occurs that arises from or relates to the Contract. The Claim shall seek all relief to which you assert you are entitled as a result of the event(s) giving rise to the dispute. Your failure to process a Claim in accordance with these specifications shall constitute a waiver of all relief associated with the dispute. Claims are subject to 6-11, "Right to Audit".
4. You shall continue to perform the Services and Work and shall maintain the Schedule during any dispute proceedings. The Engineer will continue to make payments for undisputed Services and Work.
5. The City's Claims process specified herein shall not relieve you of your statutory obligations to present claims prior to any action under the California Government Code.

3-5.1.1 Initiation of Claim.

1. You shall promptly, but no later than 30 Days after the event(s) giving rise to the Claim, deliver the Claim to the Engineer.
2. You shall not process a Claim unless the Engineer has previously denied a request by you for a Change Order that sought the relief to be pursued in the claim.

3-5.1.1.1 Claim Certification Submittal.

1. If your Claim seeks an increase in the Contract Price, the Contract Time, or both, submit with the Claim an affidavit certifying the following:

    a) The Claim is made in good faith and covers all costs and delays to which you are entitled as a result of the event(s) giving rise to the Claim.

    b) The amount claimed accurately reflects the adjustments in the Contract Price, the Contract Time, or both to which you believe you are entitled.

    c) All supporting costs and pricing data are current, accurate, and complete to the best of your knowledge. The cost breakdown per item of Work shall be supplied.

    d) You shall ensure that the affidavit is executed by an official who has the authority to legally bind you.

3-5.1.2 Initial Determination.

1. The Engineer will respond in writing to your Claim within 30 Days of receipt of the Claim.

3-5.1.3 Settlement Meeting.

1. If you disagree with the Initial Determination, you shall request a Settlement Meeting within 30 Days. Upon receipt of this request, the Engineer will schedule the Settlement Meeting within 15 Working Days.

3-5.1.7 City's Final Determination.

1. If a settle agreement is not reached, the City shall make a written Final Determination within 10 Working Days after the Settlement Meeting.

2. If you disagree with the City's Final Determination, notify the Engineer in writing of your objection within 15 Working Days after receipt of the written determination and file a "Request for Mediation" in accordance with 3-5.2, "Dispute Resolution Process".

3. Failure to give notice of objection within the 15 Working Days period shall waive your right to pursue the Claim.

3-5.1.8 Mandatory Assistance.

1. If a third party dispute, litigation, or both arises out of or relates in any way to the Services provided under the Contract, upon the City's request, you shall agree to assist in resolving the dispute or litigation. Your assistance includes, but is not limited to the following:

    a) Providing professional consultations.

    b) Attending mediations, arbitrations, depositions, trials, or any event related to the dispute resolution and litigation.

3-5.1.8.1 Compensation for Mandatory Assistance.

1. The City will reimburse you for reasonable fees and expenses incurred by you for any required assistance rendered in accordance with 3-5.1.8, "Mandatory Assistance" as Extra Work.
2. The Engineer will determine whether these fees and expenses were necessary due to your conduct or failure to act.
3. If the Engineer determines that the basis of the dispute or litigation in which these fees and expenses were incurred were the result of your conduct or your failure to act in part or in whole, you shall reimburse the City for any payments made for these fees and expenses.
4. Reimbursement may be through any legal means necessary, including the City's withholding of your payment.

3-5.2.3 Selection of Mediator. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

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

3-5.3 Forum of Litigation. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. It is the express intention that all legal actions and proceedings related to the Contract or Agreement with the City or to any rights or any relationship between the parties arising therefrom shall be solely and exclusively initiated and maintained in courts of the State of California for the County of San Diego.

SECTION 4 – CONTROL OF MATERIALS

4-1.3.1 **General.** To the "WHITEBOOK", ADD the following:

1. Steel pipe in sizes larger than 18 inches shall require inspection at the source of production.
2. City lab staff or a qualified inspection agency approved by the Engineer shall witness all welding, lining, coating, and testing. You shall incur additional inspection costs outlined in 4-1.3.3, "Inspection of Items Not Locally Produced".
3. All parts of production (including but not limited to product fabrication, welding, testing, lining, and coating of straight pieces and specials) shall be performed or produced in the United States.
4. Welding and all testing shall be performed by certified welders and testing staff with credentials traceable in the United States.

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

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

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

ADD:

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

1. When you intend to purchase materials, fabricated products, or equipment from sources located more than 200 miles (321.9 km) outside the geographical limits of the City, City Lab staff or a qualified inspection agency approved by the Engineer, shall be engaged at your expense to inspect the materials, equipment, or process.
2. This approval shall be obtained before producing any material or equipment. City Lab staff or inspector shall evaluate the materials for conformance with the requirements of the Plans and Specifications. You shall forward reports required by the Engineer. No materials or equipment shall be shipped nor shall any processing, fabrication or treatment of such materials be done without proper inspection by City Lab staff or the approved agent. Approval by said agent shall not relieve you of responsibility for complying with the requirements of the Contract Documents.
3. The Engineer may elect City Lab staff to perform inspection of an out-of-town manufacturer. You shall incur additional inspection costs of the Engineer including lodging, meals, and incidental expenses based on Federal Per Diem Rates, along with travel and car rental expenses. If the manufacturing plant operates a double shift, a double shift shall be figured in the inspection costs.

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

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

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

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

4-1.3.6 Preapproved Materials. To the "WHITEBOOK", ADD the following:

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

4-1.6 Trade Names or Equals. To the "WHITEBOOK", ADD the following:

11. You shall submit your list of proposed substitutions for an "equal" item **no later than 5 Working Days after the determination of the Apparent Low Bidder** and on the City's Product Submittal Form available at:

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

SECTION 5 – UTILITIES

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

g) Refer to Appendix "G" for more information on the protection of AMI devices.

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

1. Notify SDG&E at least 10 Working Days prior to excavating within 10 feet of SDG&E Underground High Voltage Transmission Power Lines (69 KV and higher).

SECTION 6 - PROSECUTION, PROGRESS AND ACCEPTANCE OF WORK

ADD:

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

3. Do not Work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed here:

    a) Sewer Pump Stations 13, 14, and 16 from the Friday prior to Memorial Day to Labor Day (inclusive).

6-3.2.1.1 Environmental Document.

1. The City of San Diego Environmental Analysis Section (EAS) of the Development Services Department has prepared a **Notice of Exemption (NOE)** for **Sewer Pump Stations (SPS') 13, 25A, and 85 Dual Force Main Improvements and Sewer Pump 76 Generator Replacement**, as referenced in the Contract Appendix. You shall comply with all requirements of the NOE, as set forth in Contract Appendix A.

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

6-7.1 General. To the "WHITEBOOK", item 3, ADD the following:

d) 30 Days for full depth asphalt final mill and resurfacing work required per SDG-107.

e) Where shutdowns of 16 inch and larger pipes are required, there is a shutdown moratorium from May until October. Plan and schedule Work accordingly. No additional payment or Working Days will be granted for delays due to the moratorium.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR

7-3 INSURANCE. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

7-3 INSURANCE.

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

7-3.1 Policies and Procedures.

1. You must procure the insurance described below, at its sole cost and expense, to provide coverage against claims for loss including injuries to persons or damage to property, which may arise out of or in connection with the performance of the Work by you, your agents, representatives, officers, employees or Subcontractors.

2. Insurance coverage for property damage resulting from your operations is on a replacement cost valuation. The market value will not be accepted.

3. You shall maintain this insurance for the duration of this Contract and at all times thereafter when you are correcting, removing, or replacing Work in accordance with this Contract. Your liabilities under the Contract, e.g., your indemnity obligations, is not deemed limited to the insurance coverage required by this Contract.

4. The payment for insurance shall be included in the Contract Price as bid by you. Except as specifically agreed to by the City in writing, you are not entitled to any additional payment. Do not begin any Work under this Contract until you have provided and the City has approved all required insurance.

5. Policies of insurance shall provide that the City is entitled to 30 Days (10 Days for cancellation due to non-payment of premium) prior written notice of cancellation or non-renewal of the policy. Maintenance of specified insurance coverage is a material element of the Contract. Your failure to maintain or renew coverage or to provide evidence of renewal during the term of the Contract may be treated by the City as a material breach of the Contract.

7-3.2 Types of Insurance.

7-3.2.1 Commercial General Liability Insurance.

1. Commercial General Liability Insurance shall be written on the current version of the ISO Occurrence form CG 00 01 07 98 or an equivalent form providing coverage at least as broad.

2. The policy shall cover liability arising from premises and operations, XCU (explosions, underground, and collapse), independent contractors, products/completed operations, personal injury and advertising injury, bodily injury, property damage, and liability assumed under an insured's contract (including the tort liability of another assumed in a business contract).

3. There shall be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You shall maintain the same or equivalent insurance for at least 10 years following completion of the Work.

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

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

7-3.2.2 Commercial Automobile Liability Insurance.

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

2. All costs of defense shall be outside the limits of the policy.

7-3.2.3 Contractors Pollution Liability Insurance.

1. You shall procure and maintain at your expense or require your Subcontractor, as described below, to procure and maintain the Contractors Pollution Liability Insurance including contractual liability coverage to cover liability arising out of cleanup, removal, storage, or handling of hazardous or toxic chemicals, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than $2,000,000 limit for bodily injury and property damage.

2. All costs of defense shall be outside the limits of the policy. Any such insurance provided by your Subcontractor instead of you shall be approved separately in writing by the City.

3. For approval of a substitution of your Subcontractor's insurance, you shall certify that all activities for which the Contractors Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance. The deductible shall not exceed $25,000 per claim.

4. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There shall be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability.

5. Occurrence based policies shall be procured before the Work commences and shall be maintained for the Contract Time. Claims Made policies shall be procured before the Work commences, shall be maintained for the Contract Time, and shall include a 12 month extended Claims Discovery Period

applicable to this contract or the existing policy or policies that shall continue to be maintained for 12 months after the completion of the Work without advancing the retroactive date.

6. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.2.4 Contractors Hazardous Transporters Pollution Liability Insurance.

1. You shall provide at your expense or require your Subcontractor to provide, as described below, Contractors Hazardous Transporters Pollution Liability Insurance including contractual liability coverage to cover liability arising out of transportation of hazardous or toxic, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than $2,000,000 limit per occurrence/aggregate for bodily injury and property damage.

All costs of defense shall be outside the limits of the policy. The deductible shall not exceed $25,000 per claim. Any such insurance provided by a subcontractor instead of you shall be approved separately in writing by the City.

3. For approval of the substitution of Subcontractor's insurance the Contractor shall certify that all activities for which Contractors Hazardous Transporters Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance.

4. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There shall be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. Occurrence based policies shall be procured before the Work commences and shall be maintained for the duration of this Contract. Claims Made policies shall be procured before the Work commences, shall be maintained for the duration of this contract, and shall include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies that shall continue to be maintained for 12 months after the completion of the Work under this Contract without advancing the retroactive date.

5. Except as provided for under California law, the policy or policies shall provide that the City is entitled to 30 Days prior written notice (10 Days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this Contract as described herein shall be carried only by responsible insurance companies with a rating of, or equivalent to, at least "A-, VI" by

A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State, and that have been approved by the City.

7-3.3.1 Non-Admitted Carriers. The City will accept insurance provided by non-admitted, "surplus lines" carriers only if the carrier is authorized to do business in the State and is included on the List of Approved Surplus Lines Insurers (LASLI list).

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

7-3.4 Evidence of Insurance. Furnish to the City documents e.g., certificates of insurance and endorsements evidencing the insurance required herein, and furnish renewal documentation prior to expiration of this insurance. Each required document shall be signed by the insurer or a person authorized by the insurer to bind coverage on its behalf. We reserve the right to require complete, certified copies of all insurance policies required herein.

7-3.5 Policy Endorsements.

7-3.5.1 Commercial General Liability Insurance.

7-3.5.1.1 Additional Insured.

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

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

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

7-3.5.2 Commercial Automobile Liability Insurance.

7-3.5.2.1 **Additional Insured.** Unless the policy or policies of Commercial Auto Liability Insurance are written on an ISO form CA 00 01 12 90 or a later version of this form or equivalent form providing coverage at least as broad, the policy shall be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured, with respect to liability arising out of automobiles owned, leased, hired or borrowed by you or on your behalf. This endorsement is limited to the obligations permitted by California Insurance Code §11580.04.

7-3.5.3 Contractors Pollution Liability Insurance Endorsements.

7-3.5.3.1 Additional Insured.

1. The policy or policies shall be endorsed to include as an Insured the City and its respective elected officials, officers, employees, agents, and representatives, with respect to liability arising out of:

    a) Ongoing operations performed by you or on your behalf,

    b) your products,

    c) your work, e.g., your completed operations performed by you or on your behalf, or

    d) premises owned, leased, controlled, or used by you.

    Except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of § 2782 of the California Civil Code apply, this endorsement shall not provide any duty of indemnity coverage for the active negligence of the City and its respective elected

officials, officers, employees, agents, and representatives in any case where an agreement to indemnify the City and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.

2. In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives that are not covered because of California Insurance Code §11580.04, the insurer's obligation to the City and its respective elected officials, officers, employees, agents, and representatives shall be limited to obligations permitted by California Insurance Code §11580.04.

7-3.5.3.2 Primary and Non-Contributory Coverage. The policy or policies shall be endorsed to provide that the insurance afforded by the Contractors Pollution Liability Insurance policy or policies is primary to any insurance or self-insurance of the City and its elected officials, officers, employees, agents and representatives with respect to operations including the completed operations of the Named Insured. Any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

7-3.5.3.3 Severability of Interest. For Contractors Pollution Liability Insurance, the policy or policies shall provide that your insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and shall provide cross-liability coverage.

7-3.5.4 Contractors Hazardous Transporters Pollution Liability Insurance Endorsements.

7-3.5.4.1 Additional Insured.

1. The policy or policies must be endorsed to include as an Insured the City and its respective elected officials, officers, employees, agents, and representatives, with respect to liability arising out of:

   a) Ongoing operations performed by you or on your behalf,

   b) your products,

   c) your work, e.g., your completed operations performed by you or on your behalf, or

   d) premises owned, leased, controlled, or used by you.

   Except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of §2782 of the California Civil Code apply, this endorsement shall not provide any duty of indemnity coverage for the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives in any case where an

agreement to indemnify the City and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.

2. In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives that are not covered because of California Insurance Code §11580.04, the insurer's obligation to the City and its respective elected officials, officers, employees, agents, and representatives shall be limited to obligations permitted by California Insurance Code §11580.04.

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

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

7-3.6 **Deductibles and Self-Insured Retentions.** You shall pay for all deductibles and self-insured retentions. You shall disclose deductibles and self-insured retentions to the City at the time the evidence of insurance is provided.

7-3.7 **Reservation of Rights.** The City reserves the right, from time to time, to review your insurance coverage, limits, deductibles and self-insured retentions to determine if they are acceptable to the City. The City will reimburse you, without overhead, profit, or any other markup, for the cost of additional premium for any coverage requested by the Engineer but not required by this Contract.

7-3.8 **Notice of Changes to Insurance.** You shall notify the City 30 Days prior to any material change to the policies of insurance provided under this Contract.

7-3.9 **Excess Insurance.** Policies providing excess coverage shall follow the form of the primary policy or policies e.g., all endorsements.

7-3.10 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.

7-4 NOT USED. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

7-4 WORKERS' COMPENSATION INSURANCE AND EMPLOYERS LIABILITY INSURANCE.

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

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

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

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

7-4.1. **Waiver of Subrogation.** The policy or policies shall be endorsed to provide that the insurer will waive all rights of subrogation against the City and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from Work performed by the Named Insured for the City.

7-5 **PERMITS, FEES, AND NOTICES.** To the "WHITEBOOK", ADD the following:

2. The City will obtain, at no cost to you, the following permits:

   a) Building Permit issued by the Development Services Department

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

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

7-9 **PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS.** To the "WHITEBOOK", ADD the following:

5. Utilities: The CONTRACTOR shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the CONTRACTOR's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. CONTRACTOR is responsible for all costs associated with supporting existing utilities across trenches or excavations.

   All utility pipelines, cables, ducts, poles, and overhead wires and cables encountered along the line of the WORK shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the RESIDENT ENGINEER are made with the owner of said utility. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

6. Trees: The CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional

agency or OWNER. All existing trees and shrubs which are damaged during construction shall be replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency and/or the OWNER. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. All cuts over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.

The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree at its own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the CONTRACTOR shall pay to the owner of said tree a compensatory payment acceptable to the tree owner, subject to the approval of the jurisdictional agency or OWNER. The size of the trees shall be not less than 1-inch diameter nor less than 6 feet in height.

7-20 ELECTRONIC COMMUNICATION. To the "WHITEBOOK", ADD the following:

2. Virtual Project Manager (VPM), or equal, will be used on this contract.

7-21.1 General. To the "WHITEBOOK", item 3, DELETE in its entirety and SUBSTITUTE with the following:

2. During the construction phase of projects, the minimum waste management reduction goal is 90% of the inert material (a material not subject to decomposition such as concrete, asphalt, brick, rock, block, dirt, metal, glass, and etc.) and 65% of the remaining project waste. You shall provide appropriate documentation, including a Waste Management Form attached as an appendix, and evidence of recycling and reuse of materials to meet the waste reduction goals specified.

SECTION 9 - MEASUREMENT AND PAYMENT

9-1.1 General. To the "GREENBOOK", ADD the following:

See Technical Specification Section 01025 for additional information.

9-3.2 Partial and Final Payment. To the "GREENBOOK", paragraph (3), DELETE in its entirety and SUBSTITUTE with the following:

Upon commencement of the Work, an escrow account shall be established in a financial institution chosen by you and approved by the City**.** Documentation for an

escrow payment shall have an escrow agreement signed by you, the City, and the escrow agent. From each progress payment, no less than 5% will be deducted and deposited by the City into the escrow account. Upon completion of the Contract, the City will notify the Escrow agent in writing to release the funds to you. Only the designated representative of the City shall sign the request for the release of Escrow funds.

ADD:

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

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

SECTION 203 – BITUMINOUS MATERIALS

203-3.4.4 **RUBBER POLYMER MODIFIED SLURRY (RPMS).** To the "WHITEBOOK", ADD the following:

1. RPMS shall be used on this Contract.

SECTION 209 – PRESSURE PIPE

209 **PRESSURE PIPE.** 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.

209-1.1.2 **Materials.** To the "WHITEBOOK", item 10, ADD the following:

a) The interior of bells shall be lined as specified in Section 02630 – Ductile Iron Pipe.

SECTION 217 – BEDDING AND BACKFILL MATERIALS

217-2.2 **Stones, Boulders, and Broken Concrete.** To the "GREENBOOK", Table 217-2.2, DELETE in its entirety and SUBSTITUTE with the following:

TABLE 217-2.2

Zone	Zone Limits	Maximum Size (greatest dimension)	Backfill Requirements in Addition to 217-2.1
Street or Surface Zone	From ground surface to 12" (300 mm) below pavement subgrade or ground surface	2.5" (63 mm)	As required by the Plans or Special Provisions.
Street or Surface Zone Backfill of Tunnels beneath Concrete Flatwork		Sand	Sand equivalent of not less than 30.
Trench Zone	From 12" (300 mm) below pavement subgrade or ground surface to 12" (300 mm) above top of pipe or box	6" (150 mm)	
Deep Trench Zone (Trenches 3' (0.9 m) wide or wider)	From 60" (1.5 m) below finished surface to 12" (300 mm) above top of pipe or box	Rocks up to 12" (300 mm) excavated from trench may be placed as backfill	
Pipe Zone	From 12" (300 mm) above top of pipe or box to 6" (150 mm) below bottom of pipe or box exterior	2.5" (63 mm)	Sand equivalent of not less than 30 or a coefficient of permeability greater than 1-½ inches/hour (35 mm per hour).
Overexcavation	Backfill more than 6" (150 mm) below bottom of pipe or box exterior	6" (150 mm)	Sand equivalent of not less than 30 or a coefficient of permeability greater than 1-½ inches/hour (35 mm per hour). Trench backfill slurry (100-E-100) per 201-1 may also be used.

SECTION 302 – ROADWAY SURFACING

ADD:

302-4.12.2.1.1 Slurry Treatment.

1. When slurry treatment is required by the Contract Documents, notify the Engineer at least 10 Working Days prior to the first application of slurry. The Engineer, upon assessment of street condition and classification, will verify the slurry type to be applied.

2. Application of sequential layers of slurry shall not commence until approved by the Engineer and until the following have been completed:

   a) Mix design and wet track abrasion testing for the first-step slurry application has been approved by the Engineer. Unless otherwise directed by the Engineer, this testing may require 4 Working Days from field sampling to reporting of test results to the Engineer.

   b) Corrective actions have been executed in accordance with 302-4.11.1.2, "Reduction in Payment Based on WTAT" such as reductions in payment, non-payment, or removal of material not meeting specifications, as directed by the Engineer.

SECTION 306 – OPEN TRENCH CONDUIT CONSTRUCTION

306-15.1 General. To the "GREENBOOK", ADD the following:

Measurement and Payment shall be per Technical Specification Section 01025 Measurement and Payment.

SECTION 601 - TEMPORARY TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES

601-2.1.1 Traffic Control Permits. To the "WHITEBOOK", ADD the following:

6. The CONTRACTOR is responsible for paying all fees and doing the necessary work for obtaining all traffic control permits for the project.

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

6. Engineered TCP (2 foot x 3 foot size) shall be required for the following areas:

   a) Sewer Pump Stations 13, 14, 16, 25A, and 85

601-6 PAYMENT. To the WHITEBOOK, DELETE item 2 and SUBSTITUTE with the following:

2. The payment for traffic control Working Drawings, engineered Traffic Control Plans, traffic control for resurfacing and slurry, and permits shall be included in the Contract Price.

EQUAL OPPORTUNITY CONTRACTING PROGRAM (EOCP) SECTION A – GENERAL REQUIREMENTS

4.1 **Nondiscrimination in Contracting Ordinance.** To the City Supplement, subsection 4.1.1, paragraph (2), sentence (1), DELETE in its entirety and SUBSTITUTE with the following:

You shall not discriminate on the basis of race, gender, gender expression, gender identity, religion, national origin, ethnicity, sexual orientation, age, or disability in the solicitation, selection, hiring, or treatment of subcontractors, vendors, or suppliers.

END OF SUPPLEMENTARY SPECIAL PROVISIONS

TECHNICAL SPECIFICATIONS

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

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SECTION 01025 - MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section and Greenbook/Whitebook define the Lump Sum Prices and Allowances listed in the Bid Schedule, and the manner in which they will be used to determine measurement and payment for the bid items included in the Bid Schedule. For progress payments refer to Greenbook/Whitebook Section 9.

B. Payment for all items of the Bid Schedule whether lump sum or unit price shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of WORK being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs shall be included in the prices named in the Bid Schedule for the various items of WORK.

C. Final payment for WORK covered by Unit Prices will be made on the basis of the actual measured quantities accepted by the RESIDENT ENGINEER multiplied by the Unit Price of the Bid Schedule.

1.2 BID PROPOSAL

A. **Lump Sum Prices:** The CONTRACTOR shall provide Lump Sum Prices in the Bid Schedule for items of WORK in the Contract Documents as defined herein and in Greenbook/Whitebook Section 9. For Lump Sum items, only the total amount need be filled in.

B. **Unit Price Items:** Unit Price Items are provided by the OWNER for additive or deductive WORK not presently identified in the Contract Documents. In the appropriate places on the Bid Schedule each Bidder shall quote Unit Prices for the items of WORK in the units stated when no unit price is provided on the Bid Schedule. Each unit price, whether additive or deductive, shall cover all costs and charges, including, without limitation, the costs of material, fabrication, delivery, installation or application, supervision, bond and insurance charges, overhead, profit, and taxes. Unit Prices shall be the exact amount per unit to be applied to the units of WORK actually provided or not provided for the purpose of modifying the Contract Price or establishing the payment due the CONTRACTOR, as applicable. Unit Prices provided by the OWNER shall be held good and in effect until the WORK is completed and accepted by the OWNER. CONTRACTOR proposed Unit Prices which are so unbalanced as to be detrimental to the OWNER'S interest may be rejected or cause rejection of the Bidder's entire bid, at the discretion of the OWNER.

C. **Allowance Items:** Allowance Item amounts are provided by the OWNER to cover the cost of additive WORK not presently identified in the Contract Documents. Payment for Allowance Items will be made only when authorized as described in Part 1.3, below.

D. **Schedule**: All scoped Allowance Bid Items and Unit Priced Bid Items are included in the scope of the Contract without specific locations for the WORK provided. The OWNER reserves the right to direct that these scoped items of WORK be performed when they are encountered, and the CONTRACTOR is obligated to accommodate this WORK within the original contract duration. The CONTRACTOR will not be entitled to additional time regardless of where the WORK is encountered.

1.3 MEASUREMENT AND PAYMENT

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

B. **Contract-Required WORK (Lump Sum):**

1. **Bid Item No. 01 – General Construction - Sewer Pump Station Number 13 Force Main (Lump Sum):**

   Payment for Sewer Pump Station Number 13 Force Main general construction will be made at the lump sum price named in the Bid Schedule under Item No. 01, which price shall constitute full compensation for completion of all mobilization, demobilization, insurance, traffic control, dewatering, imported backfill and permits, as it pertains to Force Main 13, supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Force Main 13 facilities, complete as defined within these Contract Documents with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

2. **Bid Item No. 02 – General Construction - Sewer Pump Station Number 14 Force Main (Lump Sum):**

   Payment for Sewer Pump Station Number 14 Force Main general construction will be made at the lump sum price named in the Bid Schedule under Item No. 02, which price shall constitute full compensation for completion of all mobilization,

demobilization, insurance, traffic control, dewatering, imported backfill and permits as it pertains to Force Main 14, supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Force Main 14 facilities, complete as defined within these Contract Documents with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

3. **Bid Item No. 03 – General Construction - Sewer Pump Station Number 16 Force Main (Lump Sum):**

Payment for Sewer Pump Station Number 16 Force Main general construction will be made at the lump sum price named in the Bid Schedule under Item No. 03, which price shall constitute full compensation for completion of all mobilization, demobilization, insurance, traffic control, dewatering, imported backfill and permits as it pertains to Force Main 16, supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Force Main 16 facilities, complete as defined within these Contract Documents with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

4. **Bid Item No. 04 – General Construction - Sewer Pump Station Number 25A Force Main 25A (Lump Sum):**

Payment for Sewer Pump Station Number 25A Force Main general construction will be made at the lump sum price named in the Bid Schedule under Item No. 04, which price shall constitute full compensation for completion of all mobilization, demobilization, insurance, traffic control, dewatering, imported backfill and permits as it pertains to Force Main 25A, supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Force Main 25A facilities, complete as defined within these Contract Documents with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

5. **Bid Item No. 05 – General Construction - Sewer Pump Station Number 85 Force Main 85 (Lump Sum):**

Payment for Sewer Pump Station Number 85 Force Main general construction will be made at the lump sum price named in the Bid Schedule under Item No. 05, which price shall constitute full compensation for completion of all mobilization, demobilization, insurance, traffic control, dewatering, imported backfill and permits as it pertains to Force Main 85, supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Force Main 85 facilities, complete as defined within these Contract Documents with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

6. **Bid Item No. 06 – General Construction - Sewer Pump Station Number 76 General Construction (Lump Sum):**

Payment for Sewer Pump Station Number 76 general construction will be made at the lump sum price named in the Bid Schedule under Item No. 06, which price shall constitute full compensation for completion of all mobilization, demobilization, insurance, and permits as it pertains to Sewer Pump Station 76 , supervision, planning, design, engineering fees associated with construction activities for CONTRACTOR-required design efforts, furnishing and constructing all Sewer Pump Station 76 facilities, complete as defined within these Contract Documents, with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

7. **Bid Item No. 7 – Sheeting, Shoring and Bracing (Lump Sum):**

Payment for all temporary sheeting, shoring and bracing will be made at the lump sum price named in the Bid Schedule under Item No. 07, with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule.

The price shall constitute full compensation for all temporary sheeting, shoring and bracing required by the Contract Documents and/or site conditions. Sheeting, shoring and bracing shall include all planning, design, engineering fees (including designer inspection and certification of installation), furnishing and constructing, removal and proper disposal of such temporary sheeting, shoring and bracing, complete, as required under the provisions of any permits and in accordance with the requirements of CALOSHA and the Construction Safety Orders of the State of California, pursuant to the provisions of Section 6707 of the California Labor Code.

8. **Bid Item No. 8 – Final Approval of Operation & Maintenance Manuals (or Owner's Manuals) and Master Record Documents (Stipulated Lump Sum):**

Payment for the contract-required Operation and Maintenance Manuals (or Owner's Manuals) and Master Record Documents (TO INCLUDE DRAWINGS AND SPECIFICATIONS) will be made at the lump sum price named in the Bid Schedule under Item No. 8, with the sole exclusion of the payments to be made as defined herein for the other items required by the Contract Documents and listed elsewhere in the Contract-Required Lump-Sum category or Contract-Required Unit Price category in the Bid Schedule. The price shall constitute full compensation for preparation, submittal, required revisions, complete administration and full execution and the OWNER's full acceptance of the Operations and Maintenance manuals (or Owner's Manuals) and the Master Record Documents (to include drawings and specifications) and FINAL acceptance of ALL of them by the OWNER and complete as defined within these Contract Documents.

The stipulated lump sum price must be included in the bid at the stipulated amount, and CANNOT be invoiced until the specified item is complete as defined within these Contract Documents, submitted, and FULLY ACCEPTED by the OWNER. This specified item is a requirement of the contract.

9. **Bid Item No. 9 – Water Pollution Control Plan (WPCP) Program Development (Lump Sum):**

Payment for the contract-required Water Pollution Control Plan (WPCP) Program Development will be made at the lump sum price named in the Bid Schedule under Item No. 9 as defined in WHITEBOOK Section 7-8.6.4.2.

10. **Bid Item No. 10 – Water Pollution Control Plan (WPCP) Program Implementation (Lump Sum):**

Payment for the contract-required Water Pollution Control Plan (WPCP) Program Implementation will be made at the lump sum price named in the Bid Schedule under Item No. 10 as defined in WHITEBOOK Section 7-8.6.4.2.

11. **Bid Item No. 11 – Bonds (Lump Sum):**

Payment for all contract-required Bonds will be made at the lump sum price named in the Bid Schedule under Item No. 11 as defined in Greenbook/Whitebook Section 2-4.1.

C. **Allowance Bid Items for WORK not included in the original Contract Documents (including Addenda), but ultimately included in the Contractual Final Scope of Work**

12. Bid Item No. 12 – Field Orders (Allowance):

No measurement will be made for this item. Payment for WORK under bid item No. 12 will be made only to the extent that such WORK is specifically authorized in advance by the OWNER.

Determining the price for miscellaneous field orders will be done in accordance with the contract provisions and WHITEBOOK Section 9-3.5.

Prices for this WORK will be negotiated. An allowance for overhead and profit will be permitted in accordance with the provisions of this contract. This item is considered incidental to the Contract and may be adjusted, or deleted in its entirety, as determined by the OWNER.

13. Bid Item No. 13 – Dewatering Effluent Discharge Fee (Allowance):

Payment for WORK under bid item No. 13 will be made only to the extent that such WORK is specifically authorized in advance by the OWNER.

Prices for this WORK shall cover all costs for fees and related expenses for obtaining permits. This item is considered incidental to the Contract and may be adjusted, or deleted in its entirety, as determined by the OWNER.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

** END OF SECTION **

SECTION 01070 - ABBREVIATIONS OF INSTITUTIONS

PART 1 – GENERAL

1.1 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.2 ABBREVIATIONS

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGMA	American Gear Manufacturer's Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturer's Association

CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DCDMA	Diamond Core Drill Manufacturer's Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
FPL	Forest Products Laboratory
HI	Hydronics Institute
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IOS	International Organization for Standardization
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturer's Association
MPTA	Mechanical Power Transmission Association
MTI	Marine Testing Institute
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association
NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SPR	Simplified Practice Recommendation
SSA	Swedish Standards Association
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code

UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

** END OF SECTION **

SECTION 01090 - REFERENCE STANDARDS

PART 1 – GENERAL

1.1 GENERAL

A. **Titles of Sections and Paragraphs:** Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.

B. **Applicable Publications**: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the WORK is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

C. **Specialists, Assignments**: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the WORK; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the CONTRACTOR.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes, the instruction to bidders and the applicable requirements of the following documents.

B. References herein to "Building Code" or "Uniform Building Code" or “International Building Code” or “CA Building Code” shall mean Uniform Building Code of the International Conference of Building Officials (ICBO) or the International Building Code of the International Code Council (ICC). Similarly, references to "Mechanical Code" or "Uniform or International Mechanical Code", "Plumbing Code" or "Uniform or International Plumbing Code", "Fire Code" or "Uniform or International Fire Code," shall mean Uniform or International Mechanical Code, Uniform or International Plumbing Code and Uniform or International Fire Code of the International Conference of the Building Officials (ICBO) or the International Code Council (ICC). "Electric Code" or "National Electric Code” (NEC) shall mean the National Electric Code of the National Fire Protection Association (NFPA). The latest edition of the codes as

approved by the Municipal Code and used by the local agency as of the date that the WORK is advertised for bids, as adopted by the agency having jurisdiction, shall apply to the WORK herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, drawings and the other Contract Documents, the order of precedence as listed in the Whitebook shall govern. In those cases where a conflict cannot be resolved by utilizing the order of precedence, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the RESIDENT ENGINEER for clarification and directions prior to ordering or providing any materials or furnishing labor. The CONTRACTOR'S bid shall reflect the most stringent Contract Document requirements.

D. The CONTRACTOR shall construct the WORK specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.

E. **Applicable Standard Specifications**: References in the Contract Documents to "Standard Specifications" or SSPWC shall mean the Standard Specifications for Public Works Construction, 2015 edition, including the 2015 Whitebook.

F. References herein to "OSHA Regulations for Construction" shall mean **Title 29, Part 1926, Construction Safety and Health Regulations,** Code of Federal Regulations (OSHA), including all changes and amendments thereto.

G. References herein to "OSHA Standards" shall mean **Title 29, Part 1910, Occupational Safety and Health Standards,** Code of Federal Regulations (OSHA), including all changes and amendments thereto.

H. **Applicable Safety Standards:** References herein to "Cal-OSHA" shall mean **State of California, Department of Industrial Relations, Construction Safety Orders,** as amended to date, and all changes and amendments thereto.

I. **Applicable Standard Drawings:** References in the Contract Documents to "Standard Drawings" shall mean the City of San Diego Standard Drawings for Public Works Construction, 2016 edition,

1.3 QUALITY ASSURANCE

A. Conform to reference standard by date of issue current on date for receiving bids.

B. Should the specified reference standards conflict with the Contract Documents, refer to paragraph 1.2 (c) of this Section.

1.4 SCHEDULE OF REFERENCES

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, N.W. Washington, DC 20005
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601
AFBMA	Antifriction Bearing Manufacturers Association 1101 Connecticut Avenue N.W. Suite 700 Washington, DC 20036
AGA	American Gas Association 1515 Wilson Blvd. Arlington, VA 22209
AGC	Associated General CONTRACTOR'S of America 1957 E Street, N.W. Washington, DC 20006
AGMA	American Gear Manufacturers Association 1500 King Street, Suite 201 Alexandria, VA 22314
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC 20006
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611

AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L. Street, N.W. Washington, DC 20005
ARI	Air-Conditioning and Refrigeration Institute 1501 Wilson Boulevard Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 E. 47th Street New York, NY 10017
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASPA	American Sod Producers Association 4415 West Harrison Street Hillside, IL 60162
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206

AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 550 LeJeune Road, N.W. Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091
CDA	Copper Development Association 57th Floor, Chrysler Building 405 Lexington Avenue New York, NY 10174
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
DHI	Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22101
EJCDC	Engineers' Joint Contract Documents Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FGMA	Flat Glass Marketing Association 3310 Harrison White Lakes Professional Building Topeka, KS 66611
FM	Factory Mutual System 1151 Boston-Providence Turnpike P.O. Box 688 Norwood, MA 02062

FS Federal Specification
General Services Administration
Specifications and Consumer Information Distribution Section (WRSIS)
Washington Navy Yard, Building 197
Washington, DC 20407

GA Gypsum Association
1603 Orrington Avenue
Evanston, IL 60201

JIC Joint Industrial Council
c/o National Machine Tool Builders Association
7901 Westpark Drive
McLean, VA 22102

IBR Institute of Boiler and Radiator Manufacturers
aka Hydronics Institute
P. O. Box 218
35 Russo Place
Berkeley Heights, NJ 07922

ICBO International Conference of Building Officials
5360 S. Workman Mill Road
Whittier, CA 90601

IEEE Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

IMIAC International Masonry Industry All-Weather Council
International Masonry Institute
815 15th Street, N.W.
Washington, DC 20005

MBMA Metal Building Manufacturer's Association
1230 Keith Building
Cleveland, OH 44115

MFMA Maple Flooring Manufacturers Association
60 Rivere Drive
Northbrook, IL 60062

MIL Military Specifications
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120

ML/SFA Metal Lath/Steel Framing Association
221 North LaSalle Street
Chicago, IL 60601

NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NCMA	National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070
NEBB	National Environmental Balancing Bureau 8224 Old Courthouse road Vienna, VA 22180
NEC	National Electric Code 1 Battery March Park P.O. Box 9146 Quincy, MA 02169
NEMA	National Electrical Manufacturers' Association 2101 'L' Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park
NFPA	National Forest Products Association 1619 Massachusetts Avenue, N.W. Washington, DC 20036
NSWMA	National Solid Wastes Management Association 1730 Rhode Island Avenue, N.W. Washington, DC 20036
NTMA	National Woodwork Manufacturers Association 205 W. Touhy Avenue Park Ridge, IL 60068
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
PCI	Prestressed Concrete Institute 201 North Wells Street Chicago, IL 60606
PS	Product Standard U.S. Department of Commerce Washington, DC 20203
RIS	Redwood Inspection Service One Lombard Street San Francisco, CA 94111

RCSHSB	Red Cedar Shingle and Handsplit Shake Bureau 515 116th Avenue Bellevue, WA 98004
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711
SDI	Steel Door Institute 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107
SIGMA	Sealed Insulating Glass Manufacturers Association 111 East Wacker Drive Chicago, IL 60601
SJI	Steel Joist Institute 1205 48th Avenue North Suite A Myrtle Beach, SC 29577
SMACNA	Sheet Metal and Air Conditioning CONTRACTOR'S National Association 8224 Old Court House Road Vienna, VA 22180
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
TCA	Tile Council of America, Inc. Box 326 Princeton, NJ 08540
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
WCLIB	West Coast Lumber Inspection Bureau 6980 S.W. Varns Road Box 23145 Portland, OR 97223
WWPA	Western Wood Products Association 1500 Yeon Building Portland, OR 97204

** END OF SECTION **

SECTION 01300 - CONTRACTOR SUBMITTALS

PART 1 – GENERAL

1.1 GENERAL

A. Wherever submittals are required hereunder, all such submittals by the CONTRACTOR shall be submitted to the RESIDENT ENGINEER.

B. Within seven (7) calendar days after the date of commencement as stated in the Notice to Proceed (NTP), the CONTRACTOR shall submit the following items to the RESIDENT ENGINEER for review:

1. A preliminary schedule of Shop Drawings, Samples, and submittals listed in the Bid.

2. A list of all permits and licenses the CONTRACTOR shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

C. At the preconstruction conference, the CONTRACTOR shall submit the following items to the RESIDENT ENGINEER for review:

1. A 60-day plan of operation in accordance with Greenbook/Whitebook.

2. A project overview bar chart in accordance with Greenbook/Whitebook.

3. A preliminary schedule of values in accordance with Greenbook/Whitebook.

1.2 SHOP DRAWINGS

A. Wherever called for in the Contract Documents, or where required by the RESIDENT ENGINEER, the CONTRACTOR shall furnish to the RESIDENT ENGINEER for review, 6 copies, plus the number the CONTRACTOR wants returned, not to exceed 12 copies, plus one reproducible copy, of each shop drawing submittal. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items.

B. All shop drawing submittals shall be accompanied by the RESIDENT ENGINEER's standard submittal transmittal form. The form may be obtained from the RESIDENT ENGINEER. Any submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for resubmittal.

C. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related

that expediency indicates review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the RESIDENT ENGINEER.

D. Except as may otherwise be indicated herein, the RESIDENT ENGINEER will return prints of each submittal to the CONTRACTOR with its comments noted thereon, within 15 calendar days following their receipt by the RESIDENT ENGINEER. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable submittal to the RESIDENT ENGINEER by the second submission of a submittal item. The OWNER reserves the right to withhold monies due the CONTRACTOR to cover additional costs of the RESIDENT ENGINEER's review beyond the second submittal. The RESIDENT ENGINEER'S maximum review period for each submittal, including all resubmittals, will be 15 days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be 45 days.

E. If three (3) copies of a submittal are returned to the CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.

F. If three (3) copies of a submittal are returned to the CONTRACTOR marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required.

G. If a submittal is returned to the CONTRACTOR marked "AMEND-RESUBMIT," the CONTRACTOR shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the RESIDENT ENGINEER.

H. If a submittal is returned to the CONTRACTOR marked "REJECTED-RESUBMIT," the CONTRACTOR shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the RESIDENT ENGINEER.

I. Fabrication of an item shall be commenced only after the RESIDENT ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

J. All CONTRACTOR shop drawing submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR, prior to submission to the RESIDENT ENGINEER. Each submittal shall be dated, signed, and certified by the CONTRACTOR, as being correct and in strict conformance with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the RESIDENT ENGINEER of any CONTRACTOR submittals will be made for any items which have not been so certified by the CONTRACTOR. All non-certified submittals will be returned to the CONTRACTOR without action taken by the RESIDENT

ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

K. The RESIDENT ENGINEER's/ENGINEER's review of CONTRACTOR shop drawing submittals is for general conformance with the design concept and contract documents only and shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions. The CONTRACTOR shall assume all responsibility and risk for any misfits due to any errors in CONTRACTOR submittals. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details. Markings or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications or departures therefrom. The contractor remains responsible for details and accuracy for confirming and correlating all quantities and dimensions, for selecting fabrication processes, the techniques of assembly, and for performing his work in a safe manner.

1.3 CONTRACTOR'S SCHEDULE

A. The CONTRACTOR's construction schedules and reports shall be prepared and submitted to the RESIDENT ENGINEER.

1.4 SAMPLES

A. Whenever in the Specifications samples are required, the CONTRACTOR shall submit not less than three (3) samples of each such item or material to the RESIDENT ENGINEER for acceptance at no additional cost to the OWNER.

B. Samples, as required herein, shall be submitted for acceptance a minimum of 21 days prior to ordering such material for delivery to the jobsite, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the WORK.

C. All samples shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and Manufacturer's name for identification and submitted to the RESIDENT ENGINEER for acceptance. Upon receiving acceptance of the RESIDENT ENGINEER, one set of the samples will be stamped and dated by the RESIDENT ENGINEER and returned to the CONTRACTOR, and one set of samples will be retained by the RESIDENT ENGINEER, and one set of samples shall remain at the job site until completion of the WORK.

D. Unless indicated otherwise, all colors and textures of specified items presented in sample submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time or price, the CONTRACTOR will clearly indicate same on the transmittal page of the submittal.

1.5 OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS)

A. The CONTRACTOR shall submit technical operation and maintenance information for each item of mechanical, electrical and instrumentation equipment in an organized manner in the OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS). The OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS) shall be written so that it can be used and understood by the OWNER'S operation and maintenance staff. Each individual force main and the generator shall have its own independent and unique OWNER's MANUAL (OR OPERATION AND MAINTENANCE MANUALS).

B. Each OWNER'S MANUAL (OR OPERATION AND MAINTENANCE MANUALS) shall be subdivided first by specification section number; second, by equipment item; and last, by "part." "Parts" shall conform to the following (as applicable):

1. Part 1 - Equipment Summary

   a. Summary: A summary table shall indicate the equipment name, equipment number, and process area in which the equipment is installed.

   b. Form: The RESIDENT ENGINEER will supply an Equipment Summary Form for each item of mechanical, electrical and instrumentation equipment in the WORK. The CONTRACTOR shall fill in the relevant information on the form and include it in Part 1.

2. Part 2 - Operational Procedures

   a. Procedures: Manufacturer-recommended procedures on the following shall be included in Part 2:

      Installation
      Adjustment
      Startup
      Location of controls, special tools or other equipment required or related instrumentation needed for operation
      Operation Procedures
      Load Changes
      Calibration
      Shutdown
      Troubleshooting
      Disassembly
      Reassembly
      Realignment
      Testing to determine performance efficiency
      Tabulation of proper settings for all pressure relief valves, low and high pressure switches and other protection devices
      List of all electrical relay settings including alarm and contact settings

3. Part 3 - Preventive Maintenance Procedures

    a. Procedures: Preventive maintenance procedures shall include all manufacturer-recommended procedures to be performed on a periodic basis, both by removing and replacing the equipment or component and by leaving the equipment in place.

    b. Schedules: Recommended frequency of preventive maintenance procedures shall be included. Lubrication schedules, including lubricant SAE grade and type, and temperature ranges shall be covered.

4. Part 4 - Parts List

    a. Parts List: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included.

    b. Drawings: Cross-sectional or exploded view drawings shall accompany the parts list.

5. Part 5 - Wiring Diagrams

    a. Diagrams: Part 5 shall include complete internal and connection wiring diagrams for electrical equipment items.

6. Part 6 - Shop Drawings

    a. Drawings: This part shall include approved shop or fabrication drawings, complete with dimensions.

7. Part 7 - Safety

    a. Procedures: This part describes the safety precautions to be taken when operating and maintaining the equipment or working near it.

8. Part 8 - Documentation

    a. All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.

C. For each force main and the generator, the CONTRACTOR shall furnish to the RESIDENT ENGINEER seven (7) identical OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS). Each set shall consist of one or more volumes, each of which shall be bound in a standard size, 3-ring, looseleaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches. A table of contents indicating all equipment in the manuals shall be prepared.

D. OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS) shall be submitted in final form to the RESIDENT ENGINEER not later than the 75 percent of construction completion date. All discrepancies found by the RESIDENT ENGINEER in the OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS) shall be corrected by the CONTRACTOR within 15 calendar days from the date of written notification by the RESIDENT ENGINEER.

E. Incomplete or unacceptable OWNER'S MANUALS (OR OPERATION AND MAINTENANCE MANUALS) at the 75 percent construction completion point shall constitute sufficient justification to withhold the amount stipulated in paragraph "OWNER'S MANUAL (OR OPERATION AND MAINTENANCE MANUALS) Submittals" of Section 01700, from any monies due the CONTRACTOR.

1.6 INSTRUCTION OF OWNER'S PERSONNEL

A. **General**:

1. Training is not generally a part of the contract, unless it is specifically called out in the technical specifications. If the OWNER determines that certain training is desired on a particular component or a portion of the contract not required of the technical specifications, a field order or change order will be executed in order to facilitate such training for the wastewater collections staff.

1.7 ELECTRONIC DOCUMENT SUBMITTAL REQUIREMENTS

A. **General**

1. All final submittals are required in both paper and electronic format. Four (4) copies of each final submittal shall be provided on compact disk media (CD-ROM).

2. Where preliminary submittals are required in electronic format, three (3) copies of the preliminary submittal shall be provided on CD-ROM for review.

3. CD-ROM disks shall be on high-quality CD-R media. CDs shall have printed paper labels with the project name, CIP Number, CONTRACTOR, and content. CD-RW (CD-rewritable) disks are not acceptable. CDs shall be provided with a case and a case insert label displaying the same information shown on the CD label.

4. The CD-ROM data format shall comply with ISO 9660 (2010) with Joliet extensions.

5. Deviation from this standard will be accepted only if advance approval is given by the RESIDENT ENGINEER.

B. **Documents**: Electronic submittals for the following types of documents are required as a minimum. Additional requirements are identified in the equipment specifications.

1. Design

   (a) Design Specifications
   (b) Design Drawings and record drawings

2. Operations and Maintenance

   (a) Facility design O&M manuals

      1. Volume I - process information
      2. Volume II - standard operating procedures (SOP)
      3. Volume III - all maintenance information for the facility.
      4. Manufacturer O&M manuals
      5. Facility Loop and Wiring Diagrams

3. Environmental Documents

4. Research & Development

C. **Format**

1. Construction drawings and record drawings developed under the Contract shall be in Bentley Microstation (DGN V8 version) format. All drawings shall conform to the CADD and Drafting standards set forth in the CWP Guidelines, latest edition.

2. Other than construction drawings and record drawings, documents shall be in Adobe Acrobat PDF format, using the Acrobat version as specified by the RESIDENT ENGINEER. Documents that are submitted in Acrobat Image Only format will not be accepted.

3. Electronic Conversion: Vendor and CONTRACTOR shop drawings developed under the Contract shall be in Bentley Microstation (DGN) format. Documents in electronic format (Microsoft Word, Excel, etc.) shall be converted to standard PDF format using the Acrobat printer driver or other direct conversion software. The Acrobat PDF sub-format for electronically converted documents shall be the Acrobat Standard PDF file format which includes both image and text information.

4. Documents not available in electronic format shall be scanned at 300 dpi, bitonal (black and white) and converted into Adobe Acrobat (PDF). Image enhancement software shall be used during scanning. The Acrobat PDF sub-format for scanned documents shall be the Original Image with Hidden Text format.

5. All PDF documents shall be reviewed, and corrected if necessary, for orientation and legibility.

6. Individual document files shall not exceed 3 megabytes in size. Large documents shall be broken down by subsections to facilitate this requirement

D. **Document Organization and Indexing**

1. Electronic submittals shall be logically organized. File names shall be in UPPERCASE only, use a maximum of 64 characters, contain no spaces, and clearly indicate the file contents.

2. Supplier's submittals that include O&M documentation for more than one equipment type shall be divided into separate documents for each equipment type.

3. Each document's Table of Contents shall contain PDF bookmarks which actively link to the referenced sections within the document.

4. A master PDF index file shall be included, with a master Table of Contents, and active internal links to individual document files. The master PDF index file shall be clearly identifiable. External PDF link file names shall be in uppercase only.

5. A table shall be provided and submitted in spreadsheet format which includes the information about each document file. The contents of the table shall be submitted and approved by the RESIDENT ENGINEER. An example of information to be provided is as follows: (This is an example only.)

(a) Document file name

(1) Document title and description
(2) Hard Copy Catalog No. (used by facility document coordinator)
(3) Document Type: (see above)
(4) Facility Name
(5) Specification Number
(6) Process Name
(7) Unit Process Number
(8) Manufacturer's Name (if applicable)
(9) Supplier's Name (if applicable)
(10) EMPAC asset number (if applicable)
(11) Asset Description (if applicable)
(a) Keyword
(b) Qualifier

1.8 SPARE PARTS LIST

A. The CONTRACTOR shall furnish to the RESIDENT ENGINEER five (5) identical sets of spare parts information for all mechanical, electrical, and instrumentation equipment. The spare parts list shall include the current list price of each spare part. The spare

parts list shall be limited to those spare parts which each manufacturer recommends be maintained by the OWNER in inventory at the plant site. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to facilitate the OWNER in ordering. The CONTRACTOR shall cross-reference all spare parts lists to the equipment numbers designated in the Contract Documents. The spare parts lists shall be bound in standard size, 3-ring, looseleaf, vinyl plastic hard cover binders suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches.

1.9 RECORD DRAWINGS (one component of the Project Master Record Documents as identified in specification section 01050)

A. The CONTRACTOR shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the WORK as actually constructed. These master record drawings of the CONTRACTOR's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the WORK.

Copies of the record drawings shall be submitted on the 20th working day of every month after the month in which the notice to proceed is given as well as on completion of WORK. Failure to submit complete record drawings on or before the 20th working day will enact the liquidated damages clause for interim record drawings submittals described in Article 3 of the Agreement.

B. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by change order drawings or final shop drawings, and by including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.

C. Record drawings shall be accessible to the RESIDENT ENGINEER at all times during the construction period.

D. Final payment will not be acted upon until the CONTRACTOR-prepared record drawings have been delivered to the RESIDENT ENGINEER. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information overlaid in red.

E. Upon substantial completion of the WORK and prior to final acceptance, the CONTRACTOR shall finalize and deliver a complete set of record drawings to the

RESIDENT ENGINEER for transmittal to the OWNER, conforming to the construction records of the CONTRACTOR. This set of drawings shall consist of corrected drawings showing the reported location of the WORK. The information submitted by the CONTRACTOR in the Record Drawings will be assumed to be correct, and the CONTRACTOR shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Record Drawings as a result.

F. Please also refer to specification section 01050 – FIELD ENGINEERING for Project Master Record Document requirements. Please note that the specifications are the other component of the Project Master Record Documents.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

** END OF SECTION **

SECTION 01400 - QUALITY CONTROL

PART 1 – GENERAL

1.1 DEFINITION

A. Specific quality control requirements for the WORK are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the WORK beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.

1.2 PROJECT QUALITY CONTROL PLAN

A. The CONTRACTOR is responsible for producing WORK to meet the quality required by the Contract Documents and to perform the quality control efforts necessary to ensure those requirements are met. The RESIDENT ENGINEER's inspection of any WORK will not relieve the CONTRACTOR of the primary responsibility for such efforts.

B. The CONTRACTOR shall submit to the RESIDENT ENGINEER a Quality Control Plan for review and approval within 14 days of the Notice to Proceed. The submittal must be approved before construction WORK begins. The Quality Control Plan will include:

1. A description of the workings and structure of the CONTRACTOR's Quality Control Plan that will be implemented to assure quality WORK will be done.

2. A contract specific Inspection Plan that lists and describes the inspections that the CONTRACTOR will conduct, their frequency, acceptance criteria, and who will conduct each inspection. The Inspection Plan shall include the WORK to be performed by subcontractors, fabricators, and suppliers.

3. Identification of the individuals within the CONTRACTOR's organization who are responsible for quality assurance including their role and authority.

After completion of the RESIDENT ENGINEER's review of the CONTRACTOR's Quality Control Plan, the CONTRACTOR and RESIDENT ENGINEER will meet to discuss and define quality standards and expectations and to coordinate the RESIDENT ENGINEER's inspection efforts with the CONTRACTOR's planned efforts.

C. The CONTRACTOR will be obligated to accommodate procedural changes to contract required quality control issues requested by the RESIDENT ENGINEER.

1.3 FACTORY INSPECTION AND TESTS

A. The CONTRACTOR shall be responsible for inspection and testing of materials, products, or equipment at the place of manufacture at its own expense when required, by the Special Provisions, Regulatory Permits, Codes, or as noted in the plans

or specifications. RESIDENT ENGINEERThe CONTRACTOR shall provide and bear all costs for inspection and for witnessing factory tests by the OWNER'S/RESIDENT ENGINEER'S representatives as nominated by the OWNER for the number of days indicated for such inspections and observations. These costs shall include travel expenses, and expenses for lodging, meals, and car rental if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. If air travel is involved, it shall include economy-class tickets. Costs paid by the CONTRACTOR for inspection and for witnessing factory tests shall not include the salaries or salary-related expenses of the inspectors.

B. Where the Plans and/or Technical Specifications indicate that factory inspection and witnessing of testing by the OWNER/RESIDENT ENGINEER is optional or discretionary, the OWNER will pay for travel and related costs associated with such inspection and witnessing of tests by the OWNER'S/RESIDENT ENGINEER'S representatives.

C. The presence of the OWNER'S/RESIDENT ENGINEER'S representatives at the place of manufacture shall not relieve the CONTRACTOR of the responsibility for furnishing materials, products, and equipment which comply with all requirements of the Contract Documents. The CONTRACTOR is obligated to meet the requirements of the Contract Documents, and any act or omission on the part of the OWNER/RESIDENT ENGINEER shall not relieve the CONTRACTOR of the obligation to fulfill the requirements of its Contract.
RESIDENT ENGINEERRESIDENT ENGINEER

E. When tests fail to meet the specified requirements, retesting because of non-conformance to specified requirements shall be performed by the same testing laboratory as directed by the OWNER/RESIDENT ENGINEER. The CONTRACTOR shall bear all costs for such retesting, including costs for additional trips for factory inspection RESIDENT ENGINEER

F. For samples and tests required by the CONTRACTOR for its own quality assurance program and needs, whether or not specified in the Contract Documents, costs shall be included in the Contract Price.

G. All tests required by the specifications, regulatory permits, or referenced codes and standards shall be the responsibility of the CONTRACTOR, unless specifically noted otherwise.

1.4 SAMPLING AND TESTING

A. Unless otherwise indicated, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the material, product, or equipment considered; however, the OWNER will use any generally-accepted system of sampling and testing which will insure that the quality of the workmanship is in full agreement with the Contract Documents.

B. Any waiver by the OWNER of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial

performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the RESIDENT ENGINEER will make independent investigations and tests; and failure of any portion of the WORK to meet any of the requirements of the Contract Documents shall be reasonable cause for the RESIDENT ENGINEER to require the removal or correction and reconstruction of any such work in accordance with the Contract Documents.

1.5 INSPECTION AND TESTING LABORATORY SERVICE

A. If required, the OWNER will provide and pay for the services of an independent testing laboratory to perform routine testing of earth work and concrete at the site, (i.e. soil density; concrete strength, slump, and air content) and perform random tests of other areas previously completed and inspected by CONTRACTOR.

B. The OWNER's testing laboratory will perform other inspections, testings, and other services specified in the Contract Documents, to be performed by the OWNER, or as required by the RESIDENT ENGINEER. The cost of these services will be paid for by the OWNER.

C. Reports will be submitted by the OWNER's testing laboratory to the RESIDENT ENGINEER in duplicate, indicating observations and results of tests, and indicating compliance or non-compliance with Contract Documents.

D. The CONTRACTOR shall cooperate with the RESIDENT ENGINEER and OWNER's testing laboratory by furnishing samples of materials, concrete design mix, equipment, tools, storage and other assistance as requested.

E. The CONTRACTOR shall notify the RESIDENT ENGINEER 24 hours prior to the expected time for operations requiring inspection and laboratory testing services.

F. Retesting required because of non-conformance to specified requirements shall be performed by the same testing laboratory as directed by the RESIDENT ENGINEER. The CONTRACTOR shall bear all costs from such retesting at no additional cost to the OWNER.

G. For samples and tests required for the CONTRACTOR's use, the CONTRACTOR shall make arrangements with an independent firm for payment and scheduling of testing. The cost of sampling and testing for the CONTRACTOR'S use shall be included in the Contract Price.

H. All tests required by the specifications or referenced codes and standards are the responsibility of the CONTRACTOR, unless specifically noted otherwise.

1.6 SPECIAL INSPECTION

A. The Uniform Building Code/International Building Code/CA Building Code requires that special inspections be performed on certain structural elements of the project. The RESIDENT ENGINEER will perform all on-site special inspections required by the Uniform Building Code/International Building Code/CA Building Code. The cost of these services when provided during normal WORK hours will be paid for by the OWNER.

B. When building components are fabricated off site, the CONTRACTOR must utilize a fabricator approved by the City of San Diego Development Services Department. If the CONTRACTOR elects to utilize a fabricator that is not approved by the City of San Diego Development Services Department, the CONTRACTOR shall provide a special inspector to perform continuous special inspection in the fabricator's shop. The CONTRACTOR shall be responsible for all costs associated with performing special inspection in the fabricator's shop.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 INSTALLATION

A. Inspection: The CONTRACTOR shall inspect materials or equipment upon arrival on the job site and immediately prior to installation. The CONTRACTOR shall reject damaged and defective items. This inspection shall include a review of Contract requirements; a check to assure that all materials and/or equipment have been tested, submitted, and approved; examination of the work area to ascertain that all preliminary work has been completed; and a physical examination of materials and equipment to assure that they conform to reviewed shop drawings or submittal data. This inspection shall also include instruction as necessary to assure that workmen know the requirements of the Contract as they pertain to the feature, an examination of the quality of workmanship, as well as a review of control testing for compliance with the Contract requirements.

B. Measurements: The CONTRACTOR shall verify measurements and dimensions of the WORK, as an integral step of starting each installation.

C. Special Procedures: Methods and facilities shall be provided to assure conformance with requirements for special process specifications such as welding, heat treating and nondestructive testing of materials. Certifications for personnel, procedures, and equipment shall be maintained as required to meet the requirement of the Contract Documents and all applicable codes.

D. Manufacturer's Instructions: Where installations include manufactured products, the CONTRACTOR shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

3.2 MANUFACTURER'S FIELD INSTALLATION SERVICES AND REPORTS

A. When specified in individual specification sections, the CONTRACTOR shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, (test, adjust, and balance of equipment) and to provide instructions when necessary.

B. The CONTRACTOR shall report to the RESIDENT ENGINEER in writing any observations and site decisions or instructions given by the manufacturers' representative to the CONTRACTOR that are supplemental or contrary to manufacturers' written instructions.

C. The CONTRACTOR shall submit manufacturer representative's reports (in duplicate) within seven (7) calendar days of each field visit, to the RESIDENT ENGINEER for review. If duration of field visit is greater than one week, submit weekly reports. The final report shall certify that equipment or system has been satisfactorily installed and is functioning correctly.

** END OF SECTION **

SECTION 01505 - MOBILIZATION

PART 1 – GENERAL

1.1 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto the sites of all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the WORK. Mobilization shall include the following principal items, if required:

1. Moving on to the site of all CONTRACTOR's plant and equipment required for first month operations.

2. Installing temporary construction power, wiring, and lighting facilities.

3. Developing construction water supply.

4. Providing field office trailers for the CONTRACTOR, if so desired, complete with all furnishings and utility services.

5. Providing all on-site communication facilities, including telephones, cordless phone antenna, and radio pagers.

6. Providing on-site sanitary facilities and potable water facilities.

7. Arranging for and erection of CONTRACTOR's work and storage yard.

8. Constructing and implementing security features and requirements.

9. Obtaining all required permits.

10. Having all OSHA-required notices and establishment of safety programs.

11. Having the CONTRACTOR's superintendent at the job site full-time.

12. Submitting initial submittals.

1.2 PAYMENT FOR MOBILIZATION

A. The CONTRACTOR's attention is directed to the condition that no payment for mobilization, or any part thereof will be approved for payment under the Contract until all mobilization items listed above have been completed as specified.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

** END OF SECTION **

SECTION 01580 - PROJECT SIGN

PART 1 – GENERAL

1.1 GENERAL

A. The CONTRACTOR shall install and maintain at the sites project identification signs furnished by the OWNER.

B. The OWNER will obtain a sign permit, if one is required, at no cost to the CONTRACTOR.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall pick up the signs from the General Services Sign Shop, 2781 Caminito Chollas, San Diego, and transport them to the sites.

3.2 INSTALLATION

A. The CONTRACTOR shall mount the sign in a manner and at a location at the site accepted by the RESIDENT ENGINEER.

3.3 REMOVAL

A. The CONTRACTOR shall remove the project identification signs and return them to the sign shop upon preparation of the Notice of Completion by the RESIDENT ENGINEER.

** END OF SECTION **

SECTION 01600 - PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

PART 1 – GENERAL

1.1 DEFINITIONS

A. The word "Products," as used herein, is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the WORK.

1.2 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible for each unit of work, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.3 PRODUCT DELIVERY AND STORAGE

A. The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss. Materials delivered onsite without an approved submittal for verification shall be rejected and payment withheld.

1.4 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

B. The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.

C. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.5 STORAGE AND PROTECTION

A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.6 MAINTENANCE OF STORAGE

A. Stored products shall be periodically inspected on a scheduled basis. The CONTRACTOR shall maintain a log of inspections and shall make the log available on request.

B. The CONTRACTOR shall comply with manufacturer's product storage requirements and recommendations.

C. The CONTRACTOR shall maintain manufacturer-required environmental conditions continually.

D. The CONTRACTOR shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

E. For mechanical and electrical equipment, the CONTRACTOR shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

F. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to acceptance by the OWNER in accordance with the Contract Documents.

1.7 INVESTIGATION OF FAILED PRODUCTS

A. Prior to disposal of failed products, materials, or equipment, the CONTRACTOR shall inform and report the causes of failure during or after construction to the RESIDENT ENGINEER.

1.8 PROPOSED SUBSTITUTES OR "OR EQUAL" ITEMS

A. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier and/or Manufacturer, the naming of the item is intended to establish the type, function, and quality required. Unless expressly prohibited, materials or equipment of other suppliers and/or manufacturers MAY BE accepted if SUFFICIENT information is submitted by the CONTRACTOR to the RESIDENT ENGINEER for the OWNER's EXCLUSIVE review to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the CONTRACTOR.

2. The OWNER will be the sole judge as to the type, function, and quality of any such substitute and the OWNER's decision shall be final.

3. The OWNER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense additional data about the proposed substitute.

4. The OWNER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense a special performance guarantee, or other surety, with respect to any substitute.

5. Acceptance by the OWNER of a substitute item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute.

6. The CONTRACTOR shall be responsible for resultant changes including design and construction changes and any and all additional costs resulting from the changes which the accepted substitution requires in the CONTRACTOR'S WORK, the WORK of its subcontractors, vendors, and of other contractors, and shall effect such changes without cost to the OWNER.

B. The procedure for review by the OWNER will include the following:

1. If the CONTRACTOR wishes to provide a substitute item, the CONTRACTOR shall make written application to the RESIDENT ENGINEER on the "Substitution Request Form." This form will be provided by the OWNER.

2. The "Substitution Request Form(s)" shall be submitted within the stipulated period PRIOR to the award of the Contract. Please also note article 1.8 D of specification section number 01600.

3. Wherever a proposed substitute item has not been submitted within said period, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by the OWNER, the

CONTRACTOR shall provide the material or equipment indicated in the Contract Documents.

4. The CONTRACTOR shall CERTIFY that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, and be similar and of equal substance to that indicated, and be suited to the same use as that specified.

5. The OWNER will evaluate each proposed substitute within a reasonable period of time.

6. As applicable, no shop drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the OWNER'S prior written acceptance of the CONTRACTOR'S "Substitution Request Form."

7. The RESIDENT ENGINEER will record the time required by the OWNER in evaluating substitutions proposed by the CONTRACTOR and in making changes by the CONTRACTOR in the Contract Documents occasioned thereby. Whether or not the OWNER accepts a proposed substitute, the CONTRACTOR shall reimburse the OWNER for the charges of the OWNER and ENGINEER for evaluating each proposed substitute.

C. The CONTRACTOR's application using the "Substitution Request Forms" shall contain the following statements and information which shall be considered by the OWNER in evaluating the proposed substitution:

1. The evaluation and acceptance of the proposed substitute will not prejudice the CONTRACTOR's achievement of substantial completion on time.

2. Whether or not acceptance of the substitute for use in the WORK will require a change in any of the Contract Documents to adopt the design to the proposed substitute.

3. Whether or not incorporation or use of the substitute in connection with the WORK is subject to payment of any license fee or royalty.

4. All variations of the proposed substitute from the items originally specified will be identified.

5. Available maintenance, repair, and replacement service will be indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.

6. Itemized, detailed estimate of ALL costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change. Please make sure to consider article 1.8 A, 1 through 6, shown above.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

** END OF SECTION **

SECTION 01660 - EQUIPMENT TESTING AND PLANT STARTUP

PART 1 – GENERAL

1.1 GENERAL

A. Equipment testing and plant/pump station/force main startup are requisite to satisfactory completion of the contract and, therefore, shall be completed within the contract time.

1.2 EQUIPMENT TESTING

A. The CONTRACTOR shall provide the services of an experienced and authorized representative of the manufacturer of each item of equipment indicated in the equipment schedules (excluding manually-operated valves smaller than 24 inches in size, injectors, tanks, batch-type disc meters, and rotameters, and any other minor items of equipment specifically exempted by the RESIDENT ENGINEER in writing), who shall visit the site of the WORK and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the CONTRACTOR shall arrange to have the manufacturer's representative revisit the job site as often as necessary until any and all trouble is corrected and the equipment installation and operation are satisfactory to the RESIDENT ENGINEER and OWNER.

B. The CONTRACTOR shall require that each manufacturer's representative furnish to the RESIDENT ENGINEER a written report addressed to the OWNER certifying that the equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting piping or anchor bolts, and has been operated satisfactorily under full-load conditions.

C. The CONTRACTOR shall be responsible for scheduling all operations testing. The CONTRACTOR is advised that the RESIDENT ENGINEER and the OWNER's operating personnel will witness operations testing and that the manufacturer's representative shall be required to instruct the OWNER's operating personnel in correct operation and maintenance procedures. Such instruction shall be scheduled at a time arranged with the OWNER at least two (2) weeks in advance and shall be provided while the respective manufacturer's equipment is fully operational. On-site instruction shall be given by qualified persons who have been made familiar in advance with the equipment and systems in the plant. Prior to scheduling any operations testing, the CONTRACTOR shall have previously furnished the Owner's Manuals required under Section 01300.

D. The CONTRACTOR shall notify the RESIDENT ENGINEER at least three (3) days in advance of each equipment test.

E. The CONTRACTOR shall furnish all personnel, power, water, chemicals, fuel, oil, grease, and all other necessary equipment, facilities, and services required for conducting the tests.

1.3 PLANT/STATION START-UP

A. The startup of a plant/station is a highly complex operation requiring the combined technical expertise of the CONTRACTOR, manufacturers, subcontractors, the RESIDENT ENGINEER, and the OWNER. The CONTRACTOR shall provide the effective coordination of all parties necessary for the successful plant startup. The CONTRACTOR shall also submit a resume of the Startup Expert/professional. The RESIDENT ENGINEER/OWNER will approve the Startup Expert/professional.

B. It is not the intent of the RESIDENT ENGINEER to instruct the CONTRACTOR in the startup of the plant; however, the RESIDENT ENGINEER will be available prior to and during startup to provide technical support to the CONTRACTOR.

C. The CONTRACTOR shall be required to start up the plant, operate it, and pass a ten (10)-day test prior to acceptance. All equipment must properly run continuously 24 hours per day for the test period at rates indicated by the RESIDENT ENGINEER. If any item malfunctions during the test, the item shall be repaired and the test restarted at day zero with no credit given for the operating time before the aforementioned malfunction.

D. At about 50 to 70 percent completion of each station, the CONTRACTOR shall submit to the RESIDENT ENGINEER for review and approval, a detailed schedule of operations which will be necessary to effect a successful initial operation and sustained period of operation for the duration of the required startup period.

E The CONTRACTOR shall provide operating personnel for the duration of the startup. Additionally, the CONTRACTOR shall provide its own alternative plan for providing, at its own expense, all water, power, chemicals, and other consumables required for successful completion of the test, in the event that public utilities, facilities, and/or resources become not readily available for hookup or tapping.

F. The startup shall not be commenced until all required leakage tests and equipment tests have been completed to the satisfaction of the RESIDENT ENGINEER/OWNER.

G. All defects in materials or workmanship which appear during this test period shall be immediately corrected by the CONTRACTOR. Time lost for equipment repairs, wiring corrections, control point settings, or other reasons which actually interrupt the startup may, at the discretion of the RESIDENT ENGINEER, be justifiable cause for extending the startup test duration.

H. During the startup, the CONTRACTOR shall provide the services of authorized representatives of the manufacturers, in addition to those services required under operations testing, as necessary, to correct faulty equipment operation.

I. During the startup, the CONTRACTOR shall keep records of the operations, in accordance with the instructions of the RESIDENT ENGINEER.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

** END OF SECTION **

SECTION 01999 -- REFERENCE FORMS

If required by the RESIDENT ENGINEER, the forms listed below and included in this section will be used as applicable. Submit to Construction Manager within 7 calendar days of completion.

Form No.	Title
01300A	Submittal Transmittal Form
01660A	Equipment Test Report Form
01730A	Operation and Maintenance Transmittal Form
01730B	Equipment Record Form
01730C	Equipment Record Form
11000A	Manufacturer's Installation Certification Form
11000B	Manufacturer's Instruction Certification Form
11000C	Unit Responsibility Certification Form
11060A	Motor Data Form
16000A	Wire and Cable Resistance Test Data Form
16000B	Installed Motor Test Data Form
16000C	Motor Control Center Test Form
16000D	Loop Wiring and Insulation Resistance Test Data Form
16000E	Panel Indicator Calibration Test Data Form
16000F	Signal Trip Calibration Test Data Form
16000G	Field Switch Calibration Test Data Form

16000H	Transmitter Calibration Test Data Form
16000I	Miscellaneous Instrument Calibration Test Data Form
16000J	Individual Loop Test Data Form
16000K	Loop Commissioning Test Data Form

01300-A. SUBMITTAL TRANSMITTAL FORM:

SUBMITTAL TRANSMITTAL

Submittal Description: _____ Submittal No:[1] _____

Spec Section: _____

	Routing	Sent	Received
OWNER:	Contractor/CM		
PROJECT:	CM/Engineer		
	Engineer/CM		
CONTRACTOR:	CM/Contractor		

We are sending you □ Attached □ Under separate cover via
□ Submittals for review and comment
□ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review action[a]	Reviewer initials	Review comments attached

[a]**NOTE: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected; AAN = Approved as Noted**

Attach additional sheets if necessary

Contractor

Certify either A or B:

□ A. We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

□ B. We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation
_____	_____
_____	_____
_____	_____

Certified by: _____

Contractor's Signature

[1]See paragraph 01300-4.0 A, Transmittal Procedure.

NOTE: This example equipment test report is provided for the benefit of the Contractor and is not specific to any piece of equipment to be installed as a part of this project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this project.

CITY OF SAMPLE

EXAMPLE WATER TREATMENT PLANT

STAGE IV EXPANSION PROJECT

ABC Construction Company, Inc., General Contractor
XYZ Engineering, Inc., RESIDENT ENGINEER
EQUIPMENT TEST REPORT

Equipment Name: Sludge Pump 2
Equipment Number: P25202
Specification Ref: 11390

Location: East Sedimentation Basin Gallery

	Contractor		RESIDENT ENGINEER	
	Verified	Date	Verified	Date
PREOPERATIONAL CHECKLIST				
Mechanical				
Lubrication				
Alignment				
Anchor bolts				
Seal water system operational				
Equipment rotates freely				
Safety guards				
Valves operational				
Hopper purge systems operational				
Sedimentation tank/hopper clean				
O&M manual information complete				

	Contractor		RESIDENT ENGINEER	
	Verified	Date	Verified	Date
Electrical (circuit ring-out and high pot tests)				
Circuits:				
Power to MCC 5				
Control to HOA				
Indicators at MCC:				
Red (running)				
Green (power)				
Amber (auto)				
Indicators at local control panel				
Wiring labels complete				
Nameplates:				
MCC				
Control station				
Control panel				
Equipment bumped for rotation				
Piping Systems				
Cleaned and flushed:				
Suction				
Discharge				
Pressure tests				
Temporary piping screens in place				
Instrumentation and Controls				
Flow meter FE2502F calibration Calibration Report No. _____				
Flow recorder FR2502G calibrated against transmitter				
VFD speed indicator calibrated against independent reference				
Discharge overpressure shutdown switch calibration				
Simulate discharge overpressure Shutdown				

	Contractor Verified	Contractor Date	RESIDENT ENGINEER Verified	RESIDENT ENGINEER Date
FUNCTIONAL TESTS				
<u>Mechanical</u>				
Motor operation temperature satisfactory				
Pump operating temperature satisfactory				
Unusual noise, etc.?				
Pump operation: 75 gpm/50 psig				
Measurement:	Flow			
	Pressure		Test Gauge#	
Alignment hot				
Dowelled in				
Remarks:				
<u>Electrical</u>				
Local switch function: Runs in *HAND*				
No control power in *OFF*				
Timer control in *AUTO*				
Overpressure protection switch PS2502C functional in both *HAND* and *AUTO*				
Overpressure protection switch PS2502C set at 75 psig				
PLC 2500 set at 24-hour cycle, 25 min *ON*				
OPERATIONAL TEST				
Forty-eight hour continuous test. Pump cycles as specified, indicators functional, controls functional, pump maintains capacity, overpressure protection remains functional, hour meter functional.				

RECOMMENDED FOR BENEFICIAL OCCUPANCY

RESIDENT ENGINEER _____ Date _____

ACCEPTED FOR BENEFICIAL OCCUPANCY

Owner's Representative _____ Date _____

01730-A. OPERATION AND MAINTENANCE TRANSMITTAL FORM:

Date: _____ Submittal No:[2] _____

To: _____ Contract No: _____

_____ Spec. Section: _____

_____ Submittal Description: _____

_____ From: _____

Attention: _____ _____

Checklist	Contractor		RESIDENT ENGINEER	
	Satisfactory	N/A	Accept	Deficient
1. Table of contents				
2. Equipment record forms				
3. Manufacturer information				
4. Vendor information				
5. Safety precautions				
6. Operator prestart				
7. Start-up, shutdown, and postshutdown procedures				
8. Normal operations				
9. Emergency operations				
10. Operator service requirements				
11. Environmental conditions				
12. Lubrication data				
13. Preventive maintenance plan and schedule				
14. Troubleshooting guides and diagnostic techniques				
15. Wiring diagrams and control diagrams				

16. Maintenance and repair procedures				
17. Removal and replacement instructions				
18. Spare parts and supply list				
19. Corrective maintenance man-hours				
20. Parts identification				
21. Warranty information				
22. Personnel training requirements				
23. Testing equipment and special tool information				

Remarks: _____

_____
Contractor's Signature

[2]See paragraph 01300-4.0 A, Transmittal Procedure.

01730-B. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	HOURS

LUBRICANTS:	RECOMMENDED:
	ALTERNATIVE:
MISC. NOTES:	

RECOMMENDED SPARE PARTS					ELECTRICAL NAMEPLATE DATA			
PART NO.	QUAN.	PART NAME	COST		EQUIP			
					MAKE			
					SERIAL NO.		ID NO.	
					MODEL NO.		FRAME NO.	
					HP	V	AMP	HZ
					PH	RPM	SF	DUTY
					CODE	INSL. CL	DES	TYPE
					NEMA DES	C AMB	TEMP RISE	RATING
					MECHANICAL NAMEPLATE DATA			
					EQUIP			
					MAKE			
					SERIAL NO.		ID NO.	
					MODEL NO.		FRAME NO.	
					HP	RPM	CAP	SIZE
					TDH	IMP SZ	BELT NO.	CFM
					PSI	ASSY NO.	CASE NO.	
					MISC			

01730-C. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours

11000-A. MANUFACTURER'S INSTALLATION CERTIFICATION FORM:

Contract No.: _____ Specification Section: _____

Equipment Name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations, and that the trial operation of the equipment item has been satisfactory.

Comments: _____

_____

_____

_____

_____

_____

_____ _____

Date Manufacturer

_____

Signature of Authorized Representative

_____ _____

Date Contractor

_____

Signature of Authorized Representative

11000-B. MANUFACTURER'S INSTRUCTION CERTIFICATION FORM:

Contract No.: _____ Specification Section: _____
Equipment Name: _____
Contractor: _____
Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a service engineer has instructed the wastewater treatment plant operating personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)

Startup procedure reviewed	_____
Shutdown procedure reviewed	_____
Normal operation procedure reviewed	_____
Others: _____	_____
_____	_____
_____	_____

Maintenance Check List (check appropriate spaces)

Described normal oil changes (frequency)	_____
Described special tools required	_____
Described normal items to be reviewed for wear	_____
Described preventive maintenance instructions	_____
Described greasing frequency	_____
Others: _____	_____
_____	_____
_____	_____

Date Manufacturer

Date Signature of Authorized Representative

Date Signature of Owner's Representative

Date Signature of Contractor's Representative

SECTION 02050 - DEMOLITION

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes furnishing materials, equipment and labor necessary to perform and complete demolition of items described in the Contract Drawings and associated appurtenances.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 01045 Cutting and Patching

2. Section 01530 Protection of Existing Facilities

3. Section 01560 Temporary Environmental Controls

4. Section 01700 Project Closeout

5. Section 02200 Earthwork

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 CODES

A. The 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 Building Code

1.5 SUBMITTALS

A. The following shall be submitted in compliance with Section 01300:

1. Demolition Schedule: The CONTRACTOR shall submit a complete coordination schedule for demolition work including shut-off and continuation of utility services prior to start of the WORK. The schedule shall indicate proposed methods and operations of facility demolition, and provide a detailed sequence of demolition and removal work to ensure uninterrupted operation of occupied areas.

1.6 ASBESTOS REMOVAL

A. The OWNER is responsible for the removal and disposal of any asbestos found in structures scheduled for demolition, prior to commencement of demolition work by the CONTRACTOR.

B. If, during demolition work, any additional asbestos materials are being discovered, the CONTRACTOR shall stop the work immediately and notify the RESIDENT ENGINEER for further instructions.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 GENERAL

A. Structures shall be demolished and removed in compliance with SSPWC subsection 306-3 and the requirements indicated herein.

3.2 POLLUTION CONTROL

A. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used for dust suppression in compliance with Section 01560.

B. Water shall not be used when it creates hazardous or objectionable conditions such as flooding, erosion, sedimentation, or pollution.

3.3 PROTECTION

A. Safe passage of persons around the area of demolition shall be provided. Operations shall be conducted to prevent injury to people and damage to adjacent buildings, structures, and other facilities in compliance with Section 01530.

B. Interior and exterior shoring, bracing, or supports shall be provided to prevent movement, settlement or collapse of structures to be demolished.

C. Existing landscaping materials, structures, and appurtenances which are not to be demolished shall be protected and maintained as necessary and in accordance with Section 01530.

D. Unless otherwise indicated, the CONTRACTOR shall protect and maintain all utilities in the proximity of the facilities to be demolished.

E. The CONTRACTOR shall protect the nearby existing equipment such as control panels and others from dust caused by demolition activities by covering, drop-curtains and other similar methods.

3.4 STRUCTURE DEMOLITION

A. Structures and appurtenances shall be demolished, as shown and required to complete work, in compliance with governing regulations.

B. Small structures may be removed intact when approved by authorities having jurisdiction.

C. Demolition shall proceed in a systematic manner, from top of structure to ground.

D. Concrete and masonry shall be demolished in small sections. Use bracing and shoring to prevent collapse.

E. Demolition equipment shall be dispersed throughout structure and demolished materials removed to prevent excessive loads on supporting walls, floors or framing.

3.5 BELOW-GRADE DEMOLITION

A. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth which will not interfere with new construction, but not less than 12 inches below existing ground surface or future ground surface, whichever is lower. All floors of basements, vaults, and other underground structures shall be broken up.

B. Below-grade areas and voids resulting from demolition of structures shall be completely filled to a minimum compaction of 95%.

C. All fill and compaction shall be in accordance with Section 02200.

D. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Demolition and removal of debris shall be conducted to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the OWNER. Alternate routes shall be provided around closed or obstructed traffic ways.

B. Site debris, rubbish, and other materials resulting from demolition operations shall be removed and disposed of in compliance all laws and regulations. Burning of removed materials from demolished structures shall not be permitted.

3.7 PATCHING AND REPAIRING

A. The CONTRACTOR shall provide patching, replacing, repairing, and refinishing of damaged areas involved in demolition as necessary to match the existing adjacent surfaces and in compliance with Section 01045.

B. The CONTRACTOR shall repair all damages caused to adjacent facilities by demolition at no additional cost to the OWNER.

C. After patching and repairing has been completed, the CONTRACTOR shall carefully remove splatterings of mortar from adjoining work (plumbing fixtures, trim, tile, and finished metal surfaces) and repair any damage caused by such cleaning operations.

3.8 CLEANING

A. During and upon completion of work, the CONTRACTOR shall promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by work in a clean condition in accordance with Section 01700.

B. Clean adjacent structures and facilities of dust, dirt, and debris caused by demolition and return adjacent areas to condition existing prior to start of work.

C. The CONTRACTOR shall clean and sweep the affected portions of roads, streets, sidewalks and passageways daily.

** END OF SECTION **

SECTION 02100 - SITE PREPARATION

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes site preparation, clearing and grubbing.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 01530 Protection of Existing Facilities
2. Section 01550 Site Access and Storage
3. Section 02050 Demolition
4. Section 02140 Dewatering
5. Section 02200 Earthwork
6. Section 02270 Erosion Control

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 GENERAL

A. Existing Conditions: The site shall be examined and the RESIDENT ENGINEER notified of any conditions which affect the WORK of this Section.

B. Utility Interference: Where existing utilities interfere with the WORK of this Section, the RESIDENT ENGINEER shall be notified of interferences.

3.2 CLEARING AND GRUBBING

A. Clearing and grubbing shall comply with SSPWC Subsection 300-1 and the following:

1. The site shall be cleared of grass and weeds to a depth of at least 6 inches and debris and obstructions including brush, trees, logs, stumps, roots, heavy sod, vegetation, rock, stones larger than 6 inches in any dimension, broken or old concrete and pavement.

2. The site shall be grubbed to a depth necessary to remove objectionable material including stumps and roots.

3.3 SALVAGE AND DISPOSAL

A. Salvage: Topsoil shall be salvaged and stored at a location which will not interfere with the WORK.

B. Disposal: Waste material shall be disposed of in accordance with SSPWC Subsection 300-1.3.

** END OF SECTION **

SECTION 02140 - DEWATERING

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes site dewatering necessary to lower and control groundwater levels and hydrostatic pressures to permit excavation and construction to be performed properly under dry conditions.

B. Dewatering operations shall be adequate to assure the integrity of the finished project. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

C. The CONTRACTOR shall bear the sole responsibility for the design, installation, and operation of the dewatering system to comply with the requirements of this section. The CONTRACTOR shall be required to install additional dewatering equipment as may be required throughout the duration of the project to maintain specified groundwater levels.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02200 Earthwork

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SCHEDULE AND PLAN

A. The following shall be submitted in compliance with Section 01300:

1. The CONTRACTOR shall make an independent investigation of the soil and groundwater conditions at each site. The results of the CONTRACTOR's independent investigation shall include the results of any and all exploratory borings, laboratory tests, and analyses. The CONTRACTOR's independent investigation shall be in report form.

2. Prior to commencement of excavation, a detailed plan and schedule, with description, for dewatering of excavations, piezometers, estimated dewatering

rates, volume and equipment requirements shall be submitted with the dewatering plan. The plan shall be signed and sealed by a California registered Civil Engineer, Geotechnical Engineer, Engineering Geologist or Hydrogeologist with experience of at least five dewatering operations of similar magnitude and complexity in a recently completed construction project. The qualification of the dewatering system designer shall be submitted to RESIDENT ENGINEER for approval. The CONTRACTOR shall make an independent investigation of the soil conditions to be dewatered. The dewatering plan shall be prepared specifically to accommodate soil materials and groundwater conditions of the site.

3. Demonstration of proposed system and verification that adequate personnel, materials and equipment are readily available, including standby equipment.

4. A copy of the executed industrial waste permit approved by MWWD.

1.5 CONTROL AND OBSERVATION

A. Adequate control shall be maintained to ensure that the stability of excavated and constructed slopes are not adversely affected by water, that erosion is controlled and that flooding of excavation or damage to structures does not occur.

B. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed daily to detect any settlement which may develop.

C. A daily report shall be maintained recording the following:

1. Groundwater elevations of ground water and piezometric water levels in observation wells (if any).

2. Change in elevation of reference points as stated in subsection 1.5 to detect settlement in adjacent structures. RESIDENT ENGINEER may suspend work if any settlement exceeds 0.05 feet.

D. After dewatering is discontinued, a weekly report shall be maintained for two months recording:

1. Change in elevation of reference points as stated in subsection 1.5 to detect settlement in adjacent structures.

1.6 INSPECTION

A. During or after trench excavation, when CONTRACTOR observes sufficient groundwater to be present that may prevent proper installation of pipe bedding, pipelines, backfill and compaction, then CONTRACTOR shall call for inspection of conditions by the RESIDENT ENGINEER. The RESIDENT ENGINEER shall inspect the conditions and determine if unacceptable conditions are present for pipe installation.

B. If unacceptable trench conditions are found by the RESIDENT ENGINEER, then the CONTRACTOR will be authorized to mobilize and start dewatering operations of the pipeline trench.

C. Damp soils or low volumes of groundwater in the bottom of trenches are not sufficient cause for trench dewatering.

1.7 MEASUREMENT AND PAYMENT

A. Payment for dewatering shall be included in the item of work and no separate payments shall be made. All dewatering equipment and apparatus, for mobilization/demobilization of dewatering equipment, and for all dewatering operations shall be included.

B. The CONTRACTOR shall also be responsible for all costs associated with the discharge of dewatering effluent including discharge into the sanitary sewer system of the City.

C. Storm water run-off flowing into the excavation site shall be minimized to the maximum extent possible. All water entering the excavation site shall be subject to all dewatering requirements specified in this document.

D. Protection of adjacent structures from adverse effects of dewatering shall be the responsibility of the CONTRACTOR.

1.8 PERMITS

A. The CONTRACTOR shall obtain an Industrial Waste Discharge Permit from the City of San Diego for discharging effluent from dewatering operations into the City sanitary sewer system.

B. The CONTRACTOR shall be responsible for all costs associated with obtaining all proper permits and for maintaining permit compliance, including all costs associated with permit violations.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Dewatering, where indicated, includes deep wells, well points, piezometers, sump pumps, temporary pipelines for water disposal, and rock or gravel placement, and other means including standby pumping equipment maintained on the jobsite continuously.

2.2 FOUNDATION ROCK

A. Foundation rock shall be included in the dewatering system to replace weakened soil within the excavation. Rock shall be 1-1/2 inch maximum crushed stone placed in minimum 12-inch layers and completely wrapped in filter fabric. Foundation rock shall

be used in addition to bedding material shown on the plans and shall be used at the CONTRACTOR'S discretion, or as directed by the RESIDENT ENGINEER. Foundation rock shall be considered to be part of the dewatering system.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

A. All water encountered in the trench shall be disposed by the CONTRACTOR in such a manner as will not damage public or private property or create a nuisance or health nuisance. The CONTRACTOR shall furnish, install, and operate pumps, pipes, appliances, and equipment of sufficient capability to keep trench excavation free from water until the trench is backfilled, unless otherwise authorized by the RESIDENT ENGINEER. No dewatering from inside the trench will be permitted while the pipeline is being installed, unless it is approved by the RESIDENT ENGINEER.

B. Dewatering shall be performed in compliance with Subsection 306-3.3 of SSPWC and as specified herein.

C. An independent assessment of the subsurface conditions shall be performed prior to submitting a dewatering plan. The assessment shall be signed and sealed by a California registered Geotechnical Engineer, Engineering Geologist or Hydrogeologist. The plan shall include, but not be limited to:

1. Additional exploratory borings.

2. Laboratory testing.

3. Pump testing.

All boreholes and wells advanced by the CONTRACTOR shall be logged and submitted for review.

D. An adequate system shall be designed, installed and maintained to lower and control the ground water to permit excavation, construction of structures, and placement of fill materials to be performed under dry conditions. The system shall include two piezometers at each structure and one piezometer at the midpoint of each pipeline reach. The piezometers shall be properly installed to accurately reflect the groundwater depth adjacent to the excavation.

E. Sufficient dewatering equipment shall be installed to pre-drain the water-bearing strata below the bottom of foundations, sewers and other excavations.

F. The hydrostatic head in water-bearing strata below foundations, drains, sewers and other excavations shall be reduced to ensure that the water level and piezometric water levels are below the excavation surface at all times. The piezometric water level shall be maintained a minimum of 3 feet below the excavation surface. No excavation shall be made without proof of required lowered groundwater levels.

G. The system shall be placed into operation prior to excavation below ground water level to lower the ground water level and shall be operated continuously 24 hours a day, 7 days a week until drains, sewers and structures have been constructed and fill materials have been placed and dewatering is no longer required. Groundwater will need to remain depressed until adequate loading from proposed structures and uplift resistance to buoyant forces can be provided. All dewatering wells, well points and piezometers shall be installed under the supervision of a California registered Geotechnical Engineer, Engineer Geologist, or Hydrogeologist. The registered professional shall submit a written certificate that the system has been installed according to the dewatering plan.

H. The site shall be graded to facilitate drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and then be pumped or drained by gravity away from the excavation and disposed of in compliance with the CWP Guidelines, and local, State and Federal regulations.

I. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

J. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with foundation rock completely wrapped in filter fabric at no additional cost to the OWNER.

K. Flotation of structures and facilities shall be prevented by maintaining a positive and continuous removal of water. The dewatering system shall be in continuous operation until all structure and pipelines are properly backfilled.

L. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

M. An Industrial Waste Discharge Permit shall be obtained from the City of San Diego to discharge dewatering effluent into the sanitary sewer system. Sewer system maximum discharge capacity is limited. Contractor might be required to use other means and methods for disposal/discharge of dewatering effluent.

If the laboratory results of the independent assessment of subsurface conditions show contamination levels above what is acceptable, a treatment system shall be provided under the bid allowances in the Bid Schedule.

N. The release of groundwater to its original level shall be performed in such a manner as not to disturb natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

** END OF SECTION **

SECTION 02200 - EARTHWORK

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes all earthwork required for construction of the WORK. Such earthwork shall include the loosening, removing, loading, transporting, depositing, and compacting in its final location of all materials wet and dry, as required for the purposes of completing the WORK.

B. Fill material is defined as material used to raise the level of a portion of the site to the line and grade indicated. Backfill material is defined as material used to refill an excavation.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02050 Demolition

2. Section 02100 Site Preparation

3. Section 02140 Dewatering

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 REGULATORY REQUIREMENTS

A. The WORK of this Section shall comply with current versions, with revisions, of the following:

1. Construction Safety Orders, Division of Industrial Safety, State of California.

2. California Department of Transportation Traffic Manual.

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. The CONTRACTOR shall comply with the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The CONTRACTOR, prior to beginning any trench or structure excavation 5 feet deep or over shall

submit to the OWNER and shall be in possession of the OWNER's written acceptance of the CONTRACTOR's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system established in the Construction Safety Orders of the State of California, such alternative system plans shall be prepared by a civil or structural engineer licensed in the State of California.

2. Copy of the excavation permit issued by the California Department of Industrial Safety.

3. Samples of imported material. Samples shall be submitted in accordance with SSPWC, Subsection 306-3.7.

4. Such other samples of materials as the RESIDENT ENGINEER may require.

1.6 SOIL TESTING

A. General: All soils testing shall be done in accordance with SSPWC, Section 211, and by a testing laboratory of the OWNER's choice at the OWNER's expense.

B. Compaction Tests: Where soil material is required to be compacted to a percentage of maximum density, the maximum density shall be determined in accordance with the requirements of SSPWC, Subsection 211-1. In case the tests of the fill or backfill show non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the OWNER and shall be at the CONTRACTOR's expense.

PART 2 – PRODUCTS

2.1 FILL AND BACKFILL MATERIALS

A. General: Fill and backfill material shall consist of select material obtained from the excavation, imported material, bedding material, or unclassified material. The CONTRACTOR shall import at his expense materials in excess of the approved material obtained from excavation as required to complete the fill, backfill, and grading WORK as indicated.

B. Select Material: Select material encountered in the excavation shall be free of biodegradable materials, vegetation, organic matter, debris, rocks larger than 4 inches in diameter and other unsuitable material, and shall have an expansion index less than 30 (less than 20 for footings and floor slabs) as determined by IBC Standard No. 29-2, plasticity index of 10 or less, a liquid limit of 30 or less. At least 70% by weight of material shall pass a standard uniform ¾" sieve and at least 40% shall pass the #200 sieve. Select material shall be approved by the RESIDENT ENGINEER.

C. Imported Material: Imported material shall conform to the same specifications as select material defined above. In addition, the imported materials shall have a minimum sand equivalent of 15 as determined by California Test Method No. 217. Imported material placed in areas to be planted shall be able to support normal plant growth. Obtain approval by the RESIDENT ENGINEER prior to transporting imported material.

D. Bedding Material: Bedding material, defined as that material supporting, surrounding and extending to 1 foot above the top of a pipe, shall be clean, free draining sand with a sand equivalent of not less than 50 or be 3/8" crushed rock. Bedding material (pipe zone material) shall be wrapped in a geotextile filter fabric. The bedding shall be in accordance with SSPWC, Subsection 200-1, 217 and 306-6. Sand should be free of clay, organic matter, and other deleterious materials and conform to the gradation shown below.

Sieve Size	**Percent Passing by Weight**
½ inch	100
#4	75-100
#16	35-75
#50	10-40
#200	0-10

Crushed rock shall conform to Section 200-1.2 for 3/8" crushed rock gradation per SSPWC Table 200-1.2.1(A).

E. Unclassified Material: Unclassified material shall conform to SSPWC, Subsection 300-4.

2.2 ROCK PRODUCTS

A. Rock products, consisting of crushed rock, rock dust, gravel, sand, and stone for riprap shall be clean, hard, sound, durable, uniform in quality and free of disintegrated material, organic matter, oil alkali, or other deleterious substance, and shall, unless otherwise specified, conform with the requirements of SSPWC, Subsection 200-1.

2.3 UNTREATED BASE MATERIALS

A. Untreated base materials shall conform with the requirements of SSPWC, Subsection 200-2.

B. Materials for use as untreated base or subbase shall be:

1. Crushed Aggregate Base

2.4 TOPSOIL

A. Topsoil shall be designated as Class A (imported), Class B (selected), or Class C (unclassified), and shall conform with the requirements of SSPWC, Subsection 800-1.1. The RESIDENT ENGINEER shall determine the suitability of topsoil prior to use.

2.5 GEOTEXTILE FABRIC

A. Trench geotextile fabric shall be Mirafi 140N or approved equal.

B. Structure geotextile fabric shall have the following properties:

Fabric Property	**Min. Certified Values**	**Test Method**
Grab Tensile Strength	300 lb	ASTM D 4632
Grab Tensile Elongation	35% Max	ASTM D 4632
Burst Strength	600 psi	ASTM D 3786
Trapezoid Tear Strength	120 lb	ASTM D 4533
Puncture Strength	130 lb	ASTM D 4833

PART 3 – EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall perform earthwork as necessary to complete the WORK as shown on the Contract Drawings and specified herein. The CONTRACTOR shall take the necessary precautionary measures to prevent dust or other nuisances which might be created by reason of his activities. The necessary precautionary measures shall conform to the requirements of SSPWC, Subsection 7-8. The requirements specified in Subsection 7-8 shall be extended to include paved surfaces.

A. All types of earthwork, including trench, structural and general excavation, fill, backfill and compaction, shall conform to applicable requirements of the SSPWC Section 300, and to the requirements specified herein.

C. Contractor to coordinate pre and post construction surveys which will be conducted by the City's Construction Management and Field Services (CMFS) Division on all Projects, unless permission is obtained for these services in writing by CMFS, to document existing site conditions and assure his construction activities do not cause settlement.

3.2 SITE PREPARATION

A. Areas to be excavated, filled, graded, and to be occupied by permanent construction or embankments shall be prepared by clearing and grubbing. Clearing and grubbing shall conform to the applicable requirements of SSPWC, Subsection 300-1.

3.3 EXCAVATION

A. General: Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. Unless otherwise directed, the removal of said materials shall conform to the lines and grades shown. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The CONTRACTOR shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other measures for the removal or exclusion of water as required by Section 02140. Excavations shall be sloped or otherwise supported in a safe manner in accordance with the rules, orders, and regulations of the Division of Industrial Safety of the State of California.

Excavations for SPS 85 forcemain and appurtenances will likely encounter granitic bedrock with varying degrees of weathering. Contractor should expect very difficult rock excavation conditions. Excavation shall be completed using non-explosive methods. Difficult excavation may also be encountered along the SPS 13 work due to the possible presence of the Mount Soledad Formation.

B. Unclassified Excavation: Unclassified excavation shall consist of all excavation, including roadways, unless separately designated.

1. Unsuitable material shall be excavated and disposed of in accordance with the requirements of SSPWC, Subsection 300-2.2.

2. Wet material, if unsatisfactory for the specified use on the project solely because of high moisture content, may be processed to reduce the moisture content, or may be required to be removed and replaced with suitable material in accordance with the requirements of SSPWC, Subsection 300-2.2.2.

3. The removal and disposal of slide and slipout material shall be in accordance with SSPWC, Subsection 300-2.4.

4. Excavation slopes shall be finished in conformance with the lines and grades shown, and in accordance with SSPWC, Subsection 300-2.5.

5. Surplus material shall be disposed of off-site, and in accordance with SSPWC, Subsection 300-2.6.

C. Structure Excavation: Structure excavation shall consist of the removal of material for the construction of foundations for vaults, slabs on grade, retaining walls, headwalls, culverts, buildings, or other structures, and shall be in accordance with SSPWC, Subsection 300.

1. Cofferdams for foundation construction shall be constructed in accordance with SSPWC, Subsection 300-3.2.

2. The treatment of foundation material shall be in accordance with SSPWC, Subsection 300-3.3.

3. Structures shall be founded on firm native soils or approved compacted materials.

4. Structure Over-Excavation: If loose or soft soils are encountered at the bottom of the structure excavation, the loose or soft material shall be removed and replaced with ¾" crushed rock materials wrapped in geotextile fabric.

D. Underground Conduit Excavation:

1. General: Excavation for underground conduits shall be in accordance with SSPWC, Subsection 217, 306 and the requirements contained herein. Except as otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the CONTRACTOR, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 24 inches for mechanical compaction methods and 18 inches for water consolidation methods. The maximum width at the top of the pipe shall be equal to the outside diameter of the pipe plus 36 inches for pipe diameters 18 inches and larger and to the outside diameter of the pipe plus 24 inches for pipe diameters less than 18 inches.

2. Bracing Excavations: The manner of bracing excavations shall be as set forth in the rules, orders and regulations of the Division of Industrial Safety of the State of California, and in accordance with the requirements of SSPWC, Subsection 306-4.

3. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe.

The trench bottom shall be given a final trim, using a string line for establishing grade, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding out the trench to form a cradle for the pipe will not be required.

4. Open Trench: The maximum amount of open trench permitted in any one location shall be 500 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is less. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. Barricades and warning lights conforming to requirements set forth in the California Department of Transportation Traffic Manual shall be provided and maintained.

5. Trench Over-Excavation: If loose or disturbed soils are encountered at the trench bottom, it shall be overexcavated. If trenches require to be over-excavated, they shall be excavated to the depth required, and then backfilled with pipe bedding material to the grade of the bottom of the pipe.

6. Where pipelines are to be installed in embankment fills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

E. Over-Excavation Ordered by RESIDENT ENGINEER:

1. Trenches shall be over-excavated beyond the depth shown when required by the RESIDENT ENGINEER. Such over-excavation shall be to the depth ordered. The trench shall then be backfilled to the grade of the bottom of the pipe with pipe bedding material. All work specified in this Section shall be performed by the CONTRACTOR at no additional cost to the OWNER when the over-excavation ordered by the RESIDENT ENGINEER is less than 6 inches below the limits shown. When the over-excavation ordered by the RESIDENT ENGINEER is 6 inches or greater below the limits shown, additional payment will be made to the CONTRACTOR for that portion of the work which is located below said 6-inch distance.

F. Over-Excavation not Ordered or Indicated:

1. Any over-excavation carried below the grade ordered or indicated shall be backfilled to the required grade with the specified material and compacted. Such work shall be performed by the CONTRACTOR at no additional cost to OWNER.

G. Excavation in Lawn Areas:

1. Where excavation occurs in lawn areas, the sod shall be carefully removed and stockpiled to preserve it for replacement. Excavated material may be placed

on the lawn; provided, that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling and testing of the pipeline, the sod shall be replaced in a manner so as to restore the lawn as near as possible to its original condition. CONTRACTOR shall provide new sod if removed sod has remained stockpiled for more than 72 hours or has been damaged.

2. The CONTRACTOR shall restore the lawn irrigation system removed or damaged due to excavation operations to a condition equal to the previous condition.

H. Excavation in Vicinity of Trees:

1. Except where trees are shown to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without written permission of the RESIDENT ENGINEER. Trees shall be supported during excavation by means previously reviewed by the RESIDENT ENGINEER.

I. Rock Excavation:

1. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and unstratified masses which cannot be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling and blasting.

2. Rock excavation shall be completed using non-explosive methods.

3. Said rock excavation shall be performed by the CONTRACTOR and payment shall be included in the Contract Price. for the bid item of work

3.4 FILL AND BACKFILL

A. General:

1. Fill and Backfill shall be placed in accordance with the applicable provisions of SSPWC, Section 300, and the requirements stated herein. The Contractor should expect at some of the sites that imported backfill will be required due to unsuitable existing materials.

2. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has been

properly cured in accordance with the requirements of Section 03310 and has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

3. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall not be placed until all water is removed from the excavation.

B. Placing and Spreading of Materials:

1. Materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted, each layer shall not exceed 6 inches in thickness. Flooding and jetting methods are not allowed.

2. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Bedding materials shall be brought up evenly around the pipe so that when compacted, the material will provide uniform bearing and side support.

3. Where the material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved.

4. Where the material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

C. Compaction Requirements

1. Compaction tests shall be performed in accordance with SSPWC, Subsection 211-2.

2. The relative compaction of fill, backfill, and base material shall be in accordance with SSPWC, Section 300, with the following exceptions:

a. Subgrade where trench has been overexcavated: 95 percent

b. One foot layer of crushed aggregate backfill in overexcavated trench. Where trench is overexcavated more than 2 feet, minimum of 2 layers shall be compacted: 95 percent

c. Pipe zone for flexible rigid pipe: 95 percent

d. Fill beneath structures, including water containing structures 95 percent

e. Backfill around underground structure: 90 percent

D. Unclassified Fill:

1. All fill shall be of unclassified material unless separately designated. Construction of unclassified fill, including preparing the area on which fill is to be placed, and the depositing, conditioning, and compacting of fill material shall be in accordance with SSPWC, Subsection 300-4.

E. Structure Backfill:

1. Backfill at structures shall be select material placed in accordance with SSPWC, Subsections 300-3.5 and 300-4.5.

F. Underground Conduit Backfill:

1. Bedding around pipe shall be bedding material placed in accordance with the requirements of SSPWC, Subsection 217 and 306.

2. Backfill above pipe shall be considered as starting 1 foot above the pipe or conduit, or at the subgrade for cast-in-place or precast structures such as manholes, transition structures, junction structures, vaults, and valve boxes.

3. Backfill at underground conduits shall be select material placed and densified according to SSPWC, Subsection 217 and 306.

3.5 PREPARATION OF SUBGRADE UNDER IMPROVEMENT

A. The preparation of subgrade for pavement, curbs and gutters, driveways, sidewalks and other roadway structures shall be in accordance with SSPWC, Subsection 301-1.

3.6 UNTREATED BASE

A. Spreading and Compacting:

1. Aggregate base material shall be spread and compacted in accordance with SSPWC, Subsection 301-2.

** END OF SECTION **

SECTION 02270 - EROSION CONTROL (VEGETATIVE)

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing vegetative erosion control including fertilizing, seeding, planting and mulching for all areas as needed.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02200 Earthwork

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Catalogue information on fertilizer, seed, plants and mulch.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General: Materials shall comply with SSPWC Section 800 and as indicated herein.

B. Fertilizer: Fertilizer shall be a commercial, chemical type, uniform in composition, free-flowing, conforming to state and federal laws and suitable for application with equipment designed for that purpose. Fertilizer shall have a guaranteed analysis showing not less than 11 percent nitrogen, 8 percent available phosphoric acid, and 4 percent water soluble potash.

C. Seed: Seed shall be delivered in original unopened packages bearing an analysis of the contents. Seed shall be guaranteed 95 percent pure with a minimum germination rate of 80 percent.

Seed mix shall be equal parts by weight of fescue and perennial ryegrass.

D. Mulch: Mulch shall be a fibrous, wood cellulose product produced for this purpose. It shall be dyed green and shall contain no growth or germination inhibiting substances, and shall be manufactured so that when thoroughly mixed with seed, fertilizer, and water in the proportions indicated, it will form a homogenous slurry which is capable of being sprayed.

2.2 MANUFACTURERS

A. Materials shall be of the following manufacture and type, or equal:

1. Mulch:

Weyerhauser Company's "Silva Fiber"

Consolidated Wood Conversion Corp., "Conwood Fiber"

PART 3 – EXECUTION

3.1 GENERAL

A. Weather Conditions: Fertilizing, seeding, or mulching operations shall not be conducted when wind velocities exceed 15 miles per hour or when the ground is unduly wet or otherwise not in a tillable condition.

B. Soil Preparation: The ground to be seeded or planted shall be graded in conformance with the Drawings and shall be loose and reasonably free of large rocks, roots, and other material which will interfere with the WORK.

C. Method of Application: Fertilizer, seed, and mulch may be applied separately (Method A), or they may be mixed together with water and the homogeneous slurry applied by spraying (Method B), as specified in SSPWC Subsection 801-4.8.2, except that all slopes steeper than 3 units horizontal to 1 unit vertical shall be stabilized by Method B.

3.2 METHOD A

A. Fertilizing: The fertilizer shall be spread uniformly at the rate of 800 lbs per acre (approximately 1 lb per 55 square feet). The fertilizer shall be raked in and thoroughly mixed with the soil to a depth of approximately two inches prior to the application of seed or mulch.

B. Seeding: The seed shall be broadcast uniformly at the rate of 60 lbs/acre (approximately 1 lb per 730 sq ft). After the seed has been distributed, it shall be incorporated into the soil by raking or by other approved methods.

C. Mulch Application: Mulch shall be applied at the rate of 1,500 lb (air dried weight) per acre (approximately 1 lb per 30 sq ft).

3.3 METHOD B

A. Method B consists of the uniform application by spraying of a homogeneous mixture of water, seed, fertilizer, and mulch. The slurry shall be prepared by mixing the ingredients in the same proportions per acre as indicated above for Method A. The slurry shall have the proper consistency to adhere to the earth slopes without lumping or running. Mixing time of materials shall not exceed 45 minutes from the time the seeds come into contact with the water in the mixer to the complete discharge of the slurry onto the slopes, otherwise the batch shall be recharged with seed. The mixture shall be applied using equipment containing a tank having a built-in, continuous agitation and recirculation system, and a discharge system which will allow application of the slurry to the slopes at a continuous and uniform rate. The application rates of the ingredients shall be the same as those indicated for the Method A. The nozzle shall produce a spray that does not concentrate the slurry nor erode the soil.

3.4 WATERING

A. The seeded and planted areas shall be watered so as to provide optimum growth conditions for the establishment of the vegetative ground cover. In no case, however, shall the period of maintaining such moisture be less than two weeks after the application of the seed or after sprigging.

3.5 MAINTENANCE

A. The CONTRACTOR shall maintain the planted areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include the filling, leveling, and repairing of any washed or eroded areas, as may be necessary, and sufficient watering to maintain the plant materials in a healthy condition. The RESIDENT ENGINEER may require replanting of any areas in which the establishment of the vegetative ground cover does not develop satisfactorily.

** END OF SECTION **

SECTION 02320 - HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This Section includes materials and trenchless installation of HDPE pipe, DR 11, using horizontal directional drilling methods. For the purpose of this project, HDD is defined as the trenchless installation of pipe by horizontal directional drilling, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities, and environmental protection and restoration.

1.2 RELATED SECTIONS

A. Section 02200 Earthwork

B. Section 02620 HDPE

C. Section 02730 Sanitary Sewage System Testing

1.3 SYSTEM DESCRIPTION

A. Furnish and install complete pipe by HDD construction to the limits shown on the Approved Plans, including appurtenant connections in conformance with manufacturer's installation requirements and compliance with applicable construction and safety codes and standards.

B. The bore path shall be designed by the drilling contractor to ensure that pipe joints do not deflect more that 50% of manufacturer's recommended maximum deflection.

C. The limits of HDD shown on the Approved Plans may be increased by Contractor for Contractor's convenience, if Contractor so desires. However, approval by City to increase the limits of HDD must first be obtained. It shall be understood that where an increase in HDD limits is permitted by City for Contractor's convenience, payment for the Work will be made as though the original HDD limits had been used.

D. Contractor will be allowed the use of various construction methods for constructing HDD shafts and HDD within the parameters provided in these specifications, provided Contractor can demonstrate to the satisfaction of City's Representative that the proposed methods will complete the Work in accordance with these contract documents, permit requirements, and any applicable safety codes and regulations. Acceptance of methods or equipment for HDD by City shall in no way relieve Contractor of the responsibility for damages of any nature which might occur as a result of the method used or of the responsibility of meeting the requirements of the Approved Plans and Specifications.

E. The installation pull forces on the pipe shall be determined by Contractor, based on the selected method of construction and geotechnical information obtained by the Contractor.

1.4 QUALITY ASSURANCE

A. Provide names, qualifications, and experience of machine operators, including training and experience records, previous project names, previous project locations, previous project Owners (including contacts with current telephone numbers), and experience of the operators with the model and manufacture of the machine proposed for use on this project. The machine operators shall have worked on at least one prior project with similar scope and magnitude.

B. Provide the name of the project superintendent for HDD operations. The HDD superintendent shall have shall have worked on at least one prior project with similar scope and magnitude.

C. Contractor is solely responsible for safety on the jobsite. Perform work in a manner to maximize safety, avoid exposure of workers, and control dust, fumes, vapors, gases, or other atmospheric impurities in accordance with OSHA, Federal, State, and local requirements for work in confined spaces. Comply with "Tunnel Safety Orders" of the Division of Industrial Safety of State of California as outlined in Title 8 of the California Administrative Code.

D. The requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification or within any associated permit. Adherence to the specifications contained herein, or the inspector's approval on any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract. The HDD contractor shall be responsible for the repair of all damage to private and/or public property (at no expense to the City). Repair work shall meet all local and state rules and requirements.

1.5 REFERENCES

A. Title 8, California Administrative Code, Tunnel Safety Orders.

1.6 SUBMITTALS

A. Furnish the following submittals in accordance with Section 01300:

SUBMITTAL	DESCRIPTION
Safety Plan (Submitted for record purposes only and not subject to review by City's Representative)	Procedures to meet all applicable OSHA safety requirements
	Shoring, sheeting, or bracing protection against soil instability and groundwater inflow
	Safety for shaft access and exit, including ladders, stairs, walkways, and hoists
	Protection against mechanical and hydraulic equipment operations, and for lifting and hoisting equipment and material
	MSDS for any hazardous substances to be used.
	Monitoring for hazardous gases
	Protection of shaft including traffic barriers, accidental or unauthorized entry, and falling objects
	Emergency protection equipment
	Name of site safety representative and safety supervising responsibilities
HDD Work Plan	The Contractor shall have a minimum of 5 years' experience and shall have worked on at least one prior project with similar scope and magnitude. Provide a list of personnel, including backup personnel, with their qualifications and experience.
	Complete drawings and written descriptions sufficiently detailed for the sequence of operations to be performed during construction and that demonstrate that the proposed materials and procedures will meet the requirements of this specification.
	Arrangement drawings and technical specifications of the equipment to be used and equipment features showing that the machine meets the requirements set forth herein.
	The equipment and methods of controlling line and grade of pilot hole operations. Confirm that alignment control and steering system can achieve the required pipeline line and grade within the specified tolerances. Procedures for monitoring boring advancement.
	Size and type of cutter head, back reamer, electronic monitoring devices with information supporting its relevance to existing soil conditions.
	Size, type and bend radius of drill rods.

SUBMITTAL	DESCRIPTION
	Pre-construction bore-log depicting a plan and profile of the proposed bore path. The bore-log shall show all utility crossings and existing structures.
	Contractor shall execute a potholing program to identify all existing utilities in proposed bore path prior to HDD. Submit report on findings and validate proposed HDD alignment.
	Drilling fluid management plan including potential environmental impacts and emergency procedures and associated contingency plans. Location of disposal sites with written documentation indicating they will accept drilling mud and are in compliance with state regulations. Drilling fluid type to be defined and must match soil conditions and the cutter.
	Approved Plans for storage and handling of pipe
	Calculations of estimated maximum thrust forces for HDD and calculations for the combined loading on the pipe, in conjunction with soil load, groundwater, mud, and equipment pull forces, including all assumptions and values used in the calculations, so to demonstrate the proposed piping as shown on Approved Plans will sustain installation forces without pipe failure. Calculations shall be signed and sealed by a California-licensed professional engineer.
	Details of noise control measures.
	Planned location, layout, size, and design of proposed shafts. Shaft design submittals shall be site specific, signed, and sealed by a Professional Engineer registered in the State of California.
	Layout and limits of working sites. Indicate areas for storage, material, and spoil handling, and equipment set-up.
	Site security arrangements and traffic protection, including security fence for the working site perimeter, shaft security fence or shaft covers to prevent accidental or unauthorized entry, and traffic barriers.
	Submit for approval the as-built records in duplicate to the City's Representative within five days after completing the pull back. The as-built records (24 x 36 sepia and Auto CAD disk of as-built data, 40 horizontal max scale with 8-foot vertical max scale) shall include a plan, profile (data every 25 LF of main, at a minimum), and all information recorded during the progress of the work, including all subsurface anomalies identified by potholing. The HDD contractor shall certify the accuracy of all as-built record drawings.
Contingency Plans	Contingency plans for possible problems including differing soil conditions, a Frac-Out and Surface Spill Contingency Plan (for approval).

SUBMITTAL	DESCRIPTION
Experience	Description of similar projects, including names, addresses, and telephone numbers of Owner's Representatives on which this similar system by the same manufacturer has been successfully used.
	All personnel shall be fully-trained in their respective duties as part of the directional drilling crew and in safety. (Each person must have been fully-trained for over 1,000 hours on all facets of directional drilling, including, but not limited to, machine operations, mud mixing, locating, and material fusion.) A responsible representative who is thoroughly familiar with the equipment and type of work to be performed, must be in direct charge and control of the operation at all times. In all cases, the supervisor must be continually present at the job site during the actual Directional Bore operation. The Contractor shall have a sufficient number of competent workers on the job at all times to ensure the Directional Bore is made in a timely and satisfactory manner.
Schedule	Schedule of HDD work, including shaft excavation, and shoring, dewatering, pipe setup, equipment setup, pilot hole installation, reaming, and pull back completion.
Dewatering	Groundwater control methods, drawings, details, calculations, and supporting information in accordance with the Stormwater Pollution Prevention Plan and applicable NPDES discharge permits. Plan shall include, at a minimum, the location and depth of dewatering wells and sump, method of water disposal, and sequence of dewatering shaft.

B. Refer to General Provisions for definition of requirements for shop drawings and catalog data.

C. Review of submittal material does not relieve Contractor of responsibilities for excavation method, excavation support system, dewatering, making a satisfactory pipe installation, and meeting requirements of these documents, but will be primarily to ascertain compliance with contract requirements. Contractor shall not commence work on any items requiring a Work Plan or other submittals until the submittals have been reviewed and returned by City's Representative. Structural designs and other engineered components shall be signed and sealed by a California-licensed professional engineer.

1.7 PROJECT SITE CONDITIONS

A. Contractor is strongly encouraged to visit the site to observe existing site conditions, utilities, traffic, access points, etc., prior to bidding.

B. The geotechnical report prepared for this project is available on line. See City Supplemental Specification Section 2-7.

C. Contractor shall be responsible for potholing existing utilities and facilities to assure no conflicts with any of his operations.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Refer to General Provisions for basic requirements for products and materials.

B. Pipe used in HDD shall be high density polyethylene in accordance with Section 02620. The minimum and maximum range of inside diameters of pipe shall be as shown on the Approved Plans. Pipe shall be straight, round, smooth, and with flush-joint outer surfaces. Contractor shall select pipe compatible with equipment provided, soil conditions shown in the geotechnical report, and the line and grade requirements. Contractor shall have sole responsibility to determine pipe laying length, wall thickness, and other criteria necessary to meet these requirements. Pipe used for HDD shall withstand pull forces imposed by process of installation, as well as final in-place loading and operational conditions.

C. Polyethylene fittings and custom fabrications shall be molded or fabricated by the pipe manufacturer or trained personnel. Butt fusion shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe. See Section 02620 for more details and pipe fusion.

2.2 EQUIPMENT REQUIREMENTS

A. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery, and recovery system of sufficient capacity to successfully complete the drill, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be re-used, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, and trained and competent personnel to operate the system. All equipment shall be in good, safety operating condition with sufficient supplies, materials, and spare parts on hand to maintain the system in good working order for the duration of this project.

B. The directional drilling machine shall consist of a power system to rotate, push, and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the

drilling string and an audible alarm which automatically sounds when an electrical current is detected.

The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.

C. Mud Motors (if required) shall be of adequate power to turn the required drilling tools.

D. A Magnetic Guidance System (MGS) or proven gyroscopic system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at all depths up to eighty feet and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to +/-2% of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 4-feet horizontally. The MGS shall be of a proven type and shall be operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies on the surface of the drill path and shall consider such influences in the operation of the guidance system if using a magnetic system.

E. Bore Tracking and Monitoring: At all times during the pilot bore, the Contractor shall provide and maintain a bore tracking system that is capable of accurately locating the position of the drill head in the x, y, and z axes. The Contractor shall record these data at least once per drill pipe length or every twenty-five (25) feet, whichever is most frequent.

F. Downhole and Surface Grid Tracking System: Contractor shall monitor and record x, y, and z coordinates relative to an established surface survey bench mark. The data shall be continuously monitored and recorded at least once per drill pipe length or at twenty-five (25) feet, whichever is more frequent.

G. Deviations between the recorded and design bore path shall be calculated and reported on the daily log. If the deviations exceed plus or minus 5 feet (horizontal or vertical deviation) from the design path, such occurrences shall be reported immediately to the Engineer. The Contractor shall undertake all necessary measures to correct deviations and return to design line and grade.

H. Drilling Fluid Pressures and Flow Rates: Drilling fluid pressures and flow rates shall be continuously monitored and recorded by the Contractor. The pressures shall be monitored at the pump. These measurements shall be made during pilot bore drilling, reaming, and pullback operations.

I. Drilling Fluid (Mud) System:

1. Mixing System: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid. Mixing system shall continually agitate the drilling fluid during operations.

2. Drilling Fluids: Drilling fluid shall be composed of clean water, appropriate additives, and clay. Water shall be from an authorized source with a minimum pH of 6.0. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No potentially hazardous material may be used in drilling fluid. Contractor to coordinate with the City to identify a water source.

3. Delivery System: The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and conveyed to the drilling fluid recycling system. A berm, minimum of 12" high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits, and drilling fluid cycling system to prevent spills into the surrounding environment. Pumps and/or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.

4. Drilling Fluid Recycling System: The drilling fluid recycling system shall separate sand, dirt, and other solids from the drilling fluid to render the drilling fluid re-usable. Spoils separated from the drilling fluid will be stockpiled for later use or disposal.

5. Control of Drilling Fluids: The Contractor shall follow all requirements of the Frac-Out and Surface Spill Contingency Plan, as submitted and approved, and shall control operational pressures, drilling mud weights, drilling speeds, and any other operational factors required to avoid hydrofracture fluid losses to formations, and control drilling fluid spillage. This includes any spillages or returns at entry and exit locations or at any intermediate point. All inadvertent returns or spills shall be promptly contained and cleaned up. The Contractor shall maintain on-site mobile spoil removal equipment during all drilling, pre-reaming, reaming, and pullback operations and shall be capable of quickly removing spoils. The Contractor shall immediately notify the City of any inadvertent returns or spills and immediately contain and clean up the return or spill.

J. Other Equipment:

1. Pipe Rollers: Pipe rollers, if utilized, shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe.

2. Restrictions: Other devices or utility placement systems for providing horizontal thrust, other than those defined above in the preceding sections, shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior

to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the projects.

PART 3 – EXECUTION

3.1 PREPARATION

A. Notify City's Representative at least three days in advance of start of HDD operations.

B. HDD shall not begin until the following conditions have been met:

CONDITION	DESCRIPTION
Submittals	Submittals made and approved
Potholing	Contractor's potholing completed and validated bore path clear of existing utilities.
Pre-Construction Surveys	Surveys completed, including installation of settlement points and their initial survey.
Shaft Excavation and Support	Shaft excavation and support has been completed in accordance with Contract Documents and applicable safety rules.
Groundwater Control	Groundwater control for breaking out of HDD pit has been established.
Pre-Construction Safety Conference	Pre-construction safety conference has been conducted in accordance with CAL/OSHA requirements. Arrange this conference and inform Owner of time and place of conference at least 7 days in advance.
Safety	Contractor's site safety representative shall prepare code of safe practices and an emergency plan in accordance with CAL/OSHA requirements. Provide Owner with copy of each document prior to beginning tunnel excavation. Hold safety meetings and provide safety instruction for new employees as required by CAL/OSHA.
Equipment and Materials	Furnish at jobsite all necessary equipment, power, water, and utilities for excavation, boring machine, removal and disposal of spoil, and other associated work consistent with Contractor's methods of construction. Equipment and methods shall be compatible with the anticipated geologic conditions identified in the geotechnical report described in the Contract Documents.

C. Do not use gasoline-powered equipment in shafts. Diesel-, electric-, and pneumatic-powered equipment will be acceptable, subject to applicable local, state, and federal regulations.

3.2 INSTALLATION

A. Refer to General Provisions for basic execution and installation requirements.

B. Contractor shall be responsible for means and methods of HDD and shall ensure safety of Work, Contractor's employees, the public, and adjacent property, whether public or private.

C. Portions of excavation may be below the groundwater table. Provide the necessary groundwater control measures at the site to perform the work, to provide safe working conditions, and to prevent flowing or standing water in the excavation during HDD operations. Dewatering shall be limited to the shaft area.

D. Drilling Procedures

1. Drill Path: Prior to drilling, Contractor shall utilize all verified located information to determine drill pathway. Marked up drawings (see Site Preparation paragraph) shall be on site at all times, and referred to during the drill operation.

2. Guidance System: Contractor shall provide and maintain instrumentation necessary to accurately locate the pilot hole (both horizontal and vertical displacements), measure pilot string torsional and axial, and measure drilling fluid discharge rate and pressure. The City shall have access to instrumentation and readings at all times during operation.

3. Pilot Hole: The pilot hole shall be drilled along the path shown on the Approved Plans and profile drawings or as directed by the City in the field. Unless approved otherwise by City, the pilot hole tolerances shall be as follows:

a) Elevation: As shown on the Approved Plans. The pipeline will be used as a force main, but occasionally will be drained by gravity, therefore a positive slope must be provided equaling no less than 0.05% less than the slope shown on the plans. A steeper slope of no more than 0.10% is allowed. Contractor to pay close attention to the existing utilities and provide a minimum 6” clearance.

b) Horizontal Alignment: ±2 feet.

c) Curve Radius: The pilot hole radius shall be at least 20% larger than the maximum bending radius, as recommended by the pipe manufacturer of the pipe being installed. In no case shall the bending radius be less than 30 pipe diameters, unless approved otherwise by the Engineer.

d) Entry Point Location: The exact pilot hole entry point shall be within ±5 feet of the location shown on the drawing or as directed by the City in the field.

e) Exit Point Location: The exit point location shall be within ±2 feet of the location shown on the drawing or as directed by the City in the field.

4. Pull Back: After successfully reaming bore hole to the required diameter, Contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel and reamer to compact bore hole walls. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations Contractor will not apply more than the maximum safe pipe pull pressure at any time. Maximum allowable tensile force imposed on the pull section shall be equal to 80% of the pipe manufacturer's safety pull (or tensile) strength. Torsional stress shall be minimized by using a swivel to connect a pull section to the reaming assembly. The pullback section of the pipeline shall be supported during pullback operations so that it moves freely and the pipe is not damaged. External pressure shall be minimized during installation of the pullback section in the reamed hole. Damaged pipe resulting from external pressure shall be replaced at no cost to the City. Buoyancy modification shall be at the discretion of the Contractor and shall be approved by the City. The Contractor shall be responsible for any damage to the pull section resulting from such modifications. In the event that pipe becomes stuck, Contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, Contractor will notify the City. The City and Contractor will discuss options and then work will proceed accordingly.

E. Pipe Assembly: Pipe shall be welded/fused together in one length, if space permits. Pipe may be placed on pipe rollers before pulling into bore hole to minimize damage to the pipe and reduce pull back friction.

F. Acceptability of Damaged Pipe: Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.

G. Locate Wire: Locate wire shall be provided on all installations. Locate wire shall be 12 AWG copper-clad carbon steel with 30 mils (min) insulation. The external color shall be either white or yellow. Locate wire shall be brought to grade within a valve box or locate station box at all "entry point locations" and all "exit point locations". There is no maximum length or interval between locate wire stations. If the locate wire breaks or is not continuous (from end to end), the Contractor shall, at the Contractor's expense, provide soft-digs for the portions of the main with 12 feet or less cover (every 50 LF along main) to confirm as-built data. This soft-dig data shall be recorded on the as-built record drawings.

H. HDD Launch and Receiving Shafts: Contractor shall have sole responsibility to select the location and size of HDD shafts to suit his selected method of construction and equipment.

1. Perform excavation and backfill of shafts in accordance with Section 02200, Earthwork.

2. Install shaft shoring and bracing in accordance with shop drawing submittals and Cal-OSHA safety requirements.

3. Provide watertight seals at pipe penetrations into and out of the shafts. The seal shall withstand full hydrostatic loading conditions.

4. Construct a suitable guardrail barrier around the periphery of the shaft, meeting applicable safety standards. Properly maintain the barrier throughout the period the shaft remains open. Repair broken boards, supports, and structural members. In addition, provide a full cover or other security barrier for each access shaft in which there is no construction activity or which is unattended by Contractor's personnel.

5. Provide traffic control in accordance with applicable safety requirements.

I. Obstructions: Notify City's Representative immediately upon encountering an object, feature, or event that stops the forward progress of the HDD. City's Representative shall review all procedures, means, methods, and sequencing for removal of the object. Proceed with removal procedures upon receiving written authorization by City's Representative.

J. Equip all electrical systems utilized with appropriate ground fault systems. Use electrical systems that are insulated, not permitting any bare wire exposures.

K. Use generators that are suitably insulated for noise ("hospital" type).

L. Necessary equipment for pipe excavation shall include signal systems, fire extinguishers, safety equipment, and other equipment required by Contractor's method of construction. Such equipment shall be maintained in good repair.

3.3 FIELD QUALITY CONTROL

A. Maintain drilling logs that accurately provide drill bit location (both horizontally and vertically) at least every 15 feet along the drill path. In addition, keep logs that record, as a minimum, the following, every 15 minutes throughout each drill pass, back ream pass, or pipe installation pass:

1. Drilling Fluid Pressure
2. Drilling Fluid Flow Rate
3. Drill Thrust Pressure
4. Drill Pullback Pressure
5. Drill Head Torque

B. Make all instrumentation, readings, and logs available to the City at all times during operation.

C. Other items to log:

1. Groundwater control operations and piezometric levels
2. Any observation of lost ground or other ground movement
3. Indications of damaged pipe
4. Any unusual conditions or event
5. Operation shutdown periods or other interruptions in the work, with detailed descriptions of the reasons for the shutdown

D. Electronic data files, complete with any conversions or programs necessary for interpretation, as determined by City's Representative, shall be submitted within 24 hours of the operation. Automated data shall be recorded on a time basis not to exceed one minute. Data stored on a per foot basis shall be supplemental to the timed recordings.

E. Construction Control of Line and Grade:

1. City's Representative will define the baseline and benchmarks as indicated on Approved Plans. Contractor shall check baseline and benchmarks at beginning of work and report any errors or discrepancies to Owner's Representative.

2. Use baseline and benchmarks defined by City's Representative and provide additional temporary control monumentation as required to furnish and maintain reference control lines and grades for the construction. Use these lines and grades to establish the exact location of the excavation and structures.

3. Establish and be responsible for accuracy of control for construction of entire project, including surveying access shaft locations, structures, excavation, pipe alignment, and grade.

4. Establish control points sufficiently far from operation not to be affected by ground movement.

5. Record initial setup.

6. Maintain daily surveying records of alignment and grade. Submit three copies of these records to City's Representative within 24 hours of operation. Contractor, however, remains fully responsible for accuracy of work and correction of it, as required.

7. If allowable tolerances are exceeded, Contractor shall bear full responsibility and expense for correction (redesign, reconstruction, easement acquisition, etc.). If redesign is required, obtain services of a California-licensed Professional Engineer for redesign.

3.4 CLEANING

A. Remove spoil from the job site and dispose of off site.

B. After backfill of the pits has been completed and HDD equipment has been removed, the site shall be dressed smooth and left in a neat and presentable condition, free of all cleared vegetation, rubbish, and other construction wastes.

C. The park site shall be restored to its original condition.

3.5 PROTECTION

A. Contractor is advised the proposed work in City easements and near Mission Bay is subject to the requirements of these Specifications, Special Provisions, the plans and permit conditions. Work outside of the limits of construction shown on the Approved Plans is not allowed without prior coordination and approval from City and property owners. Work may be restricted in some areas, as described in the Special Provisions.

B. Execute HDD operations so that ground settlement and heave will be minimized. The completed pipe shall have full bearing against earth; no voids or pockets will be left in any portion of the Work. Fill the annular space between the installed pipe and the ground with bentonite lubricant or other suitable material. If loss of ground occurs, fill the resulting void with suitable material, such as grout, as accepted by City's Representative.

C. Earth Movement: Contractor shall be responsible for damage due to settlement from any construction-induced activities.

1. Take precautions to avoid damage or settlement to the buildings, structures, roads, railroads, and utilities in close proximity to the Work. Use construction methods and equipment to minimize loss of earth at the excavation face and settlement or heave of earth around pipe.

2. If excessive movement of ground is detected, City's Representative may order work stopped and secured. Before proceeding, correct any problem causing or resulting from such movement.

3. If settlement of ground surface occurs during construction affecting accuracy of temporary benchmarks established by City's Representative, Contractor shall detect and report such movement. Locations of permanent project control monuments are shown on the Approved Plans; Contractor may use these to verify temporary benchmark accuracy. Advise City's Representative of any settlement affecting permanent monument benchmarks. Upon completion, submit field books pertaining to monitoring of permanent monument benchmarks to City's Representative.

D. Dewatering method used shall not cause damage to adjacent structures, facilities or property due to lowering of water table and subsequent ground settlement.

Contractor's dewatering method shall provide means for controlling water inflows to prevent inflow of fines and other adverse effects due to groundwater. In the event any damage does occur, Contractor shall be fully responsible for correction of damage and settlement of any claims arising from such damage.

E. If dewatering is used to control groundwater level, install piezometers to monitor water level and maintain instrumentation to detect any movement in adjacent structures, facilities and property. Monitor water level by recording initial water level before dewatering is started and thereafter on a weekly basis. Remove water monthly from piezometers to demonstrate they are operable. Submit weekly reports of water levels to City's Representative. City's Representative shall have access to piezometers at all times to perform independent measurements. Remove piezometers prior to project completion. See also Section 02140.

** END OF SECTION **

SECTION 02575 - PAVEMENT REHABILITATION

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes removal and rehabilitation of pavement affected by CONTRACTOR'S operations such as trenching, modification to facilities or as otherwise indicated.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02200 Earthwork

2. Section 03280 Joints in Sitework Concrete

3. Section 03310 Cast-in-Place Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 PROJECT RECORD DRAWINGS

A. The following shall be included in the PROJECT RECORD DRAWINGS in compliance with Section 01300:

1. Drawings indicating the exact extent of pavement removed and rehabilitated.

PART 2 – PRODUCTS

2.1 ASPHALT CONCRETE

A. Asphalt concrete shall conform to the requirements of SSPWC subsection 203-6.

B. Tack coat shall comply with subsection 302-5.4 of SSPWC.

2.2 PORTLAND CEMENT CONCRETE

A. Portland cement concrete shall comply with the requirements of subsection 201-1 of SSPWC; class 560-C-3250 per subsection 201-1.1.2 of SSPWC.

B. Curing compound for concrete that is to be topped by an asphaltic wearing course shall comply with SSPWC subsection 201-4 and shall be asphaltic type. Pigmentation is not required.

PART 3 – EXECUTION

3.1 REMOVAL OF PAVEMENT

A. Existing AC pavement shall be sawcut to a minimum depth of 1-1/2 inches or 25 percent of its thickness, whichever is greater.

B. Removal of the existing cement concrete pavement for trench excavation shall be done in accordance with subsection 300-1.3 of SSPWC.

3.2 PLACEMENT OF PORTLAND CEMENT CONCRETE PAVEMENT

A. Subgrade preparation shall be done in accordance with subsection 301-1 of the SSPWC.

B. Prior to placing concrete, pavement edges shall be trimmed to neat horizontal and vertical lines. In case of AC pavement, a tack coat shall be applied to the existing pavement prior to placing cement concrete; while in the case of concrete pavement, the surface of edges shall be thoroughly wetted with water.

C. Portland cement concrete pavement shall be reconstructed in accordance with the applicable provisions of SSPWC subsection 302-6.

3.3 PLACEMENT OF WEARING SURFACE COURSE FOR AC PAVEMENT

A. In the case of rehabilitation of AC pavement, use only asphaltic type concrete curing compound.

B. Apply tack coat, to cement concrete pavement surface after it has cured, in accordance with SSPWC subsection 302-5.4.

C. Install asphaltic concrete, wearing course in accordance with the applicable provisions of SSPWC subsection 302-5.

** END OF SECTION **

SECTION 02600 - PIPELINE CONSTRUCTION

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing general requirements for pipelines, including pipe, joints, specials, and appurtenances, complete and in place.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 01530 Protection of Existing Facilities

2. Section 02140 Dewatering

3. Section 02200 Earthwork

4. Section 02730 Sanitary Sewage System Testing

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SHOP DRAWINGS AND SAMPLES

A. In addition to the requirements of Section 02200 and the pipe material specifications, the following shall be submitted in compliance with Section 01300.

1. Post-installation videotape and inspection reports.

2. Line layout and marking diagrams which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; the station and invert elevation to which the bell end of each pipe will be laid; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of retrained and/or welded joints, or of concrete encasement.

3. Shop drawings and design calculations for joint restraint systems using reinforced concrete encasement of pressure pipe and fittings.

4. Drawings and calculations for thrust blocks.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer. Materials delivered onsite without an approved submittal for verification shall be rejected and payment withheld.

B. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

C. Protection of Equipment: Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment with anti-friction or sleeve bearings shall be stored in weather tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers shall not be used to prevent accumulation of condensate in gears and bearings. Gears and bearings to be stored for extended periods shall be containerized suitable for export shipment.

1.6 FACTORY INSPECTION AND TESTING

A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for two OWNER-designated inspectors for the number of days indicated to complete such inspections or observations, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

PART 2 – PRODUCTS

2.1 PIPE AND APPURTENANCES

A. Provide pipe materials, coatings and linings, and appurtenances of the sizes and types indicated on the Drawings and comply with Section 02620 – High Density Polyethylene Pipe, Section 02630 - Ductile Iron Pipe, Section 02644 - PVC Non-Pressure Pipe and Section 02646 - PVC Pressure Pipe.

2.2 FILL AND BACKFILL MATERIAL

A. Fill and backfill materials shall be in accordance with Section 02200.

PART 3 – EXECUTION

3.1 PREPARATION

A. Traffic: Conform to requirements of Section 01570.

B. Utility Relocation: Notify the RESIDENT ENGINEER of property which must be relocated, of existing public utilities and franchise holders which must be relocated and the reasonable time for doing so. The OWNER will contact the utility or franchise holder and request relocation. Relocation and protection of existing utilities which are the CONTRACTOR's responsibility shall be in accordance with Section 01530.

C. Before submitting joint shop drawings, where the proposed piping will connect to existing piping, the CONTRACTOR shall excavate the point of connection to verify size, layout, and depth. Prepare a sketch of the proposed point of connection for submittal with the joint shop drawings. The CONTRACTOR shall give the RESIDENT ENGINEER a minimum of two hours to inspect the existing piping before backfilling.

3.2 DEWATERING

A. Install and operate according to Section 02140 a continuous dewatering system capable of maintaining the ground water level 2 feet below the excavated trench bottom. Only well points located on both sides of the trench shall be used for dewatering, unless otherwise approved by the RESIDENT ENGINEER.

B. Operate the dewatering system 7 days per week, 24 hours per day with water level as indicated above until backfilling is completed.

C. Field-determined departures from the dewatering plans may necessitate adjustments to the trench shoring and bracing methods to achieve soil stability. Adjustment shall be at no additional cost to the OWNER.

D. Dewatering shall prevent softening of the bottom of excavations. Dewatering shall not remove native soils. All loose soil shall be removed and recompacted in accordance with Section 02200.

3.3 EXCAVATION

A. Unless indicated otherwise, excavation and overexcavation shall be in accordance with Section 02200.

B. Trench width shall be as indicated.

C. Stabilize the trench subgrade by compaction to 95 percent relative density. Where trench bottom has been over-excavated, compact the bedding to 95 percent in 1-foot thick layers.

3.4 LAYOUT AND HANDLING

A. Handling of Pipe and Accessories: Pipe shall be lifted in such a manner as to minimize bending and prevent damage to the pipe. During transport, pipe shall be supported to prevent distortion or damage to the pipe. When not being handled, pipe shall be stockpiled on timber cradles or properly prepared ground with all rocks larger than 3 inches eliminated. All pipe, fittings valves and accessories shall be carefully lowered into the trench in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. The CONTRACTOR shall smooth out any burrs, gouges, or weld splatter and repair other defects prior to laying the pipe. Any pipe section, including coatings and linings, that becomes damaged as a result of handling or stockpiling shall be replaced with a new

unit or repaired at the discretion of the RESIDENT ENGINEER at no additional cost to the OWNER.

3.5 DIVERSION PUMPING

A. Where the proposed piping will connect to existing piping which is in sewage service, install and operate bulkheads, plugs, piping, and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow.

B. Design diversion piping, joints, and accessories to withstand 50 psi minimum.

C. No sewage shall be diverted into any open area outside of a sanitary sewer.

D. In the event of spill or overflow, immediately stop the overflow and take action to clean up and disinfect the spillage area to original condition. Promptly notify the RESIDENT ENGINEER.

E. Sewage bypassing shall be per SSPWC Section 7-8.5.2 Sewage Bypass and Pumping Plan.

3.6 INSTALLATION

A. General: Pipe shall be installed in accordance with the pipe manufacturer's recommendations and the applicable provisions of SSPWC section 306, and the requirements herein.

B. Interferences

1. CONTRACTOR shall protect and maintain all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the WORK in compliance with Section 01530. Where indicated that the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, or pipes, the obstruction shall be supported until it is relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures. Unless otherwise indicated, this WORK shall be performed at no additional cost to the OWNER.

2. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the RESIDENT ENGINEER may direct a change in the alignment or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and integrity of the finished joint.

C. Line and Grade Tolerance: Each section of pipe shall be laid in the order and position shown on the laying schedule. Unless indicated otherwise, the pipe shall be laid to the design line and grade, within approximately one-quarter (1/4) inch plus or minus. No tolerance is permitted on pipes designed for zero slope.

D. Curved Alignments: Where curved alignments are indicated, deflecting the joints will be allowed only in accordance with the written instructions of the pipe manufacturer and these specifications. Where a smaller radius of curvature is required than can be

accommodated by deflecting the joints, sections of pipe with beveled ends may be laid unless fabricated bends are indicated. Maximum joint deflection and maximum bevel for different pipe sizes and joint designs shall be in accordance with the pipe manufacturer's recommendations and these specifications.

E. Cutting and machining of the pipe shall only be in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe, produce ragged, uneven edges, or otherwise impair the condition of the pipe.

F. The CONTRACTOR shall install all pipe, fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials, bolts, nuts, gaskets, jointing materials, and all other appurtenances as indicated and as required to provide a complete and workable installation. No pipe or appurtenance shall be installed when the interior or exterior surfaces show cracks or other defects that may be harmful as determined by the RESIDENT ENGINEER. Damaged interior and exterior surfaces shall be repaired to the satisfaction of the RESIDENT ENGINEER or a new undamaged pipe or appurtenance shall be provided.

G. Pipe laying operations shall be stopped and dewatering operations shall be adjusted to prevent the pipe from floating due to water entering the trench from any source. The CONTRACTOR shall reinstall all affected pipe to its specified condition and grade.

H. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.

I. Immediately before placing each section of pipe in final position for jointing, the bedding shall be checked for firmness and uniformity of surface.

J. Pipe shall be laid directly on the bedding material. No blocking will be permitted and the bedding shall form a continuous, solid bearing for the full length of the pipe. Excavate to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings and to facilitate placement of grout bands. Excavation shall be adequate to permit access to the joints for bonding operations and for application of coating on field joints.

K. Backfilling and compaction shall comply with Section 02200 and the pipe specifications.

L. Sheet piling used for shoring shall extend at least 2 feet below the bottom of the trench. After completion of the pipe, it may be removed by cutting at least 12 inches above the top of the pipe. No vibratory methods for pile removal will be accepted, and piling lower than 12 inches above the top of the pipe shall be left in place.

M. Lay section of pipe with the bell end upgrade.

N. Except for short runs which may be permitted by the RESIDENT ENGINEER, sections of pipe shall be laid in a sequence moving in an upgrade direction on grades exceeding

10 percent. Pipe which is laid in a downgrade direction shall be blocked and held in place until sufficient support is furnished by the following pipes to prevent movement.

O. Where indicated, concrete thrust blocks shall be provided.

3.7 FIELD TESTING

A. Field testing shall be in accordance with SSPWC and Section 02730.

3.8 SITE RESTORATION

A. Backfill and compact soil in accordance with Section 02200.

B. Place subgrade and base materials in accordance with Section 02200.

C. Replace damaged pavement, curbs, gutters, and sidewalks, shrubs, and trees as per SSPWC Section 7-9 and 306.

D. Unless otherwise noted, replace landscaping and irrigation systems in kind. As necessary during construction, modify irrigation systems so they provide full coverage of adjacent areas. At SPS 13, 14 and 16 coordinate all work with City of San Diego Parks and Recreation department staff.

** END OF SECTION **

SECTION 02620 - HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 – GENERAL

1.1 DESCRIPTION

This Section designates the requirements for the manufacture and installation of high density polyethylene (HDPE) pipe PE4710, to be furnished for sewage application and installed by the Contractor at the location and to the lines and grades shown on the Approved Plans.

1.2 REFERENCE STANDARDS:

ASTM D 3350
ASTM F 714
ASTM D 3261
ASTM D 2321
ASTM 2837
AWWA C906

1.3 RELATED WORK DESCRIBED ELSEWHERE

The Contractor shall refer to the following Specification section(s) for additional requirements:

A. Section 02200 Earthwork

B. Section 02320 HDD

C. Section 02730 Sanitary Sewage System Testing

1.4 SUBMITTALS

The Contractor shall furnish submittals in accordance with the GENERAL PROVISIONS. Submittals are required for the following:

A. Submit Shop Drawings, material lists, manufacturer's literature and catalog cuts of, but not limited to, the following:

Shop Drawings
Layout Schedule
Special Fitting
Dimensional Checks
Shop Drawings shall be submitted and approved prior to manufacture of special fittings. The layout schedule shall indicate the order of installation, the length and location of each pipe section and special, the station and elevation of the pipe invert at all changes in grade, and all data on curves and bends for both horizontal and vertical alignment.

B. Submit data used by the Contractor in manufacture and quality control.

1.5 QUALITY ASSURANCE

A. The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction. Certifications shall be provided to the owner through the submittal process.

B. The pipe and/or fitting manufacturer's production facility shall be open by the owner or his designated agents with a reasonable advance notice. During inspection, the manufacturer shall demonstrate that it has facilities capable of manufacturing and testing the pipe and/or fittings to the standards required by this specification.

1.6 PAYMENT

A. Payment for the Work in this Section shall be included as part of the lump sum or unit price bid amount for which such Work is appurtenant thereto.

B. Payment by the linear foot shall be for each diameter and for each pipe strength designation measured horizontally over the pipe centerline.

PART 2 – MATERIALS

2.1 GENERAL

A. High Density Polyethylene Pipe PE4710 and fittings shall be manufactured in accordance with ASTM F714 and shall be of the sizes and DR (Dimension Ratio) classes shown on the Approved Plans. The horizontal directional drilling portion of the project shall be at minimum DR 11.

B The Manufacturer shall have quality control facilities capable of producing and assuring the quality of the pipe and fittings required by the reference standards and these specifications. High Density Polyethylene pipe and fittings shall be supplied by the same manufacturer. Pipe and fittings from different manufacturers shall not be interchanged.

2.2 ACCEPTABLE MANUFACTURERS

Acceptable manufacturers include the following:

ITEM	MANUFACTURER	MANUFACTURER LOCATION
HDPE	Performance Pipe Driscoplex	Reno, NV
	J-M Manufacturing Company, Inc.	Los Angeles, CA
	Accepted equal	

2.3 PIPE MATERIAL

A. Materials used for the manufacture of polyethylene pipe and fittings shall be in accordance with ASTM F714 for PE 4710 high density polyethylene conforming to cell

classification 445574E gray per ASTM D 3350; and shall be as listed in the name of the pipe and fitting manufacturer in the Plastic Pipe Institute's Recommended Hydrostatic and Design Stresses for Thermoplastic Pipe and Fittings Compounds, with a standard grade HDB rating of 1600 psi at 73°F. The Manufacturer shall provide a certification that the materials used to manufacture the pipe and fittings meets these requirements.

B. Polyethylene pipe shall be manufactured in accordance with ASTM F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on outside diameter, and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, % carbon, (from pipe) dimensions and ring tensile strength. The results of these tests shall be submitted to the Owner for review.

C. Service identification stripes shall be provided by co-extruding color stripes into the pipe outside surface per manufacturer's recommendations. The stripe color shall be green for wastewater.

2.4 FITTINGS

A. Butt Fusion Fittings: Butt Fusion Fittings shall be in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to this specification. All fittings shall be pressure rated to provide a working pressure rating no less than that of the pipe. Fabricated fittings shall be manufactured using a McElroy Datalogger to record fusion joints made producing fittings shall be maintained as part of the quality control. The fitting shall be homogenous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

B. Electrofusion Fittings: Electrofusion Fittings and Cell Classification shall be as determined by ASTM D3350-02 and be the same base resin as the pipe. Electrofusion fittings shall not be permitted on sections of pipe that will be subjected to forces associated with the installation process.

C. Flanged and Mechanical Joint Adapters: Flanged and Mechanical Joint Adapters and Cell Classification shall be as determined by ASTM D3350-02 and be the same base resin as the pipe. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3216. All adapters shall be pressure rated to provide a working pressure rating no less than that of the pipe. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder.

D. Mechanical Restraint: Mechanical Restraint for HDPE may be provided by mechanical means separate from the mechanical joint gasket sealing gland. The restrainer shall provide wide, supportive contact around the full circumference of the pipe and be equal to the listed widths. Means of restraint shall be machined serrations on the inside surface of the restrainer equal to or greater than the listed serrations per inch and width. Loading of the restrainer shall be by a ductile-iron follower that provides even circumferential loading over the entire restrainer. Design shall be such that restraint shall be increased with increases in line pressure.

Serrated restrainer shall be ductile-iron ASTM A536-80 with a ductile-iron follower; bolts and nuts shall be corrosive resistant, high strength quality alloy steel.

The restrainer shall have a pressure rating of, or equal to that of the pipe on which it is used or 150 PSI whichever is lesser. Restrainers shall be JCM Industries, Sur-Grip or pre-approved equal.

Pipe stiffeners shall be used in conjunction with restrainers. The pipe stiffeners shall be designed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel to the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE. Stiffeners shall be by JCM Industries or pre-approved equal.

2.5 COMPLIANCE TESTS

The Manufacturer's production facilities shall be open for inspection by the owner or his Authorized Representative. The Manufacturer's inspection and testing shall comply with applicable ASTM standards, a list of the inspection certifications and test certifications shall be submitted prior to the shop drawing submittal for the HDPE pipe itself. The list shall be submitted as a shop drawing. In case of conflict with Manufacturer's certifications, the Contractor, the Engineer, or the City may request retesting by the Manufacturer or have retests performed by an outside testing service. All failed retesting shall be paid for by the Manufacturer.

PART 3 – EXECUTION

3.1 GENERAL

High Density Polyethylene pipe and fittings shall be handled, assembled and installed in accordance with ASTM D 2774, Manufacturer's recommendations, and as specified herein. All necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.

3.2 EXCAVATION

A. Excavation and backfill, including the pipe bedding, shall conform to the provisions of Section 02200.

B. See Section 02320 for the horizontal directional drilling portion of the project.

3.3 PIPE HANDLING

A. The Manufacturer's written procedures for unloading, inspection, and handling of the HDPE pipe shall be adhered to by the Contractor. A copy of these Manufacturer's written procedures shall be submitted as a shop drawing and included with the shop drawings for the pipe material.

B. When lifting with slings, only wide fabric choker slings capable of safely carrying the load, shall be used to lift, move, or lower pipe and fittings. Wire rope or chain shall not be used. Slings shall be of sufficient capacity for the load, and shall be inspected before use. Worn or damaged equipment shall not be used.

3.4 JOINING

Polyethylene pipe and fittings may be joined together or to other materials by means of flanged connections, mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material or electro fusion, as shown on the Approved Plans or as approved by the City Engineer. The installation instructions of the joining device Manufacturer shall be strictly followed when joining by other means is performed.

1. Butt Fusion: Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe Manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe Manufacturer, including but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with McElroy Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. External and Interior beads from butt fusion welds shall not be removed.

    a. Butt Fusion shall be performed between pipe ends, or pipe ends and fitting outlets that have the same outside diameter. Transitions between unlike wall thickness greater than one SDR shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means or electrofusion.

    b. The Contractor shall ensure that persons making heat fusion joints have received training in the recommended procedure. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.

2. Sidewall Fusion: Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting Manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.

3. Mechanical: Bolted joining may be used where the butt fusion method cannot be used. Flange joining will be accomplished by using HDPE flange adapter with a ductile-iron back-up ring. Mechanical joint joining will be accomplished using either a molded mechanical joint adapter or the combination of a Sur-Grip Restrainer and Pipe Stiffener as manufactured by JCM Industries, Inc. Either mechanical joint joining method will have a ductile-iron mechanical joint gland.

4. Other: Socket fusion, hot gas fusion, threading solvents, and epoxies may not be used to join HDPE pipe.

3.5 PREVENTING FOREIGN MATTER FROM ENTERING THE PIPE

At all times when pipe laying is not in progress, the open end of the pipe shall be closed with a tight-fitting cap or plug to prevent the entrance of foreign matter into the pipe. These provisions shall apply during the noon hour as well as overnight. In no event shall the pipeline

be used as a drain for removing water which has infiltrated into the trench. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the Engineer.

3.6 DAMAGED PIPE OR FITTINGS

Sections of pipe having been discovered with cuts or gouges in excess of 1/8-inch thickness shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the heat fusion joining method.

3.7 TESTING

A. Butt Fusion Testing

On every day butt fusions are made, the first fusion of the day shall be a trial fusion. The trial fusion shall be cooled completely, then fusion test straps shall be cut and bent strap tested in accordance with ASTM F2620. The test strap shall be 12-inch (min.) or 30 times the wall thickness in length with the fusion in the center, and 1-inch (min.) or 1.5 times the wall thickness in width. Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested. Butt fusion of the pipe to be installed shall not commence until a trial fusion has passed the bent strap test.

B. Pressure Testing

All pipelines shall be flushed and tested in accordance with Section 02730 and the applicable provisions of AWWA C600, except as modified herein.

C. Allowable Leakage

There will be no leakage allowed for the butt fused portions of the pipeline.

** END OF SECTION **

SECTION 02630 - DUCTILE IRON PIPE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing ductile iron pipe and all appurtenant work. Fusion bond epoxy coating and lining material shall be furnished only by an OWNER-approved manufacturer.

B. The WORK requires that one pipe manufacturer accept responsibility for furnishing the coated and lined pipe without altering or modifying the CONTRACTOR's responsibilities under the Contract Documents.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02140 Dewatering
2. Section 02200 Earthwork
3. Section 02600 Pipeline Construction
5. Section 09800 Protective Coating
6. Section 15000 Piping Components

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. AWWA C110/ANSI A21.10 Ductile-Iron and Gray-Iron Fittings, 3 IN through 48 IN for Water and Other Liquids

2. AWWA C150/ANSI A21.50 Thickness Design of Ductile-Iron Pipe

3. AWWA C151/ANSI A21.51 Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids

4. AWWA C153/ANSI A21.53 Ductile-Iron Compact Fittings, 3 IN through 24 IN and 54 through 64 IN for Water Service

5. ANSI/AWWA C203 Coal Tar Protective Coatings and Linings for Steel Water Pipelines – Enamel and Tape – Hot Applied

6. ANSI/AWWA C213 Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines

7. ASTM D16 Definition of Terms Relating to Paint, Varnish, Lacquer, and Related Products

8. ASTM D471 Test Method for Rubber Property – Effect of Liquids

9. ASTM D2240 Test Method for Rubber Property – Durometer Hardness

10. ASTM D4060 Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser

11. ASTM D4541 Method for Pull-Off Strength of Coatings using Portable Adhesion Testers

12. ASTM E96 Test Methods for Water Vapor Transmission of Materials

13. ASTM G14 Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

14. NAPF 500-3 Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings

15. References herein to "SSPC Specifications" or "SSPC" shall mean the published standards of the Steel Structures Painting Council, 40 24th Street, 6th Floor, Pittsburgh, PA 15222.

16. References herein to "NACE" shall mean the published standards of the National Association of Corrosion Engineers, P.O. Box 281340, Houston, TX 77218-8340.

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Certified dimensional drawings of all pipe, valves, fittings, and appurtenances.

2. Pipe line layout and marking diagrams which indicate the specific pipe, fitting, coupling and valve locations and lengths to be provided at each of the SPS sites. Layout shall include sizes, joint type and the direction of each fitting in the completed line.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. A certified affidavit of compliance for pipe and other products or materials with the requirements of this Section.

1.7 FACTORY INSPECTION AND TESTS

A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for two OWNER-designated

inspectors for one day required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

B. Inspection: All pipe shall be subject to inspection at the place of manufacture and place of coating and lining application in accordance with the provisions of the referenced standards, as supplemented by the requirements herein. The CONTRACTOR shall notify the RESIDENT ENGINEER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of the pipe manufacture and coating application.

C. During the manufacture of the pipe, the RESIDENT ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

D. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.

E. The CONTRACTOR shall perform said material tests at no additional cost to the OWNER. The RESIDENT ENGINEER will witness all testing conducted by the CONTRACTOR; provided, that the CONTRACTOR'S schedule is not delayed for the convenience of the RESIDENT ENGINEER.

F. In addition to those tests specifically required, the RESIDENT ENGINEER may request additional samples of any material including lining and coating samples for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.

1.8 MARKING, HANDLING, AND STORAGE

A. Markings: All pipes shall be factory marked indicating size and class. Legibly mark specials 24 inches in diameter and larger in accordance with the laying schedule and marking diagram. Mark the surface of each fitting and special that is intended to be at the top when the fitting or special is placed in the trench.

PART 2 – PRODUCTS

2.1 GENERAL

A. Pipe and Fittings: Ductile iron pipe and fittings shall be in accordance with SSPWC, Subsection 209-1 and the requirements contained herein. The pipe shall be pressure class 350 and of the diameter indicated.

2.2 PIPE JOINTS

A. Ductile iron pipe joints shall comply with the requirements of SSPWC, Subsection 209-1 and shall be of the type indicated. Flange gaskets shall be per SSPWC Section 209-1.

B. Restrained joints shall be an approved type provided and recommended by the pipe manufacturer.

2.3 MATERIALS

A. Ductile Iron Pipe: Pipe materials shall conform to the requirements of SSPWC, Subsection 209-1, and AWWA C151.

B. Polyethylene Sleeves: Polyethylene sleeves shall not be used.

C. Wax-Tape: Wax-tape shall conform to the requirements of Section 09800.

2.4 SPECIAL FITTINGS

A. Fittings of the compact type for ductile iron pipe shall conform to the requirements of AWWA C153/ANSI A21.53, and shall have a minimum pressure rating of 250 psi.

B. Fittings shall be of the diameter shown in the Specifications or the Plans. Compact type fittings shall only be used where expressly specified.

2.5 FUSION-BONDED EPOXY COATING AND LINING FOR DUCTILE IRON PIPE

A. General: Ductile iron pipe, fittings, and specials shall be lined and coated with fusion bonded epoxy in accordance with Section 09800. Except as described below, the material system for the exterior and interior of ductile iron pipe and fittings installed underground or underwater shall be in accordance with ANSI/AWWA C213. Buried ductile iron pipe and fittings shall also be wrapped in a 3 part wax tape coating system per Section 09800.

B. Minimum Pipe Diameter: The minimum pipe diameter for application of an internal lining shall be 4 inches.

C. Maximum Temperature: This material system shall be able to withstand a maximum service temperature of 1900 F.

D. Thickness: The powder shall be applied to the preheated pipe at a uniform cured thickness. The minimum uniform cured thickness of the applied material shall be as follows:

1. Interior 24 mils MDFT

2. Exterior 24 mils MDFT

3. Maximum thickness shall be determined by the applicator based on the roughness of the pipe so as to obtain a holiday free product. Lining and coating thickness for pipe joints shall be compatible with the pipe dimensional tolerances.

E. Degassifying:

1. The pipe and fittings shall be heated to between 4250 F and 4750F and held at that temperature for 60 minutes or until total outgassing is achieved.

F. Blast Cleaning:

1. The pipe surfaces to be covered in the plant shall be blast-cleaned with steel grit to achieve a near white surface conforming to SSPC SP10 or NACE TM-01-70 grade NACE No.1, as applicable to ductile iron pipe. Surface preparation shall be in accordance with NAPF 500-3.

G. Continuity Tests for Coatings with Thickness Exceeding 20 Mils:

1. Interior of pipe shall be electrically inspected at the factory for continuity at 3000 volts. At the option of the RESIDENT ENGINEER, if the number of holidays exceeds one per 3 linear feet of pipe 20 inches O.D. or smaller, or one per 2 linear feet of pipe over 20 inches O.D., the pipe shall be reprocessed. Unless reprocessed, all defects disclosed by the holiday detector shall be repaired in the shop according to Subsection 3.4 - Coating Repair of ANSI/AWWA C213.

2. Exterior of pipe shall be electrically inspected at the factory for continuity at 3000 volts. If the number of holidays exceeds one per 3 linear feet of pipe 20 inches in O.D. or smaller or one per 2 linear feet of pipe over 20 inches O.D., the RESIDENT ENGINEER will determine if the pipe coating shall be removed and reapplied or if holidays shall be repaired in the shop. Shop repairs shall be performed similar to the procedures in ANSI/AWWA C213.

H. Qualifications, Approval, and Documentation of Fusion Bond Epoxy Manufacturers

1. Qualifications: The fusion bond epoxy manufacturer shall have a record of at least one application of the proposed coating/lining material on a successfully performing ductile iron piping installation of comparable size and complexity constructed in the recent past.

2. Approval:

a. Bidders shall submit the name and documented qualifications of the manufacturer proposed for the fusion bond epoxy material. The OWNER will review and approve the proposed selection.

b. Documentation to be submitted by CONTRACTOR

(1) Documentation of at least one ductile iron pipe project constructed in the recent past and successfully performing under similar service conditions.

(2) The name, telephone number, and address of the owner and completion date and location for the project listed above.

(3) The name, telephone number, and address of the firm which applied the fusion bond epoxy in the project listed above.

(4) Descriptive literature, including Material Safety Data Sheet, for the proposed material.

PART 3 – EXECUTION

3.1 INSTALLATION OF PIPE

A. Ductile iron pipe shall be installed in accordance with the applicable provisions of SSPWC, Section 306, Section 02600, and the recommendations of the manufacturer.

B. Apply wax-tape to all fusion-bonded epoxy coated buried couplings, fittings, valves and flanged joints in accordance with Section 09800 and the recommendations of the manufacturer.

3.2 FIELD TESTING FOR COATING CONTINUITY

A. All exterior surface coatings, except for cement mortar, shall be inspected electrically immediately before the pipe is lowered into the trench, following the same requirements for factory inspection procedure and voltage indicated above for the protective material. All holidays shall be repaired before the pipe is placed in the trench.

** END OF SECTION **

SECTION 02644 - PVC NON-PRESSURE PIPE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing underground PVC non-pressure pipe for gravity flow and all appurtenant work, complete in place.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 01530 Protection of Existing Facilities
2. Section 02140 Dewatering
3. Section 02200 Earthwork
4. Section 02600 Pipeline Construction
5. Section 02730 Sanitary Sewerage System Testing
6. Section 03310 Cast-in-Place Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ASTM D 2321 Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Samples of all the materials proposed for use on the WORK. The samples shall be clearly marked to show the manufacturer's name and product identification and shall be submitted along with the manufacturer's technical data and installation instructions.

2. Shoring and bracing drawings in accordance with the requirements of Section 02200.

3. Shop drawings and laying diagrams of all pipe, joints, bends, special fittings, and piping appurtenances.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's certificates of compliance indicating that all materials furnished under this Section meet the requirements of the Contract Documents.

1.7 FACTORY TESTING

A. The manufacturer shall perform all tests and submit the test results data and certification in compliance with SSPWC Subsection 207-17.4.

PART 2 – PRODUCTS

2.1 GENERAL

A. PVC pipe, fittings, couplings and appurtenances shall comply with SSPWC Subsection 207-17.

B. In addition to the identification marks specified in SSPWC 207-17.2.1, the CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

C. All PVC pipe shall be suitable for joining by compression joints unless otherwise shown or indicated.

2.2 BEDDING AND BACKFILL MATERIAL

A. Unless otherwise indicated, all material used for pipe bedding and trench backfill shall conform to the requirements of Section 02200.

PART 3 – EXECUTION

3.1 GENERAL

A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the RESIDENT ENGINEER, and shall be subject to his approval before acceptance

B. Installation shall conform to the recommendations of pipe manufacturer, the requirements of ASTM D 2321, SSPWC Section 306, Section 02600, and as indicated herein.

3.2 TRENCHING AND BACKFILL

A. Trench excavation and backfill shall conform to the requirements of Sections 02200, 02600, and SSPWC Section 306.

B. The minimum depth of cover over the top of the pipe shall be 36 inches unless otherwise shown. The width of the trenches shall be as indicated on the Drawings.

3.3 FIELD JOINTING

A. Pipe shall be jointed in compliance with manufacturer's printed instructions.

3.4 COMPACTION OF PIPE BEDDING AND BACKFILL

A. Compaction of pipe bedding and backfill material shall conform to the requirements of Sections 02200 and 02600.

3.5 TESTING

A. Field testing of gravity sewer pipe shall conform to the requirements of Section 02730.

** END OF SECTION **

SECTION 02646 - PVC PRESSURE PIPE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing polyvinyl chloride (PVC) pressure pipe and all appurtenant work, complete in place.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, also apply to the extent required for proper performance of this WORK.

1. Section 01530 Protection of Existing Facilities
2. Section 02140 Dewatering
3. Section 02200 Earthwork
4. Section 02600 Pipeline Construction
5. Section 02730 Sanitary Sewerage System Testing
6. Section 03310 Cast-In-Place Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current additions of the following apply to the WORK of this Section:

1. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings 3-in Through 48-in for Water and Other Liquids
2. ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
3. ANSI/AWWA C600 Installation of Ductile-Iron Water Mains and Appurtenances
4. ANSI/AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe 4-in Through 12-in for Water Distribution
5. ANSI/AWWA C905 Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14-inch Through 36-inch
6. ASTM D2584 Test Method for Ignition Loss of Cured Reinforced Resins

7. PPI Technical Report TR 3/4 Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials

8. AWWA Manual M23 PVC Pipe - Design and Installation

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300 - Contractor Submittals:

1. Shop drawings and laying diagrams of all pipe, joints, bends, special fittings, and piping appurtenances.

2. Shoring and bracing drawings in accordance with Section 02200.

3. Manufacturer's technical data and installation instructions plus samples of all materials proposed for use on the WORK. Samples shall be clearly marked to show the manufacturer's name and product identification.

4. Test Reports from:

a. Hydrostatic proof testing

b. Sustained pressure testing

c. Burst strength testing

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's certificates of compliance indicating that all materials provided under this Section meet the requirements of the Contract Documents.

1.7 FACTORY INSPECTION AND TESTING

A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for two OWNER-designated inspectors for one day required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

B. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards as supplemented by the requirements herein. The CONTRACTOR shall notify the RESIDENT ENGINEER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

C. During the manufacture of the pipe, the RESIDENT ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

D. Tests: Except as modified herein, pipe shall be tested in accordance with the requirements of this Section and AWWA C900 and C905, as applicable.

E. The CONTRACTOR shall perform said material tests in accordance with the requirements of the Contract Documents. The RESIDENT ENGINEER will witness all testing conducted by the CONTRACTOR; provided, that the CONTRACTOR'S schedule will not be delayed for the convenience of the RESIDENT ENGINEER.

F. All expenses incurred in obtaining samples for testing shall be borne by the CONTRACTOR at no increased cost to the OWNER.

G. In addition to those tests specifically required, the RESIDENT ENGINEER may request additional samples of any material for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.

PART 2 – PRODUCTS

2.1 GENERAL

A. PVC pressure pipe in sizes 4 through 12 inches shall conform to the applicable requirements of ANSI/AWWA C900 and pipe in sizes 14 through 24 inches shall conform to ANSI/AWWA C905. Pipe in both pipe size ranges shall also be subject to additional requirements indicated herein.

B. All ANSI/AWWA C900 force main PVC pressure piping shall be Class 305.

2.2 PIPE DESIGN CRITERIA

A. Pipe wall thickness for internal pressure shall be the greater of those calculated for the pressure type and safety factor combination below.

1. Pipe in sizes from 4 inches to 12 inches shall be designed for a minimum wall thickness, t, or dimension ratio, DR, in accordance with paragraph A3 in Appendix A of ANSI/AWWA C900. Safety factors of 3.0 for sustained working pressures and 4.0 for total system pressure shall be considered.

2. Pipe in sizes from 14 inches to 24 inches shall be designed for a minimum wall thickness, t, or dimension ratio, DR, in accordance with paragraph A3 of Appendix A of ANSI/AWWA C905. Safety factors of 3.0 for sustained working pressures and 4.0 for total system pressure shall be considered.

B. Determination of Earth Loads: Earth loads on pipe from 4 inches to 24 inches shall be computed using the prism formula:

Wc = HwBc

Where: Wc = Earth load in pounds per linear foot

H = Depth of cover, feet

w = 120 lb/ft3

Bc = Outside diameter of pipe, feet

C. Determination of Live Loads: In lieu of the method in paragraph A.4 of both standards, the truck live loads shall be determined using the method recommended by AASHTO in "Standard Specifications for Highway Bridges." For depths of cover less than 10 feet HS-20 live loads shall be added to the earth loads to determine the total load. For depths of cover 3 feet or less, HS-20 live load plus impact shall be included.

D. Deflection Control: With reference to paragraph A.5 in both standards, the deflection of the pipe after installation shall not exceed 0.03 times the outside diameter. If the calculated deflection exceeds 0.03 times the outside diameter, the pipe class shall be increased or the quality of the pipe zone backfill shall be improved to achieve a higher modulus of soil reaction, E'. For purposes of calculation, values of E' shall be 1100 psi at 90 percent Standard Proctor; 1500 psi at 95 percent Standard Proctor. Similarly, the deflection lag factor for dead loads shall be 1.5 and the bedding constant shall be 0.1.

2.3 PIPE

A. The pipe shall be of the diameter and pressure class or pressure rating indicated, shall be provided complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and pressure classes for Dimension Ratios shall conform to the requirements of AWWA C900 or AWWA C905, as appropriate.

B. Additives and Fillers: Unless otherwise required in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the RESIDENT ENGINEER, the additive and filler content shall be determined using the pyrolysis method as specified in ASTM D 2584.

C. Joints: As indicated, all joints for the pipe shall be either an integral bell manufactured on the pipe or a restrained joint employing a harness, coupling, or gland type restraint. The bell and coupling shall be the same thickness as of the pipe barrel, or greater thickness. The sealing ring groove in the coupling shall be of the same design as the groove in cast iron fittings and valves available from local water works supply distributors.

D. Joint Deflection: Deflection at the joint shall not exceed 1.5 degrees or one-half the maximum deflection recommended by the manufacturer, whichever is less. No deflection of the joint shall be allowed for joints which are over-belled or not belled to the stop mark.

2.4 FITTINGS

A. Fittings shall be ductile iron and shall conform to the requirements of AWWA C110, Class 350 and Section 02630. Fittings shall be mechanical joint unless noted otherwise.

2.5 MARKING

A. Pipe shall be identified in conformance with ANSI/AWWA C900 or C905, as appropriate.

PART 3 – EXECUTION

3.1 GENERAL

A. All laying, jointing, and testing for defects and for leakage shall be performed in the presence of the RESIDENT ENGINEER, and shall be subject to approval before acceptance.

B. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, ASTM D 2321, SSPWC Section 306 and Supplement Amendments, and to the supplementary requirements or modifications specified herein. Wherever the requirements of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

3.2 PIPE STORAGE

A. Storage: Pipe should be stored at the job site in unit packages provided by the manufacturer. Caution shall be exercised to avoid compression damage or deformation to bell ends of the pipe. Pipe shall be stored in such a way as to prevent sagging or bending and shall be protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

3.3 TRENCHING AND BACKFILL

A. Trench excavation and backfill shall conform to the requirements of Sections 02200 and 02600 and as specified herein.

3.4 INSTALLATION OF BENDS, TEES, AND REDUCERS

A. Ductile iron fittings shall be installed utilizing standard installation procedures. Fittings shall be lowered into the trench by means of rope, cable, chain, or other acceptable means without damage to the fittings or linings or coating. Cable, rope, or other devices used for lowering fittings into trench shall be attached around the exterior of fitting for handling. Under no circumstances shall the cable, rope or other device be attached through the interior for handling. Fittings shall be carefully connected to the pipe or other facility, and joints shall be checked to insure a sound and proper joint. Recoat damaged coatings.

3.5 COMPACTION OF PIPE BEDDING AND BACKFILL

A. Compaction of pipe bedding and backfill material shall conform to the requirements of Sections 02200 and 02600.

3.6 INSTALLATION OF TAPE

A. Warning tape, appropriate for the pipeline service, shall be placed on the backfill above pipelines, 2 feet below finished grade. Tape shall be continuous and shall not deviate outside the horizontal profile of the pipe.

3.7 FIELD TESTING

A. Field testing shall conform to the requirements of Section 02730 – Sanitary Sewerage System Testing.

** END OF SECTION **

SECTION 02701 - PRECAST CONCRETE MANHOLES

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing precast concrete manholes and related appurtenances.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02140 Dewatering

2 Section 02200 Earthwork

3. Section 06650 Plastic Liner for Concrete Surfaces

4. Section 09800 Protective Coating

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ASTM A 48 Specification for Gray Iron Castings

2. ASTM C 478 Specification for Precast Reinforced Concrete Manhole Sections

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Design calculations and detailed drawings of manhole component sections.

2. Shop drawings of cast iron frames and covers, and all appurtenances.

1.6 INSPECTION

A. After installation, the CONTRACTOR shall demonstrate to the RESIDENT ENGINEER that all manholes have been properly installed, level, with tight joints, and at the correct elevations.

PART 2 – PRODUCTS

2.1 MANHOLE SECTIONS

A. Precast concrete manhole shafts, risers, grade rings, tops, cones, and base sections shall be designed and constructed in accordance with the requirements of ASTM C 478.

B. Mortar for joining manhole sections shall consist of 1 part cement to 2-1/2 parts of sand by volume.

C. Manhole shafts, risers, cone sections shall be lined with PVC sheets complying with Section 06650. PVC shall be T-Lock or approved equal.

D. Manhole bases shall be primed with epoxy and lined with a 125 mil dry film thickness DFT) of 100 percent solids elastomeric polyurethane in accordance with Greenbook Section 500-2.7.

E. The exterior walls of the manhole shall be waterproofed with a coal tar emulsion such as Carboline Bitumastic 300M Coal Tar Epoxy or approved equal.

2.2 FRAMES AND COVERS

A. Manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, manhole frames and covers shall be heavy duty cast iron type with 36-inch opening. Manhole cover insert shall be 24-inch diameter with lettering "CITY OF SAN DIEGO" and "SEWER" following the arrangement similar to what is indicated on Standard Drawing M-1.

Manholes located outside of the public right-of-way shall have covers locked to the frame as indicated on Standard Drawing SDM-113.

Imported covers, cover inserts, and frames shall have the country of origin marking in compliance with federal regulations.

2.3 WARNING SIGNS

A. The entrance to every unventilated manhole shall be fitted with a plastic warning sign, located 12 inches below the top of the manhole frame, with the inscription "CAUTION -VENTILATE BEFORE ENTERING" in clear letters no smaller than 1/2-inch in height. The sign shall be attached to the concrete with four Type 316 stainless steel screws and anchors.

2.4 MANUFACTURERS

A. Products shall be manufactured by one of the following (or equal):

1. Manhole Sections: Ameron; Associated Concrete Products

2. Frames and Covers: Neenah Foundry Co.; Vulcan Foundry, Inc.

3. Warning Sign: W.H. Brady Company; Seton Nameplate Corporation

PART 3 – EXECUTION

3.1 INSTALLATION

A. Precast concrete manholes shall be installed in strict conformance with the manufacturer's written instructions, on a well-compacted foundation. PVC liner shall be installed in compliance with Section 06650 and with SSPWC, Subsection 311-1.

3.2 INSPECTION

A. Upon request, the CONTRACTOR shall provide the RESIDENT ENGINEER a workman with ladder or other safe and adequate means for inspection access.

** END OF SECTION **

SECTION 02730 - SANITARY SEWERAGE SYSTEM TESTING

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes testing of sanitary sewerage systems.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02620 High Density Polyethylene Pipe

2. Section 02630 Ductile Iron Pipe

2. Section 02644 PVC Non-Pressure Pipe

3. Section 02646 Pressure Pipe

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 CODES

A. The WORK of this Section shall comply with the current editions, with revisions, of the following codes and City of San Diego Supplements:

1. Uniform Plumbing Code

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ANSI/ASTM F 1417 Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

2. AWWA C600 Installation of Ductile Iron Water Mains and their Appurtenances

3. AWWA C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Proposed plans for testing, and for water conveyance, control, and disposal, design and manufacture data for the mandrel (if proposed) and minimum 48-hour advance written notice of proposed testing schedule, for review by the RESIDENT ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The WORK of this Section includes temporary valves, plugs, bulkheads, and other air pressure testing and water control equipment and materials. No materials shall be used which would be injurious to piping systems and future function. Air test gages shall be laboratory-calibrated prior to the leakage test.

PART 3 – EXECUTION

3.1 GENERAL

A. Except as otherwise indicated, water for testing will be furnished by the CONTRACTOR and the OWNER is not responsible for conveying the water to the points of use.

B. Release of water from pipelines, after testing has been completed, shall be performed in the presence of the RESIDENT ENGINEER.

C. Testing shall be performed in the presence of the RESIDENT ENGINEER.

3.2 TESTING OF PIPE FOR LEAKAGE

A. General: Sewer pipes shall be tested for leakage in compliance with SSPWC Section 306 except as modified herein. Testing shall be completed prior to resurfacing. When leakage exceeds the indicated limits, piping shall be repaired or replaced and leakage shall be reduced to the indicated limits.

B. Water Exfiltration Test: The water exfiltration test shall comply with SSPWC Section 306 except that the measurements of water level and head shall be from the centerline of the pipe instead of the invert, and allowable leakage shall be determined as follows:

$E = 0.000012 LD(H)1/2$

Where:

E = Allowable leakage in gallons per minute of sewer tested.

L = Length of sewer and lateral connections tested, in feet.

D = Internal diameter of the pipe in inches.

H = Difference in elevation in feet between the water surface in the upper manhole and the centerline of the pipe at the lower manhole; or if ground water is present above the centerline of the pipe in the lower manhole, the difference in elevation between the water surface in the upper manhole and the ground water at the lower manhole.

C. Water Infiltration Test: The water infiltration test shall comply with SSPWC Section 306 except that the measurements of water level and head shall be from the centerline of the pipe instead of the invert, and allowable leakage shall be determined as follows:

$E = 0.000012\ LD(H)1/2$

D. Air Pressure Test: The air test shall comply with SSPWC Subsection 306. Joints may be air tested individually with the use of specialized equipment provided the joint testing procedure is submitted for the RESIDENT ENGINEER's review prior to testing. Prior to each test, the pipe at the joint shall be wetted with water. The maximum test pressure shall be 3.0 psi. The maximum allowable pressure drop shall be 1.0 psi over a 30-second test period.

E. Hydrostatic Testing of Sewage Forcemains:

1. Prior to hydrostatic testing, all pipelines shall be flushed or blown out as appropriate. The CONTRACTOR shall test all pipelines either in sections or as a unit. No section of the pipeline shall be tested until all field-placed concrete or mortar has attained an age of 14 days. The test shall be made by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Any unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test, to avoid movement and damage to piping and equipment. The CONTRACTOR shall provide sufficient temporary air tappings in the pipelines to allow for evacuation of all entrapped air in each pipe segment to be tested. After completion of the test, such taps shall be permanently plugged. Care shall be taken to see that all air vents are open during filling. Testing shall be conducted and acceptability determined in accordance with AWWA C600/C605.

2. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the RESIDENT ENGINEER shall be taken.

3. The hydrostatic test shall consist of holding the test pressure on the pipeline for a period of 4 hours. The test pressure for sewage forcemains shall be 133 percent of the pipe pressure class shown or specified measured at the lowest point of the pipeline section being tested. The test pressure for yard piping shall be as shown or specified on the Piping Schedule measured at the lowest point of the pipeline section being tested. All visible leaks shall be repaired in a manner acceptable to the RESIDENT ENGINEER.

4. The maximum allowable leakage for sewage forcemains shall be 10 U.S. gallons per inch of diameter per mile of pipe per 24 hours for pipe with 40-ft or greater lengths between joints and with rubber-gasketed joints and 20 U.S. gallons per inch of diameter per mile of pipe per 24 hours for pipe with 20-ft or less lengths between joints and with rubber-gasketed joints. The maximum leakage for yard piping shall be as shown on the Piping Schedule. Pipe with welded joints shall have no leakage. In the case of pipelines that fail to pass the prescribed leakage test, the CONTRACTOR shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines.

3.3 TESTING OF MANHOLES

A. Manholes shall be hydrostatically tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, manholes shall be visually inspected for leaks. Leaks or cracks shall be repaired prior to hydrostatic testing. Pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints. The manhole shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs. After a period of at least one hour and when the water level has stabilized, the manhole shall be refilled and the water level shall be checked. The water level shall again be checked after a period of 4 hours. If the water level is reduced by more than 1/4-inch, the leakage shall be considered excessive, and the manhole shall be repaired and retested. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and the manhole shall be repaired.

** END OF SECTION **

SECTION 02959 -MANHOLE REHABILITATION AND PVC LINING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes materials, testing, and installation of PVC lining for interior concrete surfaces such as manholes.

B. The integral locking PVC manhole lining system shall include 3 components: PVC liner sheets with arrowhead shaped ribs on one side, epoxy mastic and mastic primer.

1.2 RELATED WORK

A. Greenbook Section 500-2.

1.3 SYSTEM DESCRIPTION

A. Furnish and install complete operating PVC liner including appurtenant structural and/or mechanical mountings or connections required to comply with Manufacturer's installation requirements and applicable building codes and standards.

B. Liner shall provide corrosion-protective barrier embedded to inside wall of manhole structure which conforms to its shape.

1.4 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen trained and experienced in necessary trades and crafts and completely familiar with specified requirements and methods for proper performance of Work of this section.

B. Factory testing shall include the following:

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
Liner Materials	Chemical Resistance	SSPWC Section 211-2	1 each product	Contractor	Contractor
	Pull Test for Locking Extensions	Resist 100 pli applied perpendicular to concrete surface for 1 minute at 70°F to 80°F	1 each product	Contractor	Contractor
	Physical Properties Flexible PVC Liner	SSPWC Table 210-2.4.1(A) or paragraph 2.2 below, whichever is stricter	1 each product	Contractor	Contractor
	Shop Welded Joint Tensile Strength	2200 psi measured per ASTM D214 using Die B at 77°F±5°F and using measured minimum dimensions of reduced section	1 each procedure (test weld)	Contractor	Contractor
	Pinholes	Spark Test set for 15,000 to 20,000V	All liner	Contractor	Contractor

1.5 REFERENCES

A. ASTM D214 Tensile Strength Properties of Rubber and Elastomers
B. ASTM D256 Izod Pendulum Impact Resistance of Plastics
C. ASTM D638 Tensile Properties of Plastics
D. ASTM D648 Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
E. ASTM D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
F. ASTM D2240 Rubber Property—Durometer Hardness
G. ASTM D4226 Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products
H. SSPWC Standard Specifications for Public Works Construction Section 211-2 "Chemical Resistance (Pickle Jar) Test"
I. SSPWC Standard Specifications for Public Works Construction Section 500-2.4 "Inspection, Testing and Repair of Installed Liner Systems"
J. SSPWC Standard Specifications for Public Works Construction Section 500-2.9 Epoxy Mastic and Flexible PVC Liner System

1.6 SUBMITTALS

A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Subcontractor Qualifications	Submit company history stating years in service	
	Submit letter from Manufacturer certifying installers and welders are factory-trained and have each completed 3 successful projects in previous 3 years.	
	Submit evidence of factory authorization or licensing by Manufacturer of lining system to install product	
	Submit documentation of employees' cognizance and ability to comply with all Federal and State OSHA regulations regarding confined space entry.	

B. Furnish the following submittals.

SUBMITTAL	DESCRIPTION	
Flow Control	For each manhole to be rehabilitated, submit plan for bypassing sewage around structure during Work.	
Debris Containment Plan	Submit plan for removing and disposing of all debris from cleaning operations	
Shop Drawings	Submit construction details per structural shop drawing requirements including placement drawings, corner and weld details and material lists	.
Catalog Data	Required per catalog data requirements.	
Installation Instructions	Required per installation or application instruction requirements.	
O & M Instructions	Required per operation and maintenance instruction requirements	
Certificate of Compliance	Submit lining system and application certification per certificate of compliance requirements.	
	Submit liner welding certification per Manufacturer's requirements.	
	Submit certification or letter from Manufacturer stating all repair, patching, priming, and relining materials are compatible.	
	Submit documentation of materials passing chemical resistance (pickle jar) test described in SSPWC Standard Specifications for Public Works Construction Section 211-2.	
Warranty	Furnish 3-year warranty from date of final acceptance	

C. Refer to Section 01300 for definition of requirements for shop drawings, catalog data, installation instructions, O&M instructions, and certificates of compliance.

1.7 DELIVERY, STORAGE AND HANDLING

A. Manufacturer's instruction and warranty requirements for delivery, storage and handling of PVC lined or lining materials shall be strictly followed.

1.8 UNIT PRICES

A. Payment for Work in this section shall be included as part of lump-sum bid amount for which such Work is appurtenant.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers include the following:

ITEM	MANUFACTURER	MANUFACTURER LOCATION
100% Calcium Aluminate Cement (Bench Mix)	Standard Cement Materials, Inc.	Houston, TX
	Accepted equal	
Chemical Grout Polyurethane foam with 100% solids, no shrinkage	Zebron	Anaheim, CA
	Accepted equal	
PVC Lining for Existing Interior Concrete Surfaces (Epoxy Mastic and Flexible PVC Liner)	National Oilwell Varco (formerly Ameron Protective Linings Division) "Arrow-Lock"	Houston, TX
	Accepted equal	

2.2 MATERIALS

A. The following product design criteria, options and accessories are required for 100% Calcium Aluminate:

The 100% calcium aluminate fast setting, fiber reinforced, shrink-compensated, corrosion resistant cement bench mix shall be Fast Set Bench Repair (FSR) Cement by Standard Cements, or approved equal. (Minimum compressive strength at 24 hours of 3,800 psi per ASTM C 109; Bond Strength at 140 psi per ASTM C 321; Drying Shrinkage per ASTM C 596, 90% RH at No Loss) Apply cement per manufacturer's recommendations.

B. The following product design criteria, options and accessories are required for Grout Polyurethane foam with 100% solids, no shrinkage:

Chemical grout shall be a highly reactive, fast acting, 2 component polyurethane foam with 100% solids and no shrinkage, designed to stop large flows of water. Chemical grout shall be ZG-23 by Zebron, or approved equal.

C. PVC Liners shall be constructed of the following materials:

ITEM	MATERIAL	SPECIFICATION
Epoxy Mastic Primer on Existing Concrete Surfaces	100% Epoxy	Two-part coating applied to prepared concrete substrate to fill voids, bond with concrete and provide anchorage for PVC liner system.
PVC Liner, Welding Strips and Accessories	Polyvinyl Chloride Resin	99% by weight
Locking Extensions	Polyvinyl Chloride Resin	Integrally bonded, molded or extruded with sheets

D. The following product design criteria, options and accessories are required for PVC linings for existing concrete surfaces:

ITEM	DESCRIPTION	
Mastic Primer	Thickness	3-5 mils
Epoxy Mastic	Thickness	3/8-inch minimum
PVC Liner Sheets	Minimum Thickness	1/16 inch (0.0625 inches)
Dry Film Thickness of Combined Cured Lining System (Mastic + Liner Sheet)	Average Thickness	315 mils minimum
Flexible Plastic Liner Sheets (Tested at 77°F±5°F) After Pickle Jar Exposure	Tensile Strength (ASTM D412)	2100 psi minimum
	Elongation at Break (ASTM D412)	200% minimum
	Shore Durometer Type D Hardness	1-sec 50-60 10-sec 35-50
	Weight Change	±1.5% with respect to initial test before pickle jar exposure
Weld Strip	Minimum Thickness	0.094 inches
	Width	1±0.125 inches
	Edges	Bevel edges at time of manufacture
	Minimum Thickness	0.075 inches

ITEM	DESCRIPTION	
Field Joint Strip Type AL-1 (Use only where accepted by Owner's Representative).	Maximum Gap Between Sheets	1-inch
	Width	4±0.25 inches centered over gap
	Edges	2 1-inch weld strips fusion welded Bevel edges before application
Field Joint Strip Type AL-2	Minimum Thickness	1/16 inch (0.0625 inches)
	Maximum Gap Between Sheets	None. Remove locking extension 1-inch from one side and overlap adjacent sheet
	Width	½-inch minimum overlap
	Edges	1-inch weld strip fusion welded Bevel edges before application
Field Joint Strip Type AL-3 (Use only where accepted by Owner's Representative).	Minimum Thickness	0.094 inches
	Maximum Gap Between Sheets	¼-inch
	Width	1±0.125 inches centered over gap
	Edges	1-inch weld strip fusion welded Bevel edges before application

PART 3 – EXECUTION

3.1 PREPARATION

A. Make field measurements needed to install PVC liners before submitting shop drawings or ordering. Make minor changes in dimensions and alignments as needed to avoid utilities or structural conflicts.

B. Examine areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of Work.

C. Before using product, investigate its compatibility with surfaces, fillers and joints sealants.

D. Use only compatible materials.

E. Implement sewage bypassing as necessary. Flow control shall be Contractor's responsibility.

F. Furnish and install any necessary temporary debris containment devices while maintaining sewage flow.

G. Concrete preparation and installation of coating shall be performed under supervision of factory-authorized Manufacturer's representative.

H. Clean surface to be lined as follows:

1. Inspect host structure for damage and leaks.

2. Remove any protrusions on host structure surface that might interfere with installing lining system.

a. Remove damaged manhole steps or manhole steps scheduled for removal prior to rehabilitating manhole, using such methods that will minimize damage to structure surface.

b. Grind anchor bolts, pull rings and lifting eyebolts that are damaged or scheduled for removal down to ½" below surface and patch flush.

c. Promptly repair any damage to manhole structure caused by removal of protrusions, using methods acceptable to Owner and Manufacturer.

3. Clean cracked or soft areas with wire brush.

4. If reinforcing steel is exposed, remove rust particles on steel through thorough cleaning. Allow Owner's Representative to inspect rebar and accept it as clean. Then immediately coat bare steel with protective coating recommended by Manufacturer of manhole lining system.

5. Report any leaks or damage to Owner's Representative.

6. Clean all surfaces to be rehabilitated using one of the following methods:

a. Water blast manhole interior to remove deteriorated concrete, oil, grease, or existing coating. Water blast equipment shall use of a minimum pressure of 5,000 psi and shall not use detergent or other chemical cleaning solvents.

b. Abrasive blast.

c. Another method recommended by Manufacturer and documented in installation instructions.

d. Another method submitted to and accepted by Owner's Representative.

7. Protect host structure from damage by cleaning equipment, pressure and air pressure.

8. Remove and dispose of all debris collected from cleaning operations. Do not allow debris to enter sewer system.

I. Interior surface preparation of manholes shall proceed as follows:

1. After cleaning and before concrete repair, eliminate all active structure infiltration prior to liner application. The method of stopping these leaks shall be by chemical grout injection as accepted by the City and in accordance with NASSCO Specifications, and/or application of hydraulic cement conforming to Section 201-1.2 of Greenbook.

2. Air-placed concrete gunite application shall conform to Section 303-2 of Greenbook. Before guniting, insert containment devices accepted by City into manholes as needed to prevent rebound (nonadhering gunite) from entering sewer. Apply gunite to a thickness which will restore the original manhole surface. Apply gunite in minimum ½-inch continuous lifts. After guniting, remove containment devices and reinstall manhole cover to provide moist curing environment. Allow gunite to cure 24 hours prior to lining application.

3. Prior to installation, repair all irregularities, voids, and deteriorated surfaces to uniform surface using rapid setting repair mortar compatible with lining system.

4. Return manhole channel and shelf areas to original dimensions using 100% calcium aluminate (Bench Mix). The bench mix shall be used for the bench and channel repairs as shown on plans and as described in the specifications, to patch and repair cracks, fill voids, reform bottoms, bench areas and invert sections in the sewer manhole, in accordance with ASTM F2551-09.

5. Manufacturer's factory-authorized representative shall field-inspect manhole prior to primer coating and provide written statement that manholes have been prepared properly and is ready for primer coat.

J. Apply mastic or adhesive base for installing liner plate over existing concrete as follows:

1. Apply primer, adhesive and mastic in accordance with Manufacturer's application instructions.

3.2 INSTALLATION

A. Rehabilitate manholes, furnish and install PVC linings at locations shown on Plans and submittals.

B. The following installation standards shall be followed:

1. Manufacturer's installation and warranty requirements

2. Applicable OSHA and Cal OSHA regulations

3. Other applicable building code requirements

C. Refer variances between the above documents and Contract Documents to Owner's Representative.

D. Install PVC linings to tolerances recommended by Manufacturer. Unless otherwise shown, install PVC linings true, plumb and level using precision gauges and levels.

E. Apply PVC linings to existing concrete surfaces as follows:

1. Apply mastic primer to thickness specified above.
2. Allow primer to dry before applying epoxy mastic.
3. Use finishing trowel or other suitable tool to apply epoxy mastic to uniform thickness specified above.
4. Place plastic liner while wetting ability of epoxy mastic is at its optimum.
5. Press plastic liner into mastic, and roll to remove trapped air.
6. Allow lining system to cure for amount of time recommended by Manufacturer.

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
PVC Linings	Manufacturer's Inspection of Interior Surface Preparation	Visual inspection of manhole surface by Manufacturer's factory-authorized representative before receiving mastic coat	1 inspection	Contractor	Contractor
	City Representative's Inspection of Interior Surface Preparation	Visual inspection of manhole surface before receiving finish coat. Provide safe access for inspection and notify Owner's Representative 2 days in advance of inspection.	1 inspection	Owner	Owner
	Installation & Leakage	Visual inspection of finished installation	1 inspection	Owner	Owner
	Pull Test of Field Welds	Field welds shall withstand pull test of at least 100 lbs per liner inch applied perpendicularly to concrete surface for one minute, without evidence of cracks or separations. Conduct test at 70-80°F.	1 test of first 100 feet of weld for each welder on project	Contractor	Contractor

	Holiday Test (Spark Test)	Spark test witnessed by Owner's Representative upon completion of lining installation and visual inspection. Use Tinker & Rasor Model AP-W high voltage holiday detector or equivalent specified by coating Manufacturer. Set at 15,000V or 100V per mil of lining thickness, whichever is greater. Mark identified holidays without contaminating lining surface. Repair all imperfections found with materials-in-kind and repeat test until no holidays are found	1 test	Contractor	Contractor
	11-month Warranty Inspection	Demonstrate compliance to Contract Documents and Manufacturer's printed literature	1 test	Owner	Contractor

F. Field weld liner sections as follows:

1. Use maximum size plastic liner sheet practical to minimize seams.

2. Liner may be heated to facilitate turning corners but excessive heating of liner shall be avoided.

3. Corner strips may be used at inside and outside corners, or liner may be wrapped around corners.

4. Provide ventilation for all welding operations.

5. Fusion weld welding strips using welders accepted by Owner's Representative.

6. Hot air welding tools shall provide clean effluent air at constant pressure to surfaces to be welded within a temperature range of 500°F and 600°F

7. Overlap vertical and horizontal seams at least ½-inch. Weld with 1-inch strips.

8. Construct Type AL-2 welded field joints of dimensions described above except where other methods are accepted in writing by Owner's Representative.

9. For lap welds, offset welding strip so ⅓ of width is placed on high side of lap and properly fused. A small gap in fusion not to exceed ⅛-inch in width is acceptable at lap.

10. For butt welds, center welding strip over cleaned surfaces to be joined and fuse across its entire width. Incomplete fusion, charred or blistered welds will be rejected.

11. Use only methods and techniques of dimensions shown above and accepted by Owner's Representative. Welding operation on any joint shall be continuous until joint has been completed.

3.3 FIELD QUALITY CONTROL

A. Field testing shall include the following:

B. Field weld tests and holiday tests shall be accomplished by independent laboratory recommended by Manufacturer. Tester shall place initials and date of test on each surface tested or adjacent to each weld tested.

C. Provide services of factory-authorized representative on-site to provide the following:

1. Installation assistance and inspection of complete PVC lining system, including site visits at beginning, middle and end of installation process.

2. Observation of field testing and repair.

** END OF SECTION **

SECTION 03280 - JOINTS IN SITEWORK CONCRETE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing expansion joints, contact joints, and weakened plane joints in concrete pavement, sidewalk, curb and gutter.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 03310 Cast-in-Place Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ASTM D 1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

2. ASTM D 994 Preformed Expansion Joint Filler for Concrete (Bituminous Type)

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Placement shop drawings showing the location and type of all joints.

2. Catalog cuts and samples of the preformed expansion joint filler material including complete product data.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's certification indicating that the preformed expansion joint material meets or exceeds the requirements of these Specifications.

PART 2 – PRODUCTS

2.1 PREMOLDED JOINT FILLER

A. Premolded joint filler shall be in conformance with SSPWC subsection 201-3.2 and shall be either Preformed Expansion Joint Filler (ASTM D994) or Nonextruding and Resilient Filler (ASTM D 1751) as indicated.

2.2 STEEL BARS AND DOWELS

A. Steel bars used in construction joints or contact joints shall conform to SSPWC subsection 201-2.2.

2.3 CONCRETE CURING COMPOUND

A. Curing compound shall comply with SSPWC subsection 201-4.

PART 3 – EXECUTION

3.1 EXPANSION JOINTS

A. Expansion joints in sitework concrete shall be constructed in accordance with SSPWC subsection 302-6.5.3 except that the configuration of the joint shall be as indicated on the drawings.

B. Expansion joints in concrete curbs, sidewalk and gutter shall comply with SSPWC subsection 303-5.4.2 except that the joint configuration shall be as indicated on the drawings.

3.2 CONSTRUCTION JOINTS

A. Construction joints in sitework concrete shall comply with SSPWC subsection 302-6.5.2.

3.3 WEAKENED PLANE JOINTS

A. Weakened plane joints in sitework concrete shall comply with SSPWC subsection 302-6.5.4 except that the configuration of the joint shall be as indicated on the drawings.

B. Weakened plane joints in concrete curbs, sidewalks and gutters shall comply with SSPWC subsection 303-5.4.3 except that the joint configuration shall be as indicated on the drawings.

3.4 CONTACT JOINTS

A. Contact joints in concrete pavement shall be made by placing fresh concrete against hardened concrete. A moisture barrier consisting of curing compound conforming to SSPWC subsection 201-4 shall be applied to the face of any contact joint and allowed to dry prior to placing fresh concrete against that joint face. This provision is also applicable to existing Portland cement concrete pavement not constructed as part of the WORK performed under the contract. Application rate shall be as specified in SSPWC subsection 302-6.6 for the compound used.

** END OF SECTION **

SECTION 03310 - CAST-IN-PLACE SITEWORK CONCRETE

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing finished cast-in-place lean concrete, sitework concrete, minor non-hydraulic concrete structures, air placed concrete, including formwork, steel reinforcement, mixing, placing curing, and repairing, all in conformance with SSPWC.

B. Sitework concrete includes curbs, gutters, catch basins, sidewalks, pavements, fence and guard post embedment, underground duct bank encasement, and all concrete WORK indicated to be sitework concrete.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 03280 Joints in Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SHOP DRAWINGS AND SAMPLES

A. Submittals shall be made in compliance with Section 01300 and in accordance with the requirements of SSPWC, Section 201.

1.5 TESTS

A. Tests on component materials, for the compressive strength of concrete, and for construction tolerances shall be performed in accordance with the requirements of SSPWC, Section 201.

PART 2 – PRODUCTS

2.1 CONCRETE MATERIALS

A. Concrete component materials, including curing materials and joint materials shall be in accordance with SSPWC, Subsections 201-1, 201-4, and 201-5.

2.2 FORMWORK

A. Concrete formwork shall comply with SSPWC Subsection 204-1.

2.3 STEEL REINFORCEMENT

A. Reinforcing steel shall conform to SSPWC Subsection 201-2.

PART 3 – EXECUTION

3.1 GENERAL

A. Proportioning and mixing, preparation of surfaces for concreting, handling, transporting and placing concrete, finishing and curing concrete surfaces and related procedures shall be performed in accordance with SSPWC, Subsections 303-1 and 303-5.

3.2 AIR-PLACED CONCRETE

A. Air-placed concrete construction (Gunite and Shotcrete) shall be in accordance with SSPWC, Subsection 303-2 and the applicable provisions of Subsection 303-1.

** END OF SECTION **

SECTION 03315 - GROUT

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing grout other than that required for masonry work, complete.

B. The following types of grout are included in the WORK of this Section:

1. Non-Shrink Grout: This type of grout shall be used wherever grout is required, unless another type is specifically indicated.

2. Cement Grout

3. Epoxy Grout

4. Topping Grout and Concrete Fill

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 03310 Cast-In-Place Sitework Concrete

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current versions of the following apply to the WORK of this Section:

1. CRD-C 621 Corps of Engineers Specification for Non-shrink Grout

2. ASTM C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or 50-mm Cube Specimens)

3. ASTM C 531 Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical- Resistant Mortars, Grouts, and Monolithic Surfacings

4. ASTM C 579 Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings

5. ASTM C 827 Test Method for Early Volume Change of Cementitious Mixtures

6. ASTM D 696 Test Method for Coefficient of Linear Thermal Expansion of Plastics

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of non-shrink and epoxy grouts proposed for use in the WORK.

2. Certified test results verifying the compressive strength, shrinkage, and expansion properties for proposed non-shrink and epoxy grouts.

1.6 TESTING DURING CONSTRUCTION

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the RESIDENT ENGINEER to insure continued compliance with these specifications. The specimens will be made by the RESIDENT ENGINEER or its representative.

2. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the RESIDENT ENGINEER. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.

3. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the RESIDENT ENGINEER. A set of three specimens will be made for testing at 7 days, and each earlier time period as appropriate.

4. All grout, already placed, which fails to meet the requirements of these specifications, is subject to removal and replacement at the cost of the CONTRACTOR.

5. The cost of all laboratory tests on grout will be borne by the OWNER, but the CONTRACTOR shall assist the RESIDENT ENGINEER in obtaining specimens for testing. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The CONTRACTOR shall supply all materials necessary for fabricating the test specimens.

PART 2 – PRODUCTS

2.1 CEMENT GROUT

A. Cement Grout: Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency.

Where needed to match the color of adjacent concrete, white Portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4000 psi.

2.2 PREPACKAGED GROUTS

A. Non-Shrink Grout:

1. Non-shrink grout shall be a prepackaged, inorganic, non-gas-liberating, non-metallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the manufacturer for the particular application.

2. Class A non-shrink grouts shall have a minimum 28 day compressive strength of 5000 psi; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic state when tested in accordance with ASTM C 827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD C 621.

3. Class B non-shrink grouts shall have a minimum 28 day compressive strength of 5000 psi and shall meet the requirements of CRD C 621.

4. Application:

a. Class A non-shrink grout shall be used for the repair of all holes and defects in concrete members which are water bearing or in contact with soil or other fill material, grouting under all equipment base plates, and at all locations where grout is specified in the contract documents; except, for those applications for Class B non-shrink grout and epoxy grout indicated herein. Class A non-shrink grout may be used in place of Class B non-shrink grout for all applications.

b. Class B non-shrink grout shall be used for the repair of all holes and defects in concrete members which are not water-bearing and not in contact with soil or other fill material, grouting under all base plates for structural steel members, and grouting railing posts in place.

B. Epoxy Grout:

1. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

2. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.

3. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F.

4. The epoxy grout shall develop a compressive strength of 5000 psi in 24 hours and 10,000 psi in seven days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

4. The epoxy grout shall exhibit a minimum effective bearing area of 95 percent. This shall be determined by a test consisting of filling a 2-inch diameter by 4-inch high metal cylinder mold covered with a glass plate coated with a release agent. A weight shall be placed on the glass plate. At 24 hours after casting, the weight and plate shall be removed and the area in plan of all voids measured. The surface of the grout shall be probed with a sharp instrument to locate all voids.

6. The peak exotherm of a 2-inch diameter by 4-inch high cylinder shall not exceed 95 degrees F when tested with 75 degree F material at laboratory temperature. The epoxy grout shall exhibit a maximum thermal coefficient of 30 x 10-6 inches/inch/degree F when tested according to ASTM C 531 or ASTM D 696.

7. Application: Epoxy grout shall be used to embed all anchor bolts and reinforcing steel required to be set in grout, and for all other applications required in the Contract Documents.

2.3 TOPPING GROUT AND CONCRETE FILL

A. Grout for topping of slabs and concrete fill for built up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as indicated herein. All materials and procedures specified for concrete in Section 03310 shall apply except as indicated otherwise herein.

B. Topping grout and concrete fill shall contain a minimum of 564 pound of cement per cubic yard with a maximum water cement ratio of 0.45.

C. Coarse aggregate shall be graded as follows:

U.S. STANDARD SIEVE SIZE	PERCENT BY WEIGHT PASSING
1/2"	100
3/8"	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

D. Final mix design shall be as determined by trial mix design under supervision of the approved testing laboratory.

E. Strength: Minimum compressive strength of topping grout and concrete fill at the end of 28 days shall be 3000 psi.

2.4 CURING MATERIALS

A. Curing materials shall be as indicated in Section 03310 for cement grout and as recommended by the manufacturer of prepackaged grouts.

2.5 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as required for the particular application.

B. The slump for topping grout and concrete fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

2.6 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

2.7 MANUFACTURERS

A. Products shall be of the following manufacture (or equal):

1. Epoxy Grout: BurkEpoxy Anchoring Grout by the Burke Company

PART 3 – EXECUTION

3.1 GENERAL

A. All surface preparation, curing, and protection of cement grout shall be as specified in Section 03310. The finish of the grout surface shall match that of the adjacent concrete.

B. The manufacturer of Class A non-shrink grout and epoxy grout shall provide on-site technical assistance upon request.

C. Base concrete or masonry must have attained its design strength before grout is placed, unless authorized by the RESIDENT ENGINEER.

3.2 GROUTING PROCEDURES

A. Prepackage Grouts: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

B. Base Plate Grouting:

1. For base plates, the original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a one inch thickness of grout or a thickness as indicated.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non shrink type grout. The mixture shall be of a trowelable consistency and tamped or rodded solidly into the space between the plate and the base concrete. A backing board or stop shall be provided at the back side of the space to be filled with grout. Where this method of placement is not practical or where required by the RESIDENT ENGINEER, alternate grouting methods shall be submitted for acceptance.

C. Topping Grout:

1. All mechanical, electrical, and finish work shall be completed prior to placement of topping or concrete fill. The base slab shall be given a roughened textured surface by sandblasting or hydroblasting exposing the aggregates to ensure bonding to the base slab.

2. The minimum thickness of grout topping and concrete fill shall be one inch. Where the finished surface of concrete fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3 1/2-inches wide by 1 1/2-inches deep.

3. The base slab shall be thoroughly cleaned and wetted prior to placing topping and fill. No topping concrete shall be placed until the slab is complete free from standing pools or ponds of water. A thin coat of neat Type II cement grout shall be broomed into the surface of the slab just before topping of fill placement. The topping and fill shall be compacted by rolling or tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade.

4 Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping and fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface

shall be by hand troweling. During finishing, no water, dry cement or mixture of dry cement and sand shall be applied to the surface.

3.3 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

** END OF SECTION **

SECTION 03463 - PRECAST CONCRETE VAULTS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. This section includes materials, design, and installation of precast concrete vaults.

1.2 RELATED SECTIONS

A. The work of Section 02200 - Earthwork applies to the work of this section. Other sections of the specifications, not referenced in this section, shall also apply to the extent required for proper performance of this work Section 06650 Plastic Liner for Concrete Surfaces.

1. Section 05500 Miscellaneous Metalwork.

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SUBMITTALS

A. Submit manufacturer's catalog data on precast concrete vaults. Show dimensions of vaults and thicknesses of walls. Show reinforcing wire and steel. Show materials of construction by ASTM reference and grade.

B. Provide certification that vault design and construction comply with the referenced ASTM specifications (e.g., ASTM C 857 and C 858).

PART 2 – MATERIALS

2.1 MANUFACTURERS

A. Precast concrete vaults shall be manufactured by Old Castle, Brooks Products Inc., New Basis or equal.

2.2 PRECAST RECTANGULAR CONCRETE VAULTS

A. Precast concrete vaults shall comply with ASTM C 858 except as modified herein.

B. Design loads shall be in accordance with ASTM C 857. Traffic loads shall conform to a minimum load designation of AASHTO H20. Soil lateral loads shall be as determined by ASTM C 857 or loadings specified in the project soils report, whichever is greater. Alternate design by the strength design method shall include a load factor of 1.7 times the lateral earth or hydrostatic pressures.

C. Minimum wall thickness shall be 7.5 inches. Design knockout wall panels to accommodate loading pressures.

2.3 SEALANTS AND MORTAR

A. Plastic sealing compound shall comply with Federal Specification SS S 00210.

2.4 CONCRETE

A. Cement for vaults shall conform to ASTM C 150 and C 595, Type IP (MS) or, in lieu of Type IPMS, provide a mixture of 85% Type II Portland cement and 15% pozzolan fly ash.

B. Concrete strength shall be 6,000 psi at 28 days.

2.5 CRUSHED ROCK FOR VAULT BASE

A. Provide Class 2 aggregate base in accordance with Section 02200.

2.6 WATERPROOFING

A. All exterior surfaces of vaults, pull boxes, etc., shall be waterproofed. The waterproofing material shall be:

1. Coal tar epoxy such Carboline Bitumastic 300M Coal Tar Epoxy, or approved equal.

2. Polymer modified flexible membrane such as CEM-KOTE FLEX CR manufactured by W.R. Meadows or approved equal.

B. Vault interior shall have PVC T-Lock lining in accordance with Specification Section 06650, Plastic Liner for Concrete Surfaces. The color shall be white.

2.7 HATCH COVERS

A. Hatch covers installed on valve vaults shall be per Specification Section 05500, Miscellaneous Metalwork.

PART 3 – EXECUTION

3.1 VAULT BASE

A. Excavate for the vault and install class 2 aggregate base, 12 inches thick, per Section 02200 and the plans. Base material shall extend a minimum of 1 foot beyond the outside edge of the concrete vault base. Compact to 95% relative density.

3.2 SEALING AND GROUTING

A. Fill joints between precast sections with a plastic sealing compound.

INSTALLING VAULTS

A. Set each precast concrete vault unit plumb on a bed of sealant to make a watertight joint at least 2-inch thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant.

B. Assemble units so that the vault conforms to the finish elevation.

3.4 BACKFILL AROUND VAULTS

A. Backfill and compact around the vaults per Section 02200.

3.5 WATERPROOFING

A. Waterproofing shall be applied to all exterior surfaces of vaults. Apply to obtain a minimum 80 mil dry film thickness. Protect coating from damage during backfilling and compacting.

B. PVC T-lock lining shall be installed per Specification Section 06650, Plastic Liner for Concrete Surfaces.

** END OF SECTION **

SECTION 05500 - MISCELLANEOUS METALWORK

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing miscellaneous metalwork and appurtenances including anchor bolts, ladders, gratings, hatches, and manhole frames and covers.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 01300 Contractor Submittals

2. Section 03315 Grout

3. Section 09800 Protective Coating

1.3 CODES

A. The 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 Building Code

1.4 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. Federal Specifications:

QQ-F-461 C (1) Floor Plate, Steel, Rolled

2. Commercial Standards:

AISC MO11	Manual of Steel Constructions
AASHTO HS-20	Truck Loading
ASTM A36	Specification for Structural Steel

ASTM A 48	Specification for Gray Iron Castings
ASTM A 53	Specification for Pipe, Steel, Black and Hot- Dipped, Zinc-Coated Welded and Seamless
ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 125	Specification for Steel Springs, Helical, Heat Treated
ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
ASTM A 307	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile
ASTM A 320	Specification for Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A 489	Carbon Steel Eyebolts
ASTM A 569	Specification for Steel, Carbon, (0.15 Maximum Percent) Hot Rolled, Sheet and Strip, Commercial Quality
ASTM A 575	Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM B 98	Specification for Copper-Silicon Alloy Rod, Bar, and Shapes
ASTM B 210	Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes
ASTM B 221	Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
ASTM B 438	Specification for Sintered Bronze Bearings (Oil-Impregnated)
ANSI/AWS D1.1	Structural Welding Code - Steel
NFPA 101	Life Safety Code

1.6 SHOP DRAWINGS AND SAMPLES

A. Shop drawings of all miscellaneous metalwork shall be submitted in compliance with Section 01300.

B. An ICBO report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor used shall be submitted to the Engineer for review. Contractor shall submit manufacturer's recommended installation instructions and

procedures for all adhesive anchors for Engineer's review. Upon review, by Engineer, these instructions shall be followed specifically.

C. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

D. Calculations: Engineering calculations shall be submitted for review. Engineering calculations shall include (but not be limited to) guardrail posts, railings, handrail brackets, brackets, support flanges, and fasteners or anchors.

1.7 QUALITY ASSURANCE

A. All welding shall be inspected by a CONTRACTOR-provided inspector qualified in accordance with AWS requirements and approved by the OWNER.

PART 2 – PRODUCTS

2.1 MISCELLANEOUS METALWORK

A. Materials: Except as otherwise indicated, products fabricated of structural steel shapes, plates and bars shall comply with the requirements of ASTM A 36 or ASTM A283.

B. Corrosion Protection: Unless otherwise indicated, miscellaneous metalwork of fabricated steel, which will be used in a corrosive environment or will be submerged, shall be stainless steel or coated in accordance with Section 09800. Other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication except as otherwise indicated.

C. Stainless Steel: Stainless steel metalwork shall be of Type 316 L stainless steel. Stainless steel shall not be torch heated for welding. The CONTRACTOR shall submit welding methods and procedures. All welded stainless steel shall be passivated after welding by immersing in a pickling solution of 6 percent nitric acid and 3 percent hydrofluoric acid. Temperature and detention time for passivation shall be sufficient for removal of oxidation and ferrous contamination without etching of surface. The passivated steel shall undergo a complete neutralization by immersion in a detergent rinse followed by clean water wash, or shall be buffed with Scotch Brite EXL (or equal) for removal of weld discoloration and heat tint.

D. Aluminum: Unless otherwise indicated, aluminum metalwork shall be of Alloy 6061-T6. Aluminum in contact with concrete, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with Section 09800. All aluminum shall be anodized after fabrication.

E. Welding: Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" and supplemented by other standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.

In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall comply with the AWS Code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. Sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

F. Galvanizing: Where galvanizing is indicated, structural steel plates shapes, bars and fabricated assemblies shall be thoroughly cleaned of rust and scale and shall be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts (except ASTM A325), anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153.

2.2 ANCHOR BOLTS

A General: Anchor bolts shall comply with the following:

1. Anchor bolts shall be fabricated of materials complying with SSPWC Subsections 206-1.4.1 and 209-2.2 and as follows:

   Steel bolts ASTM A325

   Fabricated steel bolts ASTM A36

   Stainless steel bolts, nuts, washers ASTM A320, Type 316

2. Anchor bolt holes in equipment support frames shall not exceed the bolt diameters by more than 25 percent, up to a maximum oversizing of 1/4 inch. Unless otherwise indicated, minimum anchor bolt diameter shall be 1/2 inch. Anchor bolts for equipment shall be 316 stainless steel and shall be provided with leveling nuts which shall be tightened against flat surfaces to not less than 10 percent of the bolt's safe tensile stress.

3. Tapered washers shall be provided where mating surface is not square with the nut.

4. Expansion, wedge, or adhesive anchors set in holes drilled in the concrete after the concrete is placed is not permitted as substitution for anchor bolts except where otherwise indicated. Upset threads shall not be acceptable.

5. ASTM A307 anchor bolts are prohibited.

6. Anchor bolts located within the dry well or vaults shall be Type 316 stainless steel.

B. Adhesive Anchors: Unless otherwise indicated, drilled concrete or masonry anchors shall be adhesive anchors. Substitutions will not be considered unless accompanied with ICBO report verifying strength and material equivalency. Except as otherwise indicated, adhesive anchors shall comply with the following:

1. Epoxy adhesive anchors may be provided for drilled anchors where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails and reinforcing bars. Threaded rod shall be stainless steel Type 316.

2. Glass capsule, polyester resin adhesive anchors may be permitted in other locations.

C. Expanding-Type Anchors: Expanding-type anchors, where indicated, shall be Type 316 stainless steel. Size shall be as shown. Expanding-type anchors are prohibited from use in corrosive areas and in deteriorating concrete

2.3 POWER DRIVEN PINS

A. Materials: Power-driven pins for installation in concrete or steel in interior locations of nonprocess areas shall be heat-treated steel alloy complying with AISI 1062 or 4063 and shall be zinc-plated. Pins shall have capped or threaded heads capable of transmitting the shank loads. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank.

2.4 BOLTS

A. Bolt Requirements: Bolts shall comply with the following:

1. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

2. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.

B. Standard Service Bolts (Not Buried or Inside Tanks or Channels): Except where otherwise indicated, bolts and nuts shall be Type 316 stainless steel. Except as otherwise indicated herein, steel for bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A 320.

C. Bolts Buried or Inside Tanks or Channels: Unless otherwise indicated, bolts, anchor bolts, nuts and washers which are buried, submerged, or below the top of the wall inside any hydraulic structure shall be of Type 316 stainless steel.

D. Unless otherwise indicated, eyebolts shall conform to ASTM A 489.

2.5 SEAT ANGLES, SUPPORTS AND BRACKETS

A. Seat angles for supports and brackets shall be Type 316 L stainless steel.

B. Seat angles for grating shall be Type 316 L stainless steel.

2.6 IRON CASTINGS

A. Castings shall conform to the requirements of ASTM A 48 unless otherwise indicated.

2.7 ACCESS HATCHES

A. Valve vault hatches at SPS 14 shall be Type JD-AL-H20 Channel Frame Loading Access Door by The Bilco Company or approved equal. Hatches shall be as follows:

1. Vault access door shall be 8’ wide x 8’ long. The floor access door shall be a double leaf and pre-assembled from the manufacturer. Manufacturer shall design and provide any required intermediate beam supports as necessary to support the required span. Intermediate beams shall be type 316 stainless steel and be removable.
2. Access hatches shall be designed for AASHTO H-20 highway loading with a maximum allowable deflection of 1/150 of the span. Manufacturer to provide structural calculations stamped by a registered professional engineer. Operation of the covers shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Operation of the covers shall not be affected by temperature.

3. Covers: Shall be 1/4” (6mm) minimum aluminum diamond pattern.

4. Frame: Channel frame shall be extruded aluminum with bend down anchor tabs around the perimeter. A continuous Ethylene Propylene Diene Monomer (EPDM) gasket shall be mechanically attached to the aluminum frame to create a barrier around the entire perimeter of the cover and significantly reduce the amount of dirt and debris that may enter the channel frame.

5. Hinges: Shall be specifically designed for horizontal installation and shall be through bolted to the covers with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.
6. Drain Coupling: Provide a 1-1/2" (38mm) drain coupling located in the right front corner of the channel frame.
7. Lifting mechanisms: Manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the covers when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4" gusset support plate.

8. A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the covers and the latch release shall be protected by a flush, gasketed, removable screw plug. Hatches shall be provided with an automatic hold-open arm with release handle. Hatches shall be designed for easy opening from both inside and outside.

9. Hardware shall be as follows:

    a. Hinges: Heavy forged Type 316 stainless steel hinges, each having a minimum 1/4" (6mm) diameter Type 316 stainless steel pin shall be

provided and shall pivot so the cover does not protrude into the channel frame.

b. Covers shall be equipped with a stainless steel hold open arm that automatically locks the cover in the open position.

c. Covers shall be fitted with the required number and size of compression spring operators.

d. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.

e. Compression spring tubes shall be an anti-corrosive composite, all fasteners and hardware shall be Type 316 stainless steel material.

f. All other hardware shall be Type 316 stainless steel including but not limited to guide arm, hinges, hinge pins, hold open arm, lock assembly, lock strike, springs, spring tubes and lifting mechanism support shoes.

10. Hatch direction of swing of door leaves shall be 90 degrees from the mainline piping in the vault. Sizes given shall be for the approximate clear opening.

11. Hatches shall include a recessed hasp for a padlock that is covered by a hinged lid flush with the surface.

12. Type 316 stainless steel safety chains, consisting of 3/16-inch thick links, shall be mounted on both open sides of double door hatches.

13. Installation shall be in accordance with manufacturer's instructions.

14. Finish: Aluminum in contact with other metal or concrete shall be shop-painted with one coat of zinc chromate and 2 coats of approved aluminum metal-and-masonry paint.

15. Manufacturer's Warranty: Materials shall be free of defects in material and workmanship for a period of twenty-five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

A. Valve vault hatches at SPS 13, SPS 25A and SPS 85 shall be heavy duty angle type floor access door designed for direct traffic loading able to receive AASHTO H-20-44 wheel loads on two lane streets with opposing traffic and speeds up to 35 MPH. Doors shall be model DT-AHD as manufactured by U.S.F. Fabrication, Inc. or approved equal. Hatches shall be as follows:

1. Vault access door shall be 8′ wide x 6′ long (91″ by 72″ clear opening). The floor access door shall be double leaf and pre-assembled from the manufacturer.

2. Access hatch covers shall be reinforced to support AASHTO H-20-44 wheel loads on two lane streets with opposing traffic and speeds up to 35 MPH. .

Manufacturer to provide structural calculations stamped by a registered professional engineer. Operation of the covers shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Operation of the covers shall not be affected by temperature.

3. Covers: Shall be a minimum of 1/2" steel diamond pattern with hot dipped galvanized finish.

4. Frame: Shall be 1/2" minimum galvanized steel with anchoring system welded to the frame.

5. Hinges: Shall be specifically designed for horizontal installation and have Type 316 stainless steel hardware.

6. Lifting mechanisms: Manufacturer shall provide lift assist by a combination of gas shocks and springs.

7. A removable exterior key wrench handle shall be provided to open the covers and the latch release shall be protected by a flush, gasketed, removable screw plug. Hatches shall be provided with an automatic hold-open arm with locking pin. Hatches shall be designed for easy opening from both inside and outside.

8. Hardware

    a. All hardware shall be Type 316 stainless steel including but not limited to guide arm, hinges, hinge pins, hold open arm, lock assembly, lock strike, springs, spring tubes and lifting mechanism support shoes.

    b. Covers shall be equipped with a stainless steel hold open arm that automatically locks the cover in the open position.

    c. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.

9. Hatch opening direction for swing of door leaves shall be 90 degrees from the mainline piping in the vault.

10. Hatches shall include a recessed hasp for a padlock that is covered by a hinged lid flush with the surface.

11. Type 316 stainless steel safety chains, consisting of 3/16-inch thick links, shall be mounted on both open sides of double door hatches.

12. Installation shall be in accordance with manufacturer's instructions. Manufacturer shall guarantee against defects in material or workmanship for a period of five years.

13. Finish: Hot dipped galvanized steel finish shall be provided.

14. Manufacturer's Warranty: Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

2.8 PIPE COLUMNS

A. Pipe column steel shall conform to the requirements of ASTM A 53, Grade B.

2.11 MANHOLE FRAMES AND COVERS

A. Except as otherwise indicated, manhole frames and covers shall comply with SSPWC Subsection 206-3.3 and shall be fabricated of cast iron complying with ASTM A48, Class 30 and shall be the heavy-duty type designed for HS-20 highway loading, shall have a 24 inch clear frame opening and a minimum frame height of 4 1/2 inches and shall be equipped with a continuous-ring type gasket designed to minimize surface water inflow. Cover pattern shall be checkered pattern design and shall have concealed or closed pick holes with sufficient dimensions to allow for removal without special equipment. Bearing and wedging surfaces shall be machined to ensure a tight fit and to prevent rocking. Frames shall be provided with four 1-inch diameter holes for anchor bolts. The use of salvaged or scrap materials will not be permitted.

B. Covers shall be provided with a continuous, machined groove on either the underside bearing lip or the outer wedging edge of the cover. A groove on the bearing lip shall be fitted with a glued, continuous, low compression, set gasket; a groove on the outside edge shall be fitted with a neoprene O-ring seal.

C. Locking type, nongasketed frames and covers shall be provided where indicated. Locking covers shall have two locking wedges in the frame. Covers shall have two fingers which engage the locking wedges when the cover is positioned in the frame and turned.

2.12 MANUFACTURERS

A. Products of the type or model (if any) indicated shall be manufactured by one of the following (or equal):

1. Epoxy Adhesive Anchors:

   Sika/FI System with Sikadur Injection Gel Epoxy

   Masterbuilders Concresive Epoxy Cartridge Dispensing System and Concresive Paste LPL

2. Glass Capsule Polyester Resin Adhesive Anchors:

   Hilti HV

   Molly Parabond

3. Expanding-Type Anchors:

   Phillips Drill Company "Red Head"

   McCullock Industries "Kwick-Bolt"

4. Access Hatches:

   U.S.F. Fabrications, Inc.

   Babcock Davis

   Bilco Company

   Inryco-Milcor

   Milcor

5. Manhole Frames and Covers:

Neenah Foundry Company R 1642 with Self-Sealing Cover

Phoenix Iron Works P-1090 R/G

PART 3 – EXECUTION

3.1 GENERAL

A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

B. General: Fieldwork, including cutting and threading, shall not be permitted on galvanized items. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators. Grouting of anchor bolts with nonshrink or epoxy grouts, where indicated, shall be in accordance with Section 03315.

1. Drilling of bolts or enlargement of holes to correct misalignment will not be allowed.

2. Metalwork to be embedded in concrete shall be placed accurately and held in correct position while the concrete is placed or, if indicated, recesses or blockouts shall be formed in the concrete. The surfaces of metalwork in contact with or embedded in concrete shall be thoroughly cleaned. Recesses may be neatly cored in the concrete after it has attained its design strength and the metalwork grouted in place.

3. Holes shall be punched 1/16 inch larger than the nominal size of the bolts, unless otherwise indicated. Whenever needed, because of the thickness of the metal, holes shall be subpunched and reamed or shall be drilled.

4. Fabrication including cutting, drilling, punching, threading and tapping required for miscellaneous metal or adjacent work shall be performed prior to hot-dip galvanizing.

C. Craftsmanship: All Work shall be performed by craftsmen experienced in the fabrication of architectural metal work. Exposed surfaces shall be free from defects or other surface blemishes. All dimensions and conditions shall be verified in the field in advance. All joints, junctions, miters, and butting sections shall be precision-fitted, with no gaps occurring between sections, and all surfaces shall be flush and aligned.

3.2 INSTALLATION OF ANCHOR BOLTS

A. After anchor bolts have been embedded, their threads shall be protected by grease and the nuts run on.

B. Installation of adhesive, capsule and expansion anchors shall comply with the following:

1. All installation recommendations by the anchor system manufacturer shall be followed carefully, including maximum hole diameter.

2. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above 120 degrees F is not indicated. Overhead applications (such as pipe supports) shall not be allowed.

3. Use shall be limited to locations where exposure to acid concentrations higher than 10 percent, to chlorine gas, or to machine or diesel oils, is not indicated.

4. Concrete temperature (not air temperature) shall be compatible with curing requirements recommended by adhesive manufacturer. Anchors shall not be placed in concrete below 25 degrees F.

5. Anchor diameter and grade of steel shall comply with equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils.

6. Adhesive capsules of different diameters may be used to obtain proper volume for the embedment, but no more than two capsules per anchor may be used. When installing different diameter capsules in the same hole, the larger diameter capsule shall be installed first. Any extension or protrusion of the capsule from the hole is prohibited.

7. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill.

8. Holes shall be blown clean with compressed air and be free of dust or standing water prior to installation.

9. Anchor shall be left undisturbed and unloaded for full adhesive curing period.

3.3 INSTALLATION OF POWER DRIVEN PINS:

A. Power-driven pins shall be installed by a craftsman who is certified by the manufacturer as being qualified to install the manufacturer's pins. Pins shall be driven in one initial movement by an instantaneous force that has been carefully selected to attain the required penetration. Driven pins shall conform to the following requirements where "D" = Pin's shank diameter:

Material Penetrated by Pin	Material's Minimum Thickness	Pin's Shank Penetration in Supporting Material	Minimum Space From Pin's CL to Edge of Penetrated Material	Minimum Pin Space
Concrete	16D	6D minimum	14D	20D
Steel	1/4-inch	Steel thickness	4D	7D

3.4 INSTALLATION OF ACCESS HATCHES

A. Unless otherwise indicated, the WORK of this Section includes a 1/2-inch drain line to the nearest floor drain for all floor hatches. Installation shall be per manufacturers recommendations.

3.5 INSTALLATION OF DRILLED ANCHORS

A. Drilled anchors shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the indicated 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

3.8 INSTALLATION OF MANHOLE FRAMES AND COVERS

A. The installation of manhole frames and covers shall comply with SSPWC Subsection 301-1.6.

3.9 WELDING

A. Method: All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as indicated by the AWS Code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

C. Aluminum: All exposed welds shall be ground smooth and flush and shall be polished and anodized. Discoloration of exposed aluminum surfaces, whether or not due to welding, shall constitute a basis for rejection of the entire assembly.

** END OF SECTION **

SECTION 06650 - PLASTIC LINER FOR CONCRETE SURFACES

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing plastic lining to surfaces of pipes, manholes and other concrete structures.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02701 Precast Concrete Manholes
2. Section 02959 Manhole Rehabilitation and PVC Lining
3. Section 03463 Precast Concrete Vaults

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Catalogue of the manufacturer of plastic liner, including complete data indicating the physical properties and chemical resistance properties as described in Subsection 210-2 of SSPWC, and all details and dimensions per Subsection 210-2.4 of SSPWC.

2. Shop drawings indicating the installation procedures and dimensions and location of all joints or weld strips.

3. Results of all tests made on plastic liner material as indicated herein.

PART 2 – PRODUCTS

2.1 GENERAL

A. Materials for plastic liner and its installation shall comply with SSPWC, Subsection 210-2. Unless noted otherwise, liner shall be PVC T-Lock as manufactured by Ameron International or approved equal. Existing sewer manholes to be rehabilitated shall have PVC Arrowlock installed per Specification Section 02959, Manhole Rehabilitation and PVC Lining.

2.2 TESTS

A. Tests shall be made on samples taken from plastic sheets, joints or weld strips in compliance with SSPWC, Subsection 210-2.3. However, before testing in conformance with SSPWC, Subsection 210-2.3, the RESIDENT ENGINEER, will visually and manually inspect the lining with a putty knife or a similar instrument. Any imperfections found as a result of all of the above tests shall be repaired per manufacturer's instruction and RESIDENT ENGINEER's approval, and surfaces restored before placing the lining in service.

PART 3 – EXECUTION

3.1 INSTALLATION OF PLASTIC LINER

A. Plastic liner shall be installed in compliance with SSPWC, Subsection 311-1.

3.2 LINER ACCEPTANCE

A. The manufacturer, applicator, and the CONTRACTOR shall, upon completion of the work, make a field inspection of the lining and installation and shall provide the OWNER a written certificate of work compliance in their respective areas of responsibility.

** END OF SECTION **

SECTION 09800 - PROTECTIVE COATING

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A The WORK of this Section includes the protective coating of all indicated surfaces including surface preparation, pretreatment, coating application, touch-up, protection of surfaces not to be coated, cleanup, and all appurtenant work.

B. Definitions:

1. The term “paint”, “coatings”, or “finishes” as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, except galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.
2. The term “DFT” shall mean minimum dry film thickness, without any negative tolerance.

C. The following surfaces shall not be protective coated hereunder unless indicated.

1. Concrete except in chemical(s) containment areas
2. Stainless steel
3. Machined surfaces
4. Grease fittings
5. Glass
6. Equipment nameplates
7. Platform gratings, stair treads, door thresholds, and other walk surfaces

D. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the drawings are used to show exceptions to the schedules, to show or extend the limits of coating systems, or to clarify or show details for application of the coating systems.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02600 Piping Construction
2. Section 02630 Ductile Iron Pipe
3. Section 15000 Piping Components
4. Section 15100 Valves, General

1.3 CODES

A. The 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 Building Code

1.4 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. References herein to "SSPC Specifications" or "SSPC" shall mean the published standards of the Steel Structures Painting Council, 40 24th Street, 6th Floor, Pittsburgh, PA 15222.

2. References herein to "NACE" shall mean the published standards of the ational Association of Corrosion Engineers, P.O. Box 281340, Houston, TX 77218-8340.

3. Commercial Standards:

ANSI A13.1 Scheme for Identification of Piping Systems

ANSI/AWWA C105 Polyethylene Encasement for Ductile Iron Piping

ANSI/AWWA C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot-Applied

ANSI/AWWA C209 Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

ANSI/AWWA C217 Petrolatum and Petroleum Wax Tape Coatings for the Exterior of Connections and Fittings for Steel Water Pipelines

4. Federal Specifications:

TT-P-28 Paint, Aluminum, Heat Resisting (1200OF)

DOD-P-23236 Military Specification, Paint Coating Systems, Steel Ship Tank, Fuel and Salt Water Ballast

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300 unless indicated otherwise.

B. Submittals shall include the following information and be submitted at least 30 days prior to protective coating work.

1. Coating Materials List: The CONTRACTOR shall provide a coating materials list which indicates the manufacturer and the coating number, keyed to the coating systems herein, prior to or at the time of submittal of samples.

2. Paint Manufacturer's Catalogue: For each paint system to be used the CONTRACTOR shall submit manufacturer's catalogue containing the following data

a. Paint Manufacturer’s data sheet for each product used, including statements on the suitability of the material for the intended use.

b. Technical and performance information that demonstrates compliance with the system performance and material requirements.

c. Manufacturer’s Instructions and recommendations on surface preparation, thinning, mixing, handling, applying and proper storage.

d. Colors available for each product (where applicable).

e. Compatibility of shop and field applied coatings (where applicable).

f. Material safety data sheet for each product used.

C. Samples:

1. Samples of all paint, finishes, and other coating materials shall be submitted on 8.5-inch by 11-inch sheet metal. Each sample shall be completely coated over its entire surface with one protective coating material, type, and color.

2. Qualifications of Painting Subcontractor

a. Copy of a valid State of California license as required for the application of coatings.

b. Five references which show that the painting subcontractor has demonstrated successful experience with the indicated coating systems in the recent past. Provide the name, address and telephone number of the owner of each installation. The CONTRACTOR shall obtain the references from the subcontractor and submit them to the RESIDENT ENGINEER.

1.7 SERVICES OF MANUFACTURER

A. For submerged and severe service coating systems, the CONTRACTOR shall require the paint manufacturer to furnish the following services:

1. The manufacturer's representative shall furnish at least 6 hours of on-site instruction in the proper surface preparation, use, mixing, application and curing of the coating systems.

2. The manufacturer's representative shall personally observe the start of surface preparation, mixing, and application of the coating materials.

3. The manufacturer's representative shall provide technical support to resolve field problems associated with manufacturer's products furnished under this Contract or the application thereof.

4. The manufacturer shall certify that these services have been furnished, and the CONTRACTOR shall submit the certification within 7 days of completion of each paint system.

1.8 INSPECTION AND TESTING

A. General: The CONTRACTOR shall give the RESIDENT ENGINEER a minimum of 3 days' advance notice of the start of any field surface preparation work or coating application work, and a minimum of 7 days' advance notice of the start of any shop surface preparation work.

B. All such work shall be performed only in the presence of the RESIDENT ENGINEER, unless the RESIDENT ENGINEER has granted prior approval to perform such work in its absence.

C. Inspection by the RESIDENT ENGINEER, or the waiver of inspection of any particular portion of the work, shall not relieve the CONTRACTOR of its responsibility to perform the work in accordance with these Specifications.

D. Scaffolding shall be erected and moved to locations where requested by the RESIDENT ENGINEER to facilitate inspection. Additional illumination shall be furnished to cover all areas to be inspected.

E. Inspection Devices: The CONTRACTOR shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thicknesses of protective coatings. Dry-film thickness gauges shall be made available for the RESIDENT ENGINEER'S use at all times while coating is being done, until final acceptance of such coatings. The CONTRACTOR shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the RESIDENT ENGINEER.

F. Holiday Testing: The CONTRACTOR shall holiday test all coated ferrous surfaces inside a steel reservoir, or other surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures and surfaces coated with any of the submerged and severe service coating systems. Areas which contain holidays shall be marked and repaired or recoated in accordance with the coating

manufacturer's printed instructions and then retested. In addition to the above the RESIDENT ENGINEER may test any surfaces for any number of times at no additional cost to CONTRACTOR. All defects so found shall be corrected by the CONTRACTOR at no additional cost to the OWNER.

1. Coatings with Thickness Exceeding 20 Mils: For surfaces having a total dry film coating thickness exceeding 20 mils: pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the indicated coating thickness.

2. Coatings with Thickness of 20 Mils or Less: For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

G. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM, Elcometer model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

H. Surface Preparation: Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standard TM-01-70 and TM-01-75.

1.9 WARRANTY INSPECTION

A. A warranty inspection may be conducted during the eleventh month following completion of all coating and painting work. The CONTRACTOR and a representative of the coating material manufacturer shall attend this inspection. All defective work shall be repaired in accordance with these specifications and to the satisfaction of the OWNER. The OWNER may, by written notice to the CONTRACTOR, reschedule the warranty inspection to another date within the one-year correction period, or may cancel the warranty inspection altogether. If a warranty inspection is not held, the CONTRACTOR shall not be relieved of its responsibilities under the Contract Documents.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use.

B. Paint materials shall be carefully stored in a manner that will prevent damage and in an area that is protected from deleterious elements.

PART 2 – PRODUCTS

2.1 GENERAL

A. Suitability: The CONTRACTOR shall use suitable coating materials as recommended by Manufacturer for the intended service.

B. Compatibility: In any coating system 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. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

C. Colors: All colors and shades of colors of all coats of paint shall be as indicated or selected by the RESIDENT ENGINEER. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the RESIDENT ENGINEER.

D. Substitute or "Or Equal" Products:

1. To establish equality under Section 01600 – Products, Materials, Equipment, and Substitutions, the CONTRACTOR shall provide satisfactory documentation from the firm manufacturing the proposed substitute or "or-equal" material that said material meets the requirements and is equivalent or better than the listed materials in the following properties:

    a. Quality
    b. Durability
    c. Resistance to abrasion and physical damage
    d. Life expectancy
    e. Ability to recoat in future
    f. Solids content by volume
    g. Dry film thickness per coat
    h. Compatibility with other coatings
    i. Suitability for the intended service
    j. Resistance to chemical attack
    k. Temperature limitations in service and during application
    l. Type and quality of recommended undercoats and topcoats
    m. Ease of application
    n. Ease of repairing damaged areas
    o. Stability of colors

2. The City shall be the sole arbiter of substitutions and "or equals" and their decision shall be final. The process shall be as identified in Section 01600.

E. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the CONTRACTOR shall provide the name of least one successfully performing application of the proposed manufacturer's products in a project of comparable size and complexity constructed in the recent past.

F. The cost of all testing and analyzing proposed substitute materials that may be required by the RESIDENT ENGINEER shall be paid by the CONTRACTOR at no additional cost to the OWNER. If the proposed substitution requires changes in the contract work, the CONTRACTOR shall bear all such costs involved and the costs of allied trades affected by the substitution at no additional cost to the OWNER.

2.2 INDUSTRIAL COATING SYSTEMS

A. Material Sources: Each of the following manufacturers is capable of supplying many of the industrial coating materials indicated herein. Where manufacturers and paint numbers are listed, it is to show the type and quality of coatings that are required. Proposed substitute materials shall be considered as indicated above. All industrial coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, water, and wastewater treatment plants.

1. Tnemec Company
2. Carboline Coatings Company
3. Inorganic Coatings, Inc.
4. International (Courtaulds)
5. PPG Amercoat (formerly Ameron)

B. System 4 Aliphatic Polyurethane: Two component aliphatic acrylic polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, resistance to chemical fumes and severe weathering and with a minimum solids content of 58 percent by volume. Primer shall be a rust inhibitive two component epoxy coating with a minimum solids content of 68 percent by volume.

1. Prime coat (DFT = 5 mils), Tnemec 66HS, or equal.
2. Finish coat (one or more, DFT = 3 mils), Tnemec 1095, or equal.
3. Total system DFT = 8 mils.
4. More than one finish coat shall be applied as necessary to produce a finish with uniform color and texture.

C. System 7 Acrylic Latex: Single component, water based acrylic latex with a fungicide additive shall have a minimum solids content of 35 percent by volume. Prime coat shall be as recommended by manufacturer. The coating material shall be available in the ANSI safety colors.

1. Prime coat (DFT = 3 mils), as recommended by manufacturer.
2. Finish coats (2 or more, DFT = 6 mils), Tnemec 1029, or equal.

3. Total system DFT = 9 mils.

D. System 8 - Epoxy Equipment: Two component, rust inhibitive polyamide cured epoxy coating material shall provide a recoatable finish that is available in a wide selection of colors. The coating material shall have a minimum solids content of 66 percent by volume and be resistant to service conditions of condensing moisture, splash and spillage of lubricating oils, and frequent washdown and cleaning

1. Prime coat DFT = 4 mils, Tnemec 66HS, or equal.
2. Prime coat, where shop applied. (DFT = 3 mils), universal primer,Tnemec 394, or equal.
3. Finish coat (2 or more, DFT =8 mils), Tnemec 66HS, or equal.
4. Total system DFT = 11 mils.

E. System 11 Aliphatic Polyurethane, Concrete: Two component aliphatic polyester polyurethane coating material shall provide superior color and gloss retention, resistance to splash from acid and alkaline chemicals, and resistance to chemical fumes and severe weathering, and with a minimum solids content of 65 percent by volume. Filler-sealer compound shall be a two component epoxy material used to provide a smooth surface for the epoxy intermediate coat. The filler-sealer shall be applied to the entire concrete surface and worked into the concrete surface with a wide blade putty knife or squeegee. The intermediate coat shall be a high-build epoxy coating with a minimum solids content of 70 percent by volume.

1. Prime coat (Filler-sealer), Tnemec 218-1000, or equal.
2. Intermediate coat (DFT = 5 mils), Tnemec 66HS, or equal.
3. Finish coats (1 or more, DFT = 3 mils), Tnemec V290, or equal.

2.3 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. Materials Sources: The manufacturers' products listed in this paragraph are materials which satisfy the material descriptions of this paragraph and have a documented successful record for long term submerged or severe service conditions. Proposed substitute products shall be considered as indicated above.

B. System 101 - Wax-Tape: Wax-Tape coating materials and procedures shall be in accordance with ANSI/AWWA C217. Prefabricated tape shall be Trenton #1 Wax-Tape or equal. The system shall be a 3 part system with a total system DFT = 70 mils to 90 mils.

C. System 106 - Fusion Bonded Epoxy: All ferrous piping submerged, wetted, aboveground, exposed or buried, including internal wetted surfaces of pumps and valves, shall be Fusion-Bonded Epoxy Coated inside and outside. The coating material shall be a 100 percent powder epoxy applied in accordance with the ANSI/AWWA C213 "AWWA Standard for Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines," except that the surface preparation shall be as specified in the coating system schedule of this Section. The coating shall be applied using the

fluidized bed process and shall be 3M Scotchkote Coating 134 or equal. Refer to Section 02630, Ductile Iron Pipe for additional data.

1. Exterior non-buried or buried surface including valves, couplings, pipes, DFT = 24 mils minimum, 3M Scotchkote Coating 134 (electrostatic) or equal, applied in one coat.
2. Exterior and interior coating of ductile iron or steel pipe and fittings, DFT = 24 mils.
3. Interior coating of valves, DFT = 12 mils.
4. For field repairs, the use of a liquid epoxy will be permitted, applied in one coat to provide a DFT of 15 mils. The liquid epoxy shall be Scotchkote 312 or as recommended by the powder epoxy manufacturer.

2.4 SPECIAL COATING SYSTEMS

A. System 200 - PVC Tape: Prior to wrapping the pipe with PVC tape, the pipe and fittings first shall be primed using a primer recommended by the PVC tape manufacturer. After being primed, the pipe shall be wrapped with a 20-mil adhesive PVC tape, half-lapped, to a total thickness of 40 mils.

B. System 208 - Aluminum Metal Isolation: Two coats of a high build polyamide epoxy painting, such as Tnemec 66, or equal (8 mils). Total thickness of system DFT = 8.0 mils.

PART 3 – EXECUTION

3.1 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on all WORK.

B. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough cleaning and an adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given to insure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.

C. All damage to surface resulting from the WORK shall be cleaned, repaired, and refinished to original condition.

3.2 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing,

handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed.

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be stored under the conditions recommended by the Material Safety Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.3 PREPARATION FOR COATING

A. General: All surfaces to receive protective coatings shall be cleaned as indicated prior to application of coatings. The CONTRACTOR shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application. Surfaces to be coated shall be dry and free of visible dust.

B. Protection of Surfaces Not to be Coated: Surfaces which are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

C. All hardware, lighting fixtures, switchplates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

D. Care shall be exercised not to damage adjacent work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions. The CONTRACTOR shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.

E. Protection of Painted Surfaces: Cleaning and coating shall be scheduled so that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.

3.4 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC-SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

5. Commercial Blast Cleaning (SSPC-SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

6. Brush-Off Blast Cleaning (SSPC-SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust and paint which cannot be removed by a dull putty knife may remain.

7. Near-White Blast Cleaning (SSPC-SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

3.5 METAL SURFACE PREPARATION (UNGALVANIZED)

A. The minimum abrasive blasting surface preparation shall be as specified in the coating system schedules included at the end of this Section. Where there is a conflict between these specifications and the coating manufacturer's printed recommendations for the intended service, the more stringent degree of cleaning shall apply.

B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers, NACE Standard TM-01-70 - Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive and TM-01-75 - Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grits.

C. Oil, grease, welding fluxes and other surface contaminants shall be removed by solvent cleaning per SSPC-SP1 prior to blast cleaning.

D. All sharp edges shall be rounded or chamfered and all burrs, and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

E. The type and size of abrasive shall be selected to produce a surface profile that meets the manufacturer's recommendation for the specific coating and service conditions. Abrasive shall not be used unless approved by the RESIDENT ENGINEER.

1. Submerged and Severe Service

a. Automated blasting systems shall not be used for surfaces that will be in submerged service but are acceptable for severe service.

b. Abrasives for submerged and severe service coatings shall be clean, hard, sharp cutting crushed: no metallic abrasives shall be used.

2. Other Services

a. Either automated or manual methods of blasting may be used.

b. Abrasives shall be clean, oil-free metallic abrasives, composed of at least 50 percent grit.

F. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

G. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil/moisture separators which remove at least 95 percent of the contaminants.

H. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming or another approved method prior to painting.

I. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.

J. Damaged or defective coating shall be removed by the specified blast cleaning to meet the clean surface requirements before recoating.

K. If the specified abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC-SP2, or SSPC-SP3 may be used.

L. Shop applied coatings of unknown composition shall be completely removed before the specified coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC-SP1 before the abrasive blast cleaning work has been started.

M. Shop primed equipment shall be solvent cleaned in the field before finish coats are applied.

3.6 SURFACE PREPARATION FOR GALVANIZED FERROUS METAL

A. Galvanized ferrous metal shall be alkaline cleaned per SSPC-SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used, followed by brush-off blast cleaning per SSPC-SP7.

B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

3.7 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS, EXCLUDING STEEL RESERVOIR INTERIORS

A. General: All grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.

B. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning specified in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not specified in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC-SP6, Commercial Blast Cleaning. Areas of tightly adhering coatings shall be cleaned to SSPC-SP7, Brush-off Blast Cleaning, with the remaining thickness of existing coating not to exceed 3 mils.

C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the CONTRACTOR shall apply intermediate coatings per the paint manufacturer's recommendation for the specified coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.

E. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where job site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged and severe service coating systems unless indicated.

3.8 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. Surface preparation shall not begin until at least 30 days after the concrete or masonry has been placed.

B. All oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC-SP1 before abrasive blast cleaning.

C. Concrete, concrete block masonry surfaces and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface equivalent to the surface of the No. 80 grit flint sandpaper.

D. If acid etching is required by the coating application instructions, the treatment shall be made after abrasive blasting. After etching, rinse surfaces with water and test the pH. The pH shall be between neutral and 8.

E. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.

F. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhorst Model DB, or equal.

3.9 PLASTIC, FIBER GLASS, AND NONFERROUS METALS SURFACE PREPARATION

A. Plastic and fiber glass surfaces shall be sanded or brush off blast cleaned prior to solvent cleaning with a chemical compatible with the coating system primer.

B. Non-ferrous metal surfaces shall be solvent-cleaned SSPC-SP1 followed by sanding or brush-off blast cleaning SSPC-SP7.

C. All surfaces shall be clean and dry prior to coating application.

3.10 ARCHITECTURAL CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. The mortar surfaces shall be cured at least 14 days before surface preparation work is started.

B. Dust, dirt, grease, and other foreign matter shall be removed prior to abrasive blasting.

C. The masonry surfaces shall be prepared in accordance with the material manufacturer's printed instructions.

3.11 SHOP COATING REQUIREMENTS

A. Unless indicated otherwise, items of equipment, or parts of equipment which are not submerged in service, shall be shop primed and then finish coated in the field after installation with the indicated or approved color. The methods, materials, application

equipment and all other details of shop painting shall comply with this section. If the shop primer requires topcoating within a specified period of time, the equipment shall be finish coated in the shop and then touch-up painted after installation.

B. All items of equipment, or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have all surface preparation and coating work performed in the field.

C. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the specified quality in the field. Such equipment shall be primed and finish coated in the shop and touched up in the field with the identical material after installation. The CONTRACTOR shall require the manufacturer of each such piece of equipment to certify as part of its shop drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the shop drawings for the equipment.

D. For certain small pieces of equipment the manufacturer may have a standard coating system which is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the shop drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

E. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before topcoated, or less time if recommended by the coating manufacturer.

F. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturer's printed instructions.

G. The CONTRACTOR shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment shop drawings.

3.12 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with "Paint Application Specification No. 1, (SSPC PA1)," Steel Structures Painting Council.

B. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The CONTRACTOR shall schedule such inspection with the RESIDENT ENGINEER in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other zeterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.

F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner which will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperature exceeding the manufacturer's recommended maximum and minimum allowable.
2. Dust or smoke laden atmosphere.
3. Damp or humid weather.
4. When the substrate or air temperature is less than 5 degrees F above the dewpoint.
5. When air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.
6. When wind conditions are not calm.

I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables.

J. Steel piping shall be abrasive blast cleaned and primed before installation.

K. The finish coat on all work shall be applied after all concrete, masonry, and equipment installation is complete and the work areas are clean and dust free.

3.13 CURING OF COATINGS

A. The CONTRACTOR shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the stringent, prior to placing the completed coating system into service.

B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

C. Forced Air Ventilation of Steel Reservoirs and Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of enclosed hydraulic structures. During application and curing periods continuously exhaust air from the lowest level of the structure using portable ducting. After all interior coating operations have been completed provide a final curing period for a minimum of 10 days, during which the forced ventilation system shall operate continuously. For additional requirements, refer to the specific coating system being used.

3.14 IDENTIFICATION OF PIPING

A. Identification of all unburied piping, fittings, valves, pumps and equipment shall be in accordance with Section 15030, "Piping Identification Systems."

B. Every valve or connection, where it may be possible for a worker to be exposed to a hazardous substance, shall be labeled per General Industry Safety Orders, Article 112 and 5194.

C. All unburied pipe in structures and in chemical pipe trenches shall be color-code painted. Colors shall be as selected by the RESIDENT ENGINEER, or as indicated.

3.15 COATING SYSTEM SCHEDULES - FERROUS METALS

A. Coating System Schedule, Ferrous Metal - Not Galvanized:

	Item	Surface Prep.	System No.
FM1	All surfaces indoors and outdoors, exposed or covered, except those included below:	Commercial blast cleaning SSP-SP6	(4) Aliphatic polyurethane
FM2	Ferrous surfaces of couplings	Solvent cleaning SSPC-SP1 followed by near white metal blast cleaning SSPC SPS	(106) fusion-bonded epoxy
FM3	Buried surfaces that are not indicated to be coated elsewhere	White metal blast cleaning SSPC-SP5	(106) fusion-bonded epoxy
FM4	Surfaces of indoor equipment, not submerged.	Commercial blast cleaning SSPC-SP6	(8) epoxy, equipment
FM5	Surfaces exposed to sewage.	White metal blast cleaning SSPC-SP5	(106) fusion-bonded epoxy

FM-6	Buried pipe, couplings, fittings, valves, and flanged joints (where piping is ductile or cast iron,	Removal of dirt, grease, oil	(106) fusion-bonded epoxy and (101) Wax-Tape
FM-7	Exposed pipe, couplings, fittings, valves, and flanged joints (where piping is ductile or cast iron)	Removal of dirt, grease, oil	(106) fusion-bonded epoxy

B. Coating System Schedule, Ferrous Metal Galvanized: Pretreatment coatings, barrier coatings, or washes shall be applied as recommended by the coating manufacturer. All galvanized surfaces shall be coated.

	Item	**Surface Prep.**	**System No.**
FMG-1	All exposed surfaces indoors and outdoors, except those included below.	Solvent cleaning SSPC-SP1	(4) aliphatic polyurethane

3.16 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBER GLASS

A. Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	**Surface Prep.**	**System No.**
NFM-1	All exposed surfaces, indoors and outdoors, except those included below.	Solvent cleaned SSPC-SP1	(4) aliphatic polyurethane
NFM-2	Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal.	Solvent cleaned SSPC-SP1	(208) aluminum metal isolation
NFM-3	Polyvinyl chloride plastic piping, indoors and outdoors, or in structures, not submerged.	Solvent cleaned SSPC-SP1	(7) acrylic latex
NFM-4	Buried non-ferrous metal pipe.	Removal of dirt, grease, oil	(200) PVC tape

3.17 COATING SYSTEM SCHEDULE-CONCRETE

	Item	**Surface Prep.**	**System No.**
C-1	All surfaces indoors and outdoors, unless noted otherwise.	Per Paragraph 3.8	(11) aliphatic polyurethane, concrete

3.18 COATING SYSTEM SCHEDULE-CONCRETE BLOCK MASONRY

	Item	Surface Prep.	System No.
CBM-1	All surfaces, indoors and outdoors, unless noted otherwise.	Per Paragraph 3.10	(11) aliphatic polyurethane, concrete

** END OF SECTION **

SECTION 10400 - IDENTIFYING DEVICES

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing all signs and other identifying devices and all appurtenant work.

1.2 CODES

A. The 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 Building Code
2. Uniform Sign Code

1.3 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Shop Drawings: Submit shop drawings for fabrication and erection of identification device. Include plans, elevations, and large scale details of sign wording and lettering layout. Show fasteners, mountings, anchorages and accessory items.

a. Furnish location template drawings for supported or anchored to permanent construction.

b. Style and colors of lettering shall be as selected by the RESIDENT ENGINEER from manufacturer's standards.

c. Full-size rubbings shall be furnished for metal plaques. Rubbing shall clearly indicated all letter styles and sizes as well as the overall outline of plaque. Additional drawings shall be provided as required to completely define anchorages, mountings and accessory items.

2. Product Data: Manufacturer's technical data and installation instructions shall be submitted for each type of sign required.

3. Samples: The CONTRACTOR shall submit to the RESIDENT ENGINEER for approval, samples of all the materials and colors he proposes to use on the WORK. The samples shall be clearly marked to show the manufacturer's name and product identification. Accepted sample units may be installed as part of the WORK, with the RESIDENT ENGINEER'S permission.

PART 2 – PRODUCTS

2.1 GENERAL

A. Wording on all identification devices shall be as per schedule.

B. Uniformity of Manufacturer: The CONTRACTOR shall furnish products of a single manufacturer for each sign type and graphic image process indicated.

2.2 SIGNS

A. General: Signs or warnings shall be painted. Paint materials shall be baked enamel on aluminum.

1. Signs shall conform to OSHA Standards and directions. Locations, sizes, and colors shall be as reviewed by the RESIDENT ENGINEER.

2. The lettering sizes shall be 3-inch in height unless shown or specified otherwise.

3. Each sign shall be in both English and Spanish as defined below.

B. Non-Potable Water: The following warning sign shall be provided at all hose bibb locations where water is non-potable:

CAUTION	PRECAUCION
NON POTABLE WATER	AGUA NO POTABLE
DO NOT DRINK	NO BEBA

C. The following sign shall be provided in all new and existing underground structures into which employees may enter.

CAUTION	PRECAUCION
VENTILATE BEFORE ENTERING	VENTILAR ANTES DE ENTRAR

2.3 METAL LETTERS AND NUMBERS

A. Metal letters and numbers shall be provided in compliance with the requirements indicated for the manufacturing process, materials, finish, style, size and message content.

B. Letters and numbers shall be formed by casting aluminum to produce characters with smooth, flat faces, sharp corners, precisely-formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of the characters and tap to receive threaded mounting studs.

C. Baked Enamel Finish: Finish shall be AA-M4xC12C42R1x, manufacturer's standard non-directional mechanical finish including sanding and filing, cleaning with inhibited chemicals, conversion coating with an acid-chromate-fluoride-phosphate treatment and painting with manufacturer's standard organic thermosetting enamel system consisting of a prime coat and a finish coat.

2.4 MISCELLANEOUS LETTERS AND NUMBERS

A. Plastic: Plastic letters shall be 4-inch Helvetica Medium lower case cut from 1/4-inch thick acrylic plastic, finished with auto paint coating of color selected by the RESIDENT ENGINEER.

B. Wording: The lettering shall read as indicated. Number shall be verified before ordering.

2.5 MANUFACTURERS

A. Products shall be of the following manufacture and type (or equal):

1. Nameplates:

Builders Brass Works, "460 Series"
Desk and Door Nameplate Co., "Elite Sign System"
Vomar Products, Inc., "ES100 Series"

2. Metal letters:

A.R.K. Ramos
James H. Matthews and Co.
Metal Arts

PART 3 – EXECUTION

3.1 GENERAL

A. Identifying devices shall be installed where directed by the RESIDENT ENGINEER.

B. All installations of identifying devices shall be vandal-resistant. Fasteners shall be concealed, non-corrosive fasteners appropriate for materials being fastened and as required.

C. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

D. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

3.2 METAL LETTERS AND NUMBERS

A. Metal letters and numbers shall be mounted using standard fastening methods recommended by the manufacturer for the letter form, type of mounting, wall construction and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

1. Flush Mounting: Letters shall be mounted with backs in contact with the wall surface.

** END OF SECTION **

SECTION 15000 - PIPING COMPONENTS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing fittings, hangers, supports, anchors, expansion joints, flexible connectors, insulation, lining and coating, testing, disinfection, and accessories.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 05500 Miscellaneous Metalwork
2. Section 09800 Protective Coating
3. Section 15010 Mill Piping - Exposed and Buried
4. Section 15020 Pipe Supports

1.3 CODES

A. The WORK of this Section shall comply with the current editions, with revisions, of the following codes and City of San Diego Supplements:

1. Uniform Mechanical Code
2. Uniform Plumbing Code
3. Uniform Fire Code

1.4 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following applies to the WORK of this Section:

1. ANSI/ASME B1.20.1 Pipe Threads, General Purpose (inch)

2. ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys

3. ANSI/ASME B31.1 Power Piping

4. ANSI/AWWA C111 Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings

5. ANSI/AWWA C150 Thickness Design for Ductile Iron Pipe

6. ANSI/AWWA C153 Ductile Iron Compact Fittings, 3 In through 24 In and 54 In Through 64 In for Water Service

7. ANSI/AWWA C207 Steel Pipe Flanges for Water Works Service, Sizes 4 in. Through 144 in.

8. ANSI/AWWA C213 Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines

9. ANSI/AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 In Through 12 In for Water Distribution

10. ANSI/AWS D10.9 Specifications for Qualifications of Welding Procedures and Welders for Piping and Tubing

11. ASTM A 123 Specification for Zinc Coatings on Iron and Steel Products

12. ASTM A 536 Ductile Iron Castings

13. ASTM D 792 Test Methods for Specific Gravity and Density of Plastics by Displacement

14. ASTM D 2000 Classification System for Rubber Products in Automotive Applications

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Shop drawings showing dimensions and details of pipe joints, fittings, fitting specials, valves and appurtenances.

2. Detailed layout, spool, or fabrication drawings showing pipe spools, spacers, adapters, connectors, fittings, and pipe supports.

1.7 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's product data.
2. Manufacturer's installation instructions.
3. Manufacturer's certification of compliance.
4. Statement from the pipe fabricator certifying that all pipe will be fabricated subject to a Quality Control Program.
5. Outline of Quality Control Program.

1.8 INSPECTION, TESTING AND WELDING

A. Inspection: Products shall be inspected at the manufacturer's plant.

B. Tests: Materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.

C. Welding Requirements: Welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D10.9. Welding procedures shall be required for longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

D. Welder Qualifications: Welding shall be performed by skilled operators who have had adequate experience in the methods and materials to be used and have been qualified under the provisions of ANSI/AWS D10.9 by an independent approved testing agency not more than 6 months prior to commencing work on the pipeline. Machines and electrodes similar to those used in the WORK shall be used in qualification tests.

1.9 FACTORY TESTING

A. Product Testing: Products shall be tested at the factory for compliance with the indicated requirements.

B. Witnesses: The OWNER and the RESIDENT ENGINEER (at the option of either) reserves the right to witness factory tests.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials: Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.

B. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

PART 2 – PRODUCTS

2.1 GENERAL

A. Miscellaneous Small Pipes: Miscellaneous small pipes and fittings shall comply with Section 15010.

B. Pipe Supports: Pipes shall be properly supported in accordance with Section 15020.

C. Coating: Pipes above ground or in structures shall be field-painted in accordance with Section 09800.

D. Pressure Rating: Except as otherwise indicated, piping systems shall be designed for 150 percent of the maximum indicated pressure.

E. Grooved Piping Systems: Grooved couplings on buried piping must be bonded. Grooved fittings, couplings, and valves shall be from the same manufacturer.

2.2 PIPE FLANGES

A. Flanges: Where the design pressure is 150 psi or less, flanges shall conform to either ANSI/AWWA C207 Class D or ANSI B16.5 150-lb class. Where the design pressure is greater than 150 psi, up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E, Class F, or ANSI B16.5 150-lb class. Where the design pressure is greater than 275 psi up to a maximum of 700 psi, flanges shall conform to

ANSI B16.5 300-lb class. Flanges shall be attached to the pipe in accordance with ANSI/AWWA C207.

B. Blind Flanges: Blind flanges shall comply with ANSI/AWWA C207. Blind flanges for pipe sizes 12 inches and larger shall include lifting eyes in form of welded or screwed eye bolts.

C. Flange Coating: Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

D. Flange Bolts: Bolts and nuts shall comply with Section 05500. Studs and bolts shall extend through the nuts a minimum of 1/4-inch. All-thread studs may be used only on valve flange connections where space restrictions preclude the use of regular bolts.

E. Insulating Flanges: Insulated flanges shall have bolt holes 1/4-inch diameter greater than the bolt diameter.

F. Insulating Flange Sets: Insulating flange sets shall be provided where indicated and shall consist of insulating gaskets, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2-inch or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2-inch, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic. Steel washers shall comply with ASTM A 325. Insulating gaskets shall be full-face.

G. Flange Gaskets: Except as noted otherwise, gaskets for flanged joints shall be full-face, 1/16-inch thick sheets of virgin graded teflon, suitable for temperatures to 550 degrees F, a pH of 0 to 14, and pressures to 1400 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.

2.3 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, and couplings shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are indicated.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties suitable for the service and loading conditions indicated.

2.4 MECHANICAL-TYPE COUPLINGS (GROOVED OR BANDED PIPE)

A. General: Cast mechanical-type couplings shall be provided where shown. Bolts and nuts shall conform to Section 05500. Gaskets for mechanical-type couplings shall be compatible with the piping service and fluid utilized in accordance with the coupling manufacturer's recommendations. The wall thickness of all grooved piping shall conform with the coupling manufacturer's recommendations suitable for the highest pressure indicated.

2.5 SLEEVE-TYPE COUPLINGS

A. Construction: Sleeve-type couplings shall be installed where indicated and shall include Type 316 stainless steel bolts, without pipe stop, and shall be sized to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7 inches long for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Bolts and nuts shall conform to Section 05500. Buried sleeve-type couplings shall be fusion bonded epoxy-coated at the factory. Couplings installed within dry wells shall be restrained with threaded type 316 stainless steel restraining rods connecting across adjacent flanges to prevent lateral movement.

B. Pipe Preparation: The ends of the pipe, where indicated, shall be prepared for flexible couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.

C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N," grade 60, or equivalent suitable elastomer. The rubber in the gasket shall comply with the following:

1. Color - Jet Black
2. Surface - Non-blooming
3. Durometer Hardness - 74 ± 5
4. Tensile Strength - 1000 psi Minimum
5. Elongation - 175 percent Minimum

The gaskets shall resist deterioration caused by impurities normally found in water or wastewater. Gaskets shall comply with ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as otherwise indicated. Gaskets shall be compatible with the piping service and fluid utilized.

D. Insulating Couplings: Where insulating couplings are indicated, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to insulate coupling metal parts from the pipe.

E. Restrained Sleeve Couplings

1. Harnesses for flexible sleeve type couplings shall be in accordance with the requirements of the appropriate reference standards and standard practices. All hardware shall be 316 stainless steel. Couplings shall be fusion bonded epoxy lined/coated. Buried restrained sleeve couplings shall be EBAA Iron Series 3800, Romac or approved equal.

2.6 RESTRAINED JOINTS

A. Mechanical and Push-On Joints: Restraints shall be provided where shown and may be provided in lieu of concrete thrust blocks.

a. Mechanical joint restraint mechanisms shall consist of individually activated multiple gripping devices which incorporate breakoff actuating units and permanent nuts for future disassembly. Pressure ratings shall be:

(1) Ductile Iron Pipe

(a) 3 to 6 inch diameter: 350 psi (2:1 safety factor)

(b) 18 to 48 inch diameter: 250 psi (2:1 safety factor)

(2) PVC Pipe

(a) 3 to 36 inch diameter: full pressure rating or pressure class of pipe (2.5:1 safety factor)

b. Push-on joints for steel pipes shall be in accordance with the appropriate reference standards and standard practice.

c. Restrained push-on joints for all other pipe materials shall be comprised of two rings with connecting rods. The restraint ring shall be on the spigot, and a plain or slit bell ring shall be on the bell. Pressure ratings shall be:

(1) Ductile Iron Pipe

(a) 3 to 16 inch diameter: 350 psi (2:1 safety factor)

(b) 18 to 48 inch diameter: 250 psi (2:1 safety factor)

(2) PVC Pipe

(a) 3 to 12 inch diameter: 305 psi (2:1 safety factor)

(b) 14 to 16 inch diameter: 235 psi (2:1 safety factor)

(c) 18 to 30 inch diameter: 165 psi (2:1 safety factor)

(d) 36 inch diameter: 125 psi (2:1 safety factor)

(3) Dimensions of push-on bell restraints shall be compatible with ANSI/AWWA C150 and C900 for ductile iron or PVC pipe, respectively.

d. Restraint glands shall be of ductile iron conforming to ASTM A 536. Dimensions of the glands shall be compatible with standard mechanical joint bell and tee head bolts conforming to ANSI/AWWA C111 and C153, respectively.

e. Bolts and nuts shall conform to Section 05500.

2.7 FLEXIBLE CONNECTORS

A. Flexible connectors shall be provided in all piping connections to engines, blowers, compressors, vibrating equipment, and where indicated. Flexible connectors for service temperatures up to 180 degrees F shall be flanged reinforced neoprene or butyl rubber spools, rated for working pressures of 40 to 150 psi or reinforced flanged rubberized duck, as best suited for the application. For temperatures above 180 degrees F, flexible connectors shall be flanged braided Type 316 stainless steel spools with inner corrugated stainless steel hose rated for minimum 150 psi working pressure unless indicated otherwise. Connectors shall be minimum of 9 inches face to face between flanges. Material selection shall be proposed by the manufacturer based on the application. Provide Type 316 stainless steel retaining rods for all installations.

2.8 FLEXIBLE EXPANSION JOINTS

A. Linear, Angular, and Lateral Movement: Use flexible expansion joints consisting of expansion sleeve and ball-and-socket joints in a single unit. Each unit shall be capable of minimum 20 degrees angular motion in any direction, and the expansion sleeve shall be capable of minimum 4 inches of linear travel. Joints shall flanged, be suitable for the pressure and temperature application and be ductile iron conforming to ANSI/AWWA C153.

Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 350 psi. A minimum 2:1 safety factor, determined from the published pressure rating, shall apply. Factory Mutual Approval for the 3 inch through 12 inch sizes is required.

All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications.

Manufacturer's certification of compliance to the above standards and requirements shall be readily available upon request. The purchaser (or owner) shall reserve the right to inspect the manufacturer's facility for compliance. All flexible expansion joints shall be FLEX-TEND as manufactured by EBAA Iron, INC., Eastland, TX, U.S.A. or approved equal.

2.9 PIPE THREADS

A. Pipe threads shall comply with ANSI/ASME B1.20.

2.10 AIR AND GAS TRAPS

A. Air and gas pipes shall be sloped to low points, provided with drip legs, strainers and traps. The traps shall be piped to the nearest drain. Air and gas traps shall be 150-lb

iron body float type with copper or stainless steel float. Bracket, lever, and pins shall be of stainless steel.

2.11 FLANGED COUPLING ADAPTERS

A. Flanged coupling adapters shall be restrained type and specifically designed to work with the pipe materials being connected. Working pressure shall be a minimum of the pressure rating of the pipe. Flanged adapters shall have ductile iron bodies (ASTM A536), 316 stainless steel hardware and fusion bonded lining/coatings. Adapters shall be EBAA Iron Series 2100 or approved equal.

2.12 DISMANTLING JOINTS

A. Dismantling joints shall be the restrained type with tie rods. They shall have ductile iron bodies (ASTM A536), 316 stainless steel hardware and fusion bonded lining/coatings. Dismantling joints shall be Romac model DJ400 or approved equal.

2.13 MANUFACTURERS

A. Manufacturers: Products of the type or model (if any) indicated shall be manufactured by one of the following (or equal):

1. Insulating Flanges:

JM Red Devil, Type E
Maloney Pipeline Products Co.
PSI Products, Inc.

2. Flange Gaskets:

John Crane, Style 2160
Garlock, Style 3000

3. Steel Pipe Couplings:

Gustin-Bacon (banded or grooved)
Victaulic Style 41 or 44 (banded)
Victaulic Style 77 or 07 (grooved)

4. Ductile Iron Pipe Couplings:

Gustin-Bacon
Victaulic Style 31

5. Couplings for PVC Pipe:

Gustin-Bacon
Victaulic Style 775

6. Sleeve-Type Couplings:

   Dresser, style 38
   Ford Meter Box Co., Inc., Style FC1 or FC3
   Smith-Blair, Style 411

7. Air and Gas Traps:

   Armstrong Machine Works
   Spirax Sarco, Inc.

8. Restrained Couplings and Mechanical Joint Restraints:

   EBAA Iron, Inc.
   Romac

9. Flexible Expansion Joints:

   EBAA Iron, Inc.

PART 3 – EXECUTION

3.1 GENERAL

A. Pipes, fittings, and appurtenances shall be installed in accordance with the manufacturer's installation instructions.

B. Threaded pipe ends and joints shall be epoxy coated in compliance with Section 09800.

** END OF SECTION **

SECTION 15010 - MILL PIPING - EXPOSED AND BURIED

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing small steel pipe, stainless steel pipe and tubing, red brass pipe, copper pipe and tubing, and solvent-welded PVC pipe, with fittings, gaskets, bolts, insulating connections, and other specialties required for an operable piping system.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 15000 Piping Components

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

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 B16.3 Malleable Iron Threaded Fittings, Classes 150 and 300
2. ANSI/ASME B16.4 Cast Iron Threaded Fittings, Class 125 and 250
3. ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys
4. ANSI B16.11 Forged Steel Fittings, Socket-Welding and Threaded
5. ANSI B16.12 Cast-Iron Threaded Drainage Fittings
6. ANSI/ASME B16.15 Cast Bronze Threaded Fittings, Classes 125 and 250
7. ANSI B16.21 Nonmetallic Flat Gaskets for Pipe Flanges
8. ANSI B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
9. ANSI/ASME B16.24 Cast Copper Alloy Pipe Flanges and Flanged Fittings

10. ASTM A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

11. ASTM A 105 Specification for Forgings for Piping Components

12. ASTM A 106 Specification for Seamless Carbon Steel Pipe for High Temperature Service

13. ASTM A 269 Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service

14. ASTM A 312 Specification for Seamless and Welded Austenitic Stainless Steel Pipe

15. ASTM B 42 Specification for Seamless Copper Pipe, Standard Sizes

16. ASTM B 43 Specification for Seamless Red Brass Pipe, Standard Sizes

17. ASTM B 62 Specification for Composition Bronze or Ounce Metal Castings

18. ASTM B 88 Specifications for Seamless Copper Water Tube

19. ASTM D 1785 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's product specifications and performance information.

PART 2 – PRODUCTS

2.1 SMALL STEEL PIPE

A. Unless otherwise indicated, galvanized steel pipe and black steel pipe in sizes 6 inches in diameter and smaller shall conform to the requirements of ASTM A 53 and ASTM A 106 and shall be Schedule 40 or 80 as indicated. Fittings for galvanized steel pipe shall be of galvanized malleable iron, with NPT or grooved ends as indicated. Black pipe may have welded joints, with standard or extra strong welded fittings unless otherwise indicated in the Piping Schedule.

2.2 STAINLESS STEEL PIPE

A. Unless otherwise indicated, stainless steel pipe shall be Type 316 Schedule 40 threaded pipe conforming to ASTM A 312 with stainless steel threaded fittings, or with stainless steel welded fittings, where indicated. Lightweight stainless steel pipe shall be Type 316 Schedule 10 pipe conforming to ASTM A 312, with stainless steel welding fittings.

2.3 STAINLESS STEEL TUBING

A. Stainless steel tubing shall be made of Type 316 L stainless steel to the requirements of ASTM A 269, of minimum 1/4-inch inside diameter, or as indicated, for the test pressure required. The fittings shall be swage ferrule design of Type 316 L stainless steel, of the double acting ferrule design, providing both a primary seal and a secondary bearing force. Flare bite or compression type fittings are not acceptable.

2.4 RED BRASS PIPE

A. Brass pipe shall conform to the requirements of ASTM B 43. Fittings shall be of bronze conforming to the requirements of ASTM B 62 with threaded ends, conforming to ANSI/ASME B16.15.

2.5 COPPER PIPE

A. Copper pipe shall be hard drawn, to the requirements of ASTM B 42, with regular or extra strong wall thickness, as required for the test pressure. Copper pipe shall have screwed ends for NPT fittings, or brazed joints. The fittings shall be threaded cast bronze fittings to the requirements of ANSI/ASME B16.15, class 125 or 250, as required, or flanged cast copper alloy fittings to the requirements of ANSI/ASME B16.24, with 150 lbs rating, or as required.

2.6 COPPER TUBING

A. Copper tubing shall conform to the requirements of ASTM B 88 and shall be Type K, soft temper for buried tubing and hard drawn for above-ground application. Fittings shall be soldered or sweated on and shall be of wrought copper conforming to ANSI B16.22. Soldered joints shall contain 95-percent tin and 5-percent antimony. For oxygen service, joints shall be made with silver solder. No solders or fluxes containing more than 0.2 percent of lead shall be used.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Mill piping shall be installed in accordance with the manufacturer's installation instructions.

B. Small Steel Pipe: Buried galvanized or black steel pipe shall be coated in accordance with Section 09800 or with an extruded high density polyethylene coating with minimum thickness of 35 mils.

C. Plastic Pipe: Pipe joints shall be solvent-welded in accordance with the manufacturer's instructions. Expansion joints or pipe bends shall be installed to absorb pipe expansion over a temperature range of 100 degrees F, unless otherwise indicated. Care shall be taken to provide sufficient supports, anchors, and guides, to eliminate stress on the piping.

** END OF SECTION**

SECTION 15020 - PIPE SUPPORTS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing pipe supports, hangers, guides, and anchors.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 05500 Miscellaneous Metalwork
2. Section 09800 Protective Coating
3. Section 15000 Piping Components

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

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 B31.1 Power Piping
2. ANSI/MSS SP-58 Standard Pipe Support Components

1.5 SHOP DRAWINGS AND SAMPLES

A. Submittals shall comply with Section 01300 and Section 15000 and shall include:

1. Shop drawings of pipe supports including details of concrete inserts.
2. Structural design calculations.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

A. General: Piping systems including connections to equipment shall be properly supported to prevent deflection and stresses. Supports shall comply with ANSI/ASME B31.1, except as otherwise indicated.

B. ANSI/MSS Types: Except as otherwise indicated, pipe support components shall comply with the types in ANSI/MSS SP-58.

C. Support Spacing: Supports for horizontal piping shall be properly spaced. Except as otherwise indicated, pipe support spacing shall comply with the following:

1. Support Spacing for Schedule 40 & 80 Steel Pipe:

Pipe Size inches	Max. Span feet
1/2	6
3/4 & 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 & 10	19
12 & 14	23
16 & 18	25
20 & Above	30

2. Support Spacing for Copper Tubing:

Tube Size Inches	Max. Span feet
1/2 to 1-1/2	6
2 to 4	10
6 & Above	12

3. Support Spacing for Schedule 80 PVC Pipe:

Pipe Size inches	Max Span (@ 100 degrees F) feet
1/2	4
3/4	4
1	5
1-1/4	5
1-1/2	5
2	6
3	7
4	8
6	10
8	11
10	12
12	13

4. Support Spacing for Schedule 80 Polypropylene Pipe:

Pipe Size inches	Max Span (@ 100 degrees F) feet
1/2	3
3/4	3
1	3
1-1/4	4
1-1/2	4
2	4
3	5
4	6
6	7
8	8
10	8
12	9

5. Support Spacing for Fiberglass Reinforced Plastic Pipe:

Pipe Size inches	Max. Span (@ 100 degrees F) feet
2	8
3	10
4	11
6	12
8	13
10	14
12	15
14	16
16	17
18 & Above	18

6. Support Spacing for Ductile Iron Pipe:

Pipe Size	Max. Span
All Sizes	2 Supports per length or 10 feet (One of the 2 supports located at joint)

7. Variances: For temperatures other than ambient temperatures and for other piping materials or wall thicknesses, the above spacings shall be modified in accordance with the pipe manufacturer's recommendations.

8. Additional Supports: Additional supports complying with ANSI B31.1 shall be provided at critical elbows, valves, gauges, and meters.

D. Pipe Hangers: Pipe hangers shall be capable of supporting the pipe, shall allow for free expansion and contraction of the piping, and shall prevent excessive stress on equipment. Hangers shall have a means of vertical adjustment after erection. Hangers shall be designed so that they cannot become disengaged by any movement

of the pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves, shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loading, only.

E. Hangers Subject to Horizontal Movements: At hanger locations where lateral or axial movement is indicated, suitable linkage shall be provided to permit movement. Where horizontal pipe movement is greater than 1/2-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from minimum to maximum temperature, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

F. Spring-Type Hangers: Spring-type pipe hangers shall be provided for piping where vibration or vertical expansion and contraction is indicated, (engine exhausts and similar piping). Spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions indicated. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate at all times the compression of the spring. Supports shall be designed for a maximum variation of 25 percent for the total travel resulting from thermal movement.

G. Thermal Expansion: Wherever expansion and contraction of piping is indicated, a sufficient number of expansion loops or joints shall be provided, with rolling or sliding supports, anchors, guides, pivots, and restraints. They shall permit the piping to expand and contract freely in directions away from the anchored points and shall be structurally suitable to withstand all loads imposed.

H. Heat Transmission: Supports, hangers, anchors, and guides shall be designed and insulated so that excessive heat shall not be transmitted to the structure or to other equipment.

I. Riser Supports: Risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

J. Freestanding Piping: Free-standing pipe connections to equipment, including chemical feeders and pumps, shall be firmly attached to fabricated steel frames made of angles, channels, or I-beams anchored to the structure. Exterior, free-standing overhead piping shall be supported on fabricated pipe stands, consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles and U-bolts or clamps installed to secure piping.

K. Submerged Supports: Submerged piping shall be supported with hangers, brackets, clips, or fabricated supports and stainless steel anchors complying with Section 05500.

L. Point Loads: Meters, valves, heavy equipment, and other point loads on PVC, fiberglass, and other plastic pipes, shall be supported on both sides according to manufacturer's recommendations to avoid pipe stresses. Supports on plastic and fiberglass piping shall be equipped with extra wide pipe saddles or galvanized steel shields.

M. Noise Reduction: To reduce transmission of noise in piping systems, copper tubes shall be wrapped with a 2-inch wide strip of rubber fabric at each pipe support, bracket, clip, and hanger.

N. Structural Design: Pipe supports, anchors, and restrainers shall be designed for static, dynamic, wind, and seismic loads. The horizontal seismic design force shall be the greater of that indicated in the project Geotechnical Report or the requirement of the IBC for Seismic Zone 4.

2.2 COATING

A. Galvanizing: Fabricated pipe products, except stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM 123.

B. Other Coatings: Other than stainless steel or non-ferrous supports, supports shall be coated in accordance with Section 09800.

2.3 MANUFACTURERS

A. Pipe supports shall be manufactured by one of the following (or approved equal):

Basic Engineers

Bergen-Paterson Corp.

ITT-Grinnell Corp.

NPS Industries, Inc.

Powerstrut

Unistrut

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's installation instructions and ANSI/ASME B31.1.

B. Appearance: Supports and hangers shall be installed to produce an orderly, neat piping system. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings as possible and without interference with other work.

** END OF SECTION **

SECTION 15030 - PIPING IDENTIFICATION SYSTEMS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing identification devices for all piping and valves using color bands, lettering, flow direction arrows, and related permanent identification devices, and all appurtenant works. The WORK of this Section also includes providing identification devices for all hazardous materials storage and conveyance facilities.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 09800 Protective Coating
2. Section 10400 Identifying Devices
3. Divisions 2 and 15 Piping, Valves, and Appurtenances, as applicable

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

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 A13.1	Scheme for the Identification of Piping Systems
2.	ANSI Z535.1	Safety Color Code
3.	MIL-STD-810	Environmental Test Methods and Engineering Guidelines
4.	NFPA	Guide to Hazardous Materials
5.	NFPA 704	Hazard Identification System
6.	IFC 79-3	Identification of the Health, Flammability and Reactivity of Hazardous Materials
7.	29CFR 1910.106	Flammable and Combustible Liquids (OSHA)
8.	29CFR 1910.145	Specification for Accident Prevention Signs and Tags (OSHA)
9.	29CFR 1910.1200	Hazard Communication (OSHA)

1.5 CODES

A. The WORK of this Section shall comply with the following codes in the California Code of Regulations (CCR):

1.	CCR, Title 8, § 537	Piping Systems Valving and Labeling (Cal-OSHA)
2.	CCR, Title 8, § 3321	Identification of Piping (Cal-OSHA)
3.	CCR, Title 8, § 5194	Hazard Communication (Cal-OSHA)

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Samples of all types of identification devices to be used in the WORK.

2. A list of suggested wording for all valve tags.

PART 2 – PRODUCTS

2.1 IDENTIFICATION OF EXPOSED PIPING

A. Identification of all exposed interior and exterior pipe, including pipe in accessible ceiling spaces, pipe trenches, pipe chases, vaults and valve boxes, shall be accomplished by complete color coded painting of all visible pipe and its insulation in accordance with Section 09800 and providing marker lettering and color banding as indicated. Stainless steel pipe shall be color coded utilizing bands at 20 feet intervals as specified for identification of hazardous substance conveyance facilities in CCR, Title 8, Section 3321. Certain pipe indicated in paragraph 3.5 also shall be color coded utilizing bands at 20 feet intervals as specified for identification of hazardous substance conveyance facilities in CCR, Title 8, Section 3321.

B. Each pipe identification shall consist of a printed pipe marker identifying the name of the pipe and a flow arrow to indicate direction(s) of flow in the pipe. All markers shall be preprinted. Markers shall be the mechanically attached type that are easily removable; they shall not be the adhesive applied type. Markers shall consist of pressure sensitive legends applied to plastic backing which is strapped or otherwise mechanically attached to the pipe. Fasteners shall be non-metallic. Legend and backing shall be resistant to petroleum based oils and grease and shall meet criteria for humidity, solar radiation, rain, salt, fog and leakage fungus, as specified by MIL-STD-810C. Markers shall withstand a continuous operating temperature range of minus 40 degrees F to 180 degrees F. Plastic coding markers shall not be the individual letter type, but shall be manufactured and applied in one continuous length of plastic.

C. Marker and letter sizes shall conform to ANSI A13.1 except as otherwise indicated for hazardous materials identification. Directional arrows shall be the same size as the lettering.

D. Except as otherwise indicated for hazardous materials identification, markers shall be white with black letters and directional arrows, except for pipes painted white, on which markers shall be blue with white letters.

E. Pipelines which convey hazardous materials and hazardous materials storage facilities shall be labeled in full conformance with the Cal-OSHA and Federal OSHA regulatory standards, and the guidelines provided in IFC 79-3 and NFPA 704. As a minimum, pipeline identification

shall include the chemical name and an appropriate hazard warning using words, pictures, symbols, or a combination thereof to identify flammability, health and reactivity. Placards may be used for hazard warnings, if affixed to the pipes.

2.2 IDENTIFICATION OF EXPOSED VALVES AND SHORT PIPE LENGTHS

A. Identifying devices for valves, and the sections of pipe that are too short to be identified with preprinted markers, and arrows, shall be plastic tags.

B. Plastic tags shall be engraved. The minimum tag thickness shall be 1/6-inch; the minimum size of 2-1/2-inch by 2-1/2-inch with 5/32-inch diameter top holes. Color shall be white with black lettering. Minimum lettering height shall be 1/4-inch. All tags shall be designed to be firmly attached to the valves or short pipes or to the structure immediately adjacent to such valves or short pipes.

2.3 LOCATION MARKING OF BURIED PIPES

A. Identification of buried electrical conduits shall be a 6-inch wide green polyethylene tape imprinted “CAUTION – ELECTRIC UTILITIES BELOW”.

2.4 EXISTING IDENTIFICATION SYSTEMS

A. In installations where existing piping identification systems have been established, the CONTRACTOR shall continue to use the existing system for pipes which convey non-hazardous materials. Where existing identification systems are incomplete, utilize the existing system as far as practical and supplement with the indicated system. The objective is to fully identify all new piping, valves, and appurtenances to the level indicated herein.

2.5 MANUFACTURERS

A. Products of the type indicated shall be manufactured by the following (or approved equal):

1. W.H. Brady Co.
2. Seton Nameplate Corp.

PART 3 – EXECUTION

3.1 GENERAL

A. All markers and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. All such tags or markers shall be readily visible from all normal working locations.

3.2 VALVE TAGS

A. Valve tags shall be attached to the valve or structure by means of self-locking plastic or nylon ties.

B. Wording on the valve tags shall include both the valve number and a description of the exact function of each valve, e.g., "DHWR-BALANCING," "CLS THROTTLING", etc.

3.3 EXPOSED PIPE IDENTIFICATION

A. Each exposed pipe shall be identified at intervals of 20 feet, and at least one time in each room. Piping shall also be identified at a point approximately within 2 feet of all turns, ells, valves, and on the upstream side of all distribution fittings or branches. Sections of pipe that are too short to be identified with lettered markers, and directional arrows shall be tagged and identified similar to valves.

B. Pipe identification shall consist of two to four elements: color coating and/ or banding of the pipe, a lettered marker with a directional arrow; and a hazard warning for pipelines which convey hazardous materials.

3.4 BURIED PIPE

A. Caution tape for the systems listed in paragraph 2.3A shall be located 2 to 3 feet above the top of the pipe.

3.5 EXPOSED PIPE IDENTIFICATION SCHEDULE

A. Application of the pipe identification systems shall conform to the following color codes. Marker lettering shall conform to that listed under "Function and Identification."

Fluid Abbreviation	**Function & Identification**	**Identification Color**	**Remarks Suggested Tnemec Color or Equal**
PRW	Process Water (air-gapped potable)	Light Blue	Clear Sky EN17
PW	Potable Water	White	
RS	Raw Sewage	Grey	Grey IN05

3.6 COLOR IDENTIFICATION FOR EQUIPMENT AND ASSOCIATED PIPING

A. The paint scheme for other equipment and associated piping shall conform to the following color codes.

Equipment Type	**Color**
Piping	OSHA Safety Red
General Hazardous Equipment, Valves	OSHA Safety Red
General Warning - Equipment	OSHA Safety Yellow
Outside Parking Post	OSHA Safety Yellow with Reflectors
Electrical Conduit	Dark Green

** END OF SECTION **

SECTION 15100 - VALVES, GENERAL

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing general requirements for valves including installing, adjusting, and testing of valves and where buried valves are indicated, valve boxes to grade, with covers, stem extensions, and position indicators.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 09800 Protective Coating
2. Section 15000 Piping Components
3. Section 15101 Valve and Gate Operators
4. Section 15108 Check Valves
5. Section 15109 Gate Valves
6. Section 15113 Air Release and Vacuum Valves

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following standards apply to the WORK of this Section:

1. ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800

2. ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys

3. ANSI/ASME B1.20.1 General Purpose Pipe Threads (Inch)

4. ANSI/ASME B31.1 Power Piping

5. ASTM A 36 Specification for Structural Steel

6. ASTM A 48 Specification for Gray Iron Castings

7. ASTM A 126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

8. ASTM A 536 Specification for Ductile Iron Castings

9. ASTM B 61 Specification for Steam or Valve Bronze Castings

10. ASTM B 62 Specification for Composition Bronze or Ounce Metal Castings

11. ASTM B 148 Specification for Aluminum-Bronze Castings

12. ASTM B 584 Specification for Copper Alloy Sand Castings for General Applications

13. ANSI/AWWA C500 Gate Valves for Water and Sewerage Systems

14. ANSI/AWWA C509 Resilient-Seated Gate Valves for Water and Sewage Systems

15. AWWA C550 Protective Interior Coatings for Valves and Hydrants

16. SSPC-SP-2 Hand Tool Cleaning

17. SSPC-SP-5 White Metal Blast Cleaning

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Manufacturer's product data including catalogue cuts.
2. Manufacturer's installation instructions.
3. Shop drawings showing details and dimensions.
4. Manufacturer's certification that products comply with the indicated requirements.
5. Schedule of valves indicating valve identification and location.
6. Manufacturer's certification that epoxy coatings have been factory tested and comply with the indicated requirements.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:

1. Manufacturer's installation and operating instructions.
2. Manufacturer's maintenance procedures.
3. List of special tools.
4. Schedule of valves indicating valve identification and location.

1.7 FACTORY TESTING

A. General: Valves shall be tested in compliance with the AWWA Standards as indicated. Except as otherwise indicated, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

B. Proof-of-Design Tests: The CONTRACTOR shall furnish the RESIDENT ENGINEER three (3) certified copies of a report from an independent testing laboratory certifying successful completion of proof-of-design testing for all valves of sizes 10-inch and larger unless indicated otherwise in the specific valve Section. In lieu of testing the

valves at an independent testing laboratory, proof-of-design testing may be performed at the valve manufacturer's laboratory, but must be witnessed by a representative of a qualified independent testing laboratory representative. Proof-of-design testing shall have been performed on not less than three valves, with all three units demonstrating full compliance with the test standards. Failure to satisfactorily complete the test shall be deemed sufficient evidence to reject all valves of the proposed make or manufacturer's model number.

1.8 FIELD TESTING

A. Testing: Valves shall be field-tested for compliance with the indicated requirements.

PART 2 – PRODUCTS

2.1 VALVES

A. General: Shut-off valves, 6-inch and larger, shall have operators with position indicators. Where buried, these valves shall be designed for buried service and provided with valve boxes and covers containing position indicators, and valve extensions. Valves mounted higher than 7 feet above working level shall be provided with chain operators.

B. Valve Flanges: The flanges of valves shall comply with Section 15000.

C. Gate Valve Stems: Where dezincification is indicated, gate valve stems shall be fabricated with bronze conforming to ASTM B 62, containing not more than 5 percent of zinc nor more than 2 percent of aluminum. Gate valve stems shall be designed for minimum tensile strength of 60,000 psi, a minimum yield strength of 40,000 psi, and an elongation of at least 10 percent in 2 inches, as determined by a test coupon poured from the same ladle from which the valve stems are poured. Where dezincification is not indicated, bronze conforming to ASTM B 584 may be used.

D. Protective Coating: Except where otherwise indicated, ferrous surfaces, exclusive of stainless steel surfaces, in the water passages of all valves 4-inch and larger, and exterior surfaces shall be fusion bonded epoxy coated conforming to Section 09800. Flange faces of valves shall not be epoxy coated.

E. Valve Operators: Where indicated, valves shall include electric operators recommended by the manufacturer. Operators of the same type shall be furnished by the same manufacturer. Valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the manufacturing plant.

F. Nuts and Bolts: Nuts and bolts on valve flanges, bodies and supports shall comply with Section 05500.

2.2 NAMEPLATES, TOOLS AND SPARE PARTS

A. Nameplates: Except as otherwise indicated, a label shall be provided on all valves exclusive of hose bibbs and chlorine cylinder valves. The label shall be 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve.

B. Spare Parts: Two sets of packings, O-rings, gaskets, discs, seats, and bushings shall be furnished with each valve, as applicable.

2.3 FLAP GATES

A. Flap Gates shall be constructed entirely of ASTM A-240 Type 316L stainless steel. All hardware shall be Type 316L stainless steel. The body frame and cover shall be made of structural members or formed plate welded to form a rigid one- piece. The frame shall be of the flange back design suitable for mounting on a standard flange. Seals shall be made of resilient neoprene (ASTM D-2000 Grade 2 BC-510) attached to the body by means of a retainer ring. Hinges shall consist of a stainless steel pin and shall have a UHMWPE bushing.

Flap Gates shall open whenever the upstream head is over 0.2' (61mm) higher than the downstream head. The Flap Gates shall be designed to withstand a minimum of 10' of back pressure.

Flap Gates shall be supplied with all the necessary parts indicated on the drawings, specified or otherwise required for a complete, properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of flap Gates.

The manufacturer shall have experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 5 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of ASME, Section IX.

Flap Gates supplied under this section shall be Series 60 Stainless Steel Flap Gates as manufactured by Rodney Hunt-Fontaine.

2.4 3 WAY PLUG VALVES

A. Multiport plug valves shall be constructed of the following materials:

ITEM	MATERIAL	SPECIFICATION
Body	Cast Iron	ASTM A126 Grade B
	Ductile Iron	ASTM A536
Body Seat	Nickel	
Plug	Ductile Iron	ASTM A536
Bearings – Valves ½"-36"	Stainless Steel	SAE Type 316 ASTM A743 Grade CF-8M or SAE Type 317L Sintered, oil impregnated permanently lubricated
Cover Bolts	Stainless Steel	ASTM A193 Grade B8M
Cover Nuts	Stainless Steel	ASTM A194 Grade 8M
Centered Oil Bearings	Stainless Steel	ASTM A743 Grade CFBM SAE Type 316
Grit Seals (Top and Bottom)	Teflon	

ITEM	MATERIAL	SPECIFICATION
Plug Elastomer	Chloroprene (water & wastewater)	
Flanges	Cast Iron or Ductile Iron	Raised or plain faced
	Pressures 0-250 psi	ASME/ANSI B16.1 Class 125 Cast Iron or ASME/ANSI B16.42 Class 150 Ductile Iron
	Alignment	Boltholes of flanged valves shall straddle horizontal and vertical centerlines of pipe run to which valves are attached.
Flange Bolts, Nuts, Washers and Gaskets	Various steels	See Section 15000
Epoxy Lining	Fusion Bonded Epoxy	Lining: Ferrous surfaces of the valves shall be fusion bonded epoxy lined, conforming to Section 09800. Do not coat sealing areas and bronze or stainless steel parts.
Exterior Finish Coat	Epoxy	See Section 09800

B. The following product design criteria, options and accessories are required on multiport plug valves:

ITEM	DESCRIPTION
Body	Bodies in 4" and larger valves shall be furnished with ⅛" welded overlay seat of not less than 90% pure nickel.
Seat	Seat area shall be raised, with raised surface completely covered with weld to insure that plug face contacts only nickel.
Port Size (36-inch and less)	80% (1/2-inch-36-inch) / /100% 3-36-inch
Port Size (42-inch and larger)	70% / 100%
Tapered Plug	Plug shall be resilient faced with neoprene or hycar, suitable for use with sewage.
Shaft Seals	Multiple V-ring type, externally adjustable and repackable without removing bonnet or actuator from valve under pressure. Do not use O-ring seals or non-adjustable packing.
Actuators	Manual valves shall have lever or gear actuators and tee wrenches, extension stems, floorstands, etc., as shown on Plans. Equip all valves 6" and larger with gear actuators. Enclose all gearing in semi-steel housing Gearing shall be suitable

ITEM	DESCRIPTION
	for running in lubricant. Provide seals on all shafts to prevent entry of dirt and water into actuator. Actuator shaft and quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position. Provide adjustable stop to set closing torque and provide seat adjustment to compensate for change in pressure differential or flow direction change Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.

PART 3 – EXECUTION

3.1 VALVE INSTALLATION

A. General: Valves, operating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's installation instructions. Valves shall be independently supported to prevent stresses on the pipe.

B. Access: Valves shall be installed to provide easy access for operation, removal, and maintenance and to prevent interferences between valve operators and structural members or handrails.

C. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the combinations shall be properly assembled and installed to ensure that systems are compatible and operating properly.

** END OF SECTION **

SECTION 15101 - VALVE AND GATE OPERATORS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing all shut off and throttling valves with manual and power operators as indicated. The CONTRACTOR shall provide the valve and gate operators, complete and operable, including all controls, motors, gears, enclosures, and other necessary appurtenances as indicated.

B. The WORK also requires that the valve or gate manufacturer accept responsibility for furnishing the WORK in this Section but without altering or modifying the CONTRACTOR'S responsibilities under the Contract Documents.

C. The WORK additionally requires that the one manufacturer who accepts the indicated responsibilities shall manufacture the valve or gate, as a minimum.

D. The WORK also includes coordination of design, assembly, testing and installation.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 15100 Valves, General

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. NEMA ICS-2 Industrial Control Devices, Controllers and Assemblies

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300 in addition to the provisions of Section 15100:

1. Electrical wiring and control diagrams.

PART 2 – PRODUCTS

2.1 GENERAL

A. General: Unless otherwise indicated, all shut-off and throttling valves, and externally-actuated valves and gates, shall be provided with manual operators. The CONTRACTOR shall furnish all operators complete and operable with mounting hardware, gears, handwheels, levers, chains, and extensions, as applicable. All operators shall be capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.

B. Manufacturers: Where indicated, certain valves and gates may be provided with operators manufactured by the valve or gate Manufacturer. Where operators are furnished by different manufacturers, the CONTRACTOR shall coordinate selection to have the fewest number of manufacturers possible.

C. Materials: All operators shall be current models of the best commercial quality materials and liberally-sized for the maximum expected torque. All materials shall be suitable for the environment in which the valve or gate is to be installed.

D. Mounting: All operators shall be securely mounted by means of brackets or hardware specially designed and sized for this purpose and of ample strength. The word "open" shall be cast on each valve or operator with an arrow indicating the direction to open in the counter-clockwise direction. All gear and power operators shall be equipped with position indicators. Where possible, manual operators shall be located between 48 and 60 inches above the floor or a permanent work platform.

E. Standard: Unless otherwise indicated and where applicable, all operators shall be in accordance with ANSI/AWWA C 540 - AWWA Standard for Power-Actuating Devices for Valves and Sluice Gates.

F. Functionality: Electric, pneumatic, and hydraulic operators shall be coordinated with power and instrumentation equipment indicated elsewhere in the Contract Documents.

2.2 MANUAL OPERATORS

A. General: Unless otherwise indicated, all valves and gates shall be furnished with manual operators. Valves in sizes up to and including 32 inches shall have direct acting lever or handwheel operators of the Manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual operators, with an operating pull of maximum 60 pounds on the rim of the handwheel. All buried and submerged gear-assisted valves, all gates, all gear-assisted valves for pressures higher than 250 psi, all valves 30 inches in diameter and larger, and where so indicated, shall have worm-gear operators, hermetically-sealed and grease-packed, where buried or submerged. All other valves 4 inches to 24 inches in diameter may have traveling-nut operators.

B. Buried Valves: Unless otherwise indicated, all buried valves shall have extension stems to grade, with wrench nuts located within 6 inches of the valve box cover, position indicators, and cast-iron or steel pipe extensions with heavy valve boxes with stay-put, hot-dip galvanized covers, and operating keys. Where so indicated, buried valves shall be in cast-iron, concrete, or similar valve boxes with covers of ample size

to allow operation of the valve operators. Covers of valve boxes shall be permanently labeled as requested by the local Utility Company or the ENGINEER. Wrench-nuts shall comply with AWWA C 500 -Metal Seated Gate Valves for Water Supply Service, and a minimum of 2 operating keys, or one key per 10 valves, whichever is greater, shall be furnished.

C. Floor Boxes: Hot-dip galvanized cast-iron or steel floor boxes and covers to fit the slab thickness shall be provided for all operating nuts in or below concrete slabs. For operating nuts in the concrete slab, the cover shall be bronze-bushed.

D. Adjustable Shaft Valve Boxes: Adjustable shaft valve boxes shall be concrete or cast iron valve extension boxes. Box covers on water lines shall be impressed with the letter "W". Gas line covers shall be impressed with the letter "G".

E. Traveling-Nut Operator: The operator shall consist of a traveling-nut with screw (Scotch yoke) contained in a weather-proof cast-iron or steel housing with spur gear and minimum 12-inch diameter handwheel. The screw shall run in 2 end bearings, and the operator shall be self-locking to maintain the valve position under any flow condition. The screw and gear shall be of hardened alloy steel or stainless steel, and the nut and bushings shall be of alloy bronze. The bearings and gear shall be grease-lubricated by means of grease nipples. All gearing shall be designed for a 100 percent overload.

2.3 MANUFACTURERS

A. Products shall be from the following manufacturers, or equal.

1. Valve Boxes
   Brooks 3RT
   Christie G5

PART 3 – EXECUTION

3.1 GENERAL

A. Installation shall be as specified herein. Valve operators shall be located so that they are readily accessible for operation and maintenance. Valve operators shall be mounted for unobstructed access, but mounting shall not obstruct walkways. Valve operators shall not be mounted where shock or vibration will impair their operation. Support systems shall not be attached to handrails, process piping, or mechanical equipment.

3.2 SERVICES OF MANUFACTURER

A. Field Adjustments

1. Field representatives of manufacturers of valves or gates with pneumatic, hydraulic, or electric operators shall adjust operator controls and limit-switches in the field for the required function.

3.3 INSTALLATION

A. All valve and gate operators and accessories shall be installed in accordance with Section 15100 - Valves, General.

** END OF SECTION **

SECTION 15108 - CHECK VALVES

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This Section includes materials, testing, and installation of check valves.

1.2 RELATED WORK

A. Section 09800: Protective Coatings
B. Section 02630: Ductile Iron Pipe

1.3 SYSTEM DESCRIPTION

A. Furnish and install complete operating check valve including appurtenant mountings or connections required for compliance with manufacturer's installation requirements and applicable standards.

B. Check valves shall prevent backflow of fluid when downstream pressure exceeds upstream pressure. Valves shall seat drip tight against a downstream seating pressure equal to the rated design pressure of the valve.

1.4 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.5 QUALITY ASSURANCE

A. Factory testing shall include the following:

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
Check Valve	Hydrostatic test	AWWA C508	1 each valve	Contractor	Contractor
Interior Lining	Holidays and Lining Thickness	See Section 09800	1 each valve	Contractor	Contractor

1.6 REFERENCES

A. ANSI B93.10 Static Pressure Rating Methods of Square Head Fluid Power Cylinders
B. ANSI B93.15
C. ASME/ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings – Class 25, 125, 150 and 800
D. ASME/ANSI B16.42 Ductile-Iron Flanged Fittings – Classes 150 and 300
E. API/ANSI 594 Check Valves: Flanged, Lug, Wafer and Butt-welding
F. ASTM A48 Gray Iron Castings
G. ASTM A126 Gray Iron Castings for Valves, Flanges and Pipe Fittings
H. ASTM A193 Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
I. ASTM A194 Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
J. ASTM A269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service
K. ASTM A276 Stainless and Heat Resisting Steel Bars and Shapes
L. ASTM A536 Ductile-Iron Castings
M. ASTM A582 Free-Machining Stainless and Heat Resisting Steel Bars
N. ASTM B16 Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
O. ASTM B62 Composition Bronze or Ounce Metal Castings (do not use for potable water wetted surfaces)
P. ASTM B148 Aluminum-Bronze Sand Castings
Q. ASTM B271 Copper-Base Alloy Centrifugal Castings
R. ASTM B584 Copper Alloy Sand Castings for General Applications
S. AWWA C508 Swing Check Valves for Waterworks Service
T. AWWA C518 Dual Disc Swing Check Valves for Waterworks Service
U. AWWA C550 Protective Epoxy Interior Coatings for Valves and Hydrants
V. NSF/ANSI 61 Drinking Water System Components – Health Effects

1.7 SUBMITTALS

A. Furnish the following submittals.

SUBMITTAL	DESCRIPTION
Shop Drawings	Required per valve shop drawing requirements. Include detail of any penetration of valve body by hinge pin showing packing gland, hinge pin gland, cap and other pieces used.
Catalog Data	Required per catalog data requirements.
	Show lining and coating data and thicknesses.
Installation Instructions	Required per installation instruction requirements.
O & M Instructions	Required per operation and maintenance instruction requirements.
Certificate of Compliance	Submit certified report of testing of factory-applied linings
	Submit affidavit of compliance with AWWA C508 for swing check valves

SUBMITTAL	DESCRIPTION
Warranty	Furnish one-year warranty from date of final acceptance

B. Refer to General Provisions for definition of requirements for shop drawings, catalog data, installation instructions, O&M instructions and certificates of compliance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's instruction and warranty requirements for delivery, storage and handling of check valves shall be strictly followed.

1.7 UNIT PRICES

A. Payment for the Work in this Section shall be included as part of the lump sum or unit price bid amount for which such Work is appurtenant thereto.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include the following:

ITEM	MANUFACTURER	MANUFACTURER LOCATION
Swing Type, Angled Seat Check Valves	Valmatic Surgebuster or equal.	Schaumburg, IL

2.2 MATERIALS

A. Refer to General Provisions for basic requirements for products and materials.

B. Swing Check Valves for waterworks service shall conform to AWWA C508.

C. Swing type, angled seat check valves for wastewater service shall be constructed of the following materials:

ITEM	MATERIAL	SPECIFICATION
Body and Cap (bonnet)	Ductile-Iron	Class 125 - ASTM A536, Grade 65-45-12
		Class 250 – ASTM A48 Class 250
Disc	Steel and Buna-N	ASTM D2000-BG
Disk Accelerator	Stainless Steel	SAE Type 302
Backflow actuator	Buna-N (seals) Stainless Steel (Trim) Bronze (Bushing)	

ITEM	MATERIAL	SPECIFICATION
	Stainless Steel (T Handle)	
Flanges	Cast Iron or Ductile-Iron	Raised or plain faced
	Pressures 0-275 psi	ASME/ANSI B16.1 Class 125 Cast Iron or ASME/ANSI B16.42 Class 150 Ductile-Iron
	Alignment	Boltholes of flanged valves shall straddle horizontal and vertical centerlines of pipe run to which valves are attached.
Flange Bolts, Nuts, Washers and Gaskets	Various steels	See Section 15000
Fusion Bonded Epoxy Lining	Fusion Bonded Epoxy	See Section 09800 Do not coat sealing areas and bronze or stainless steel parts.
Exterior Finish Coat	Epoxy	See Section 09800

D. The following product design criteria, options, and accessories are required:

ITEM	DESCRIPTION
Rated Working Pressure	250 psi
Swing Type, Angled Seat, Swing Check Valves	Valve shall consist of body, disk and bolted cover. Valve seat shall be set at angle of 35 degrees to centerline of pipe. Pre-wired limit switch indicating open/close position
Backflow Actuator	A screw-type, rising stem type, backflow actuator shall be provided.
Mechanical Indicator	Provides disc position
Limit Switch	Provide limit switch on valve with necessary signals transmitted to PLC

PART 3 – EXECUTION

3.1 INSTALLATION

A. Refer to General Provisions for basic execution and installation requirements.

B. Furnish and install check valves at locations shown on Approved Plans and Submittals.

C. The following installation standards shall be followed:

1. Manufacturer's installation and warranty requirements
2. Applicable OSHA and Cal OSHA regulations
3. Applicable fire, plumbing, mechanical, and electrical code requirements

D. Refer variances between the above documents and Contract Documents to Owner's Representative.

3.2 FIELD QUALITY CONTROL

A. Valves shall be tested at the same time that the connecting pipelines are pressure tested and in accordance with the sections of the Contract Documents covering testing. Valves, operators, or control and instrumentation elements whose pressure rating is less than the test pressure shall be protected or isolated during pressure testing.

B. Field testing shall include the following:

ITEM	TEST FOR	TEST STANDARD (ASTM OR OTHER TEST STANDARD)	FREQUENCY	FIRST TEST PAID FOR BY	RETESTS PAID FOR BY
Check Valve	Installation & Leakage	Visual inspection for drip tight finished installation under pressure.	1 inspection	Owner	Owner
	Pressure Test	See Sections 15044	1 test	Contractor	Contractor
	Field Performance	Demonstrate compliance to Contract Documents and Manufacturers' printed Literature	1 test	Contractor	Contractor
	11 month Warranty Inspection	Demonstrate compliance to Contract Documents and Manufacturers printed Literature	1 test	Contractor	Contractor

** END OF SECTION **

SECTION 15109 - GATE VALVES

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing solid wedge, manually operated, fusion bonded epoxy lined/coated gate valves.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 15100 Valves, General

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

PART 2 – PRODUCTS

2.1 GENERAL

A. Gate valves shall be of the rising stem, manually operated type, except were space restrictions require a non-rising stem. Valves shall be constructed of ASTM A48 Ductile Iron. Valves shall be Class 125 with flanged ends. Valve shall be of the solid wedge type. All valves shall be the product of one manufacturer and shall fully comply with AWWA C 509. Valve shaft shall be stainless steel or low zinc bronze alloy.

B. Flanges: Valve flanges shall be Class 125, flat-faced conforming to ANSI B16.1.

C. Bonnet: Valve shall have bolted bonnet with bearings designed to withstand all loads for the operating conditions.

D. Operator: Valves shall be equipped with handwheel operators capable of operation with a maximum applied force of 40-lbs. CONTRACTOR shall provide any additional gearing required. Buried valves shall be provided with 2-inch square operating nut extended to no less than two feet below the finished grade, within a valve box.

E. Hardware: All body, flange, and bonnet bolts shall be Type 316 stainless steel.

F. Lining/Coating: Ferrous surfaces of the valves shall be fusion bonded epoxy lined/coated, conforming to Section 09800.

2.2 GATE VALVES (SMALLER THAN 3-INCH)

A. Construction: Gate valves, smaller than 3 inches, shall be heavy duty type for industrial service, with threaded or soldered ends. The bodies shall have threaded tops or union bonnets, fabricated of bronze conforming to ASTM B-62, with bronze stems, solid wedges, metal handwheels, and Teflon-impregnated packing. Buried valves shall have non-rising stems. Exposed valves (above ground) shall have rising stems. Valves shall have a minimum pressure rating of 125 psi steam, or 200 psi coldwater except as otherwise indicated.

2.3 MANUFACTURERS

A. Products of the type or size indicated shall be manufactured by one of the following (or equal):

1. Solid-wedge gate valves:

A-C Valves, Inc.
Clow Corporation
Kennedy Valve Mfg. Co., (ITT Grinnell)
Mueller Company
Stockham Valves and Fittings

2. Gate valves (smaller than 3-inch)

Crane Company
Milwaukee Valve Company
Wm. Powell Company
Stockham Valves and Fittings

PART 3 – EXECUTION

3.1 INSTALLATION

A. Gate valves shall be installed in accordance with Section 15100.

** END OF SECTION **

SECTION 15113 - AIR RELEASE AND VACUUM VALVES

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing air release and vacuum valves as indicated, complete and operable, including accessories and drain connections.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 15100 Valves, General

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

PART 2 – PRODUCTS

2.1 GENERAL

A. Sewage Combination Air Valves: Combination air valves shall be specifically designed to operate on sewage systems. The valves shall be the single body style and shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting sufficient quantities of air, as determined by the manufacturer's approved sizing methods, while a system is being filled or drained, respectively.

The air and vacuum valve component shall be capable of venting sufficient quantities of air as determined by the manufacturer's approved sizing methods, including while pipelines are being filled and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of Type 316 stainless steel. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

The air release valve component shall have the same requirements for sewage air release valves.

B. Sewage Air Release Valves: All air release valves shall be specifically designed to operate on sewage systems. The valves shall be capable of venting accumulating air and gases during system operation. They shall have long float stems and bodies to minimize clogging. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of Type 316 stainless steel. The float, seat, and all

moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

Each sewage air release valve shall be furnished with the following backwash accessories, fully assembled on the valve:

1. Inlet shut-off valve
2. Blow-off valve
3. Clear water inlet valve
4. Rubber supply hose
5. Quick disconnect couplings

2.2 MANUFACTURERS

A. Products shall be manufactured by one of the following (or equal):

1. APCO (Dezurik)
2. Crispin, Model USL (Multiplex Manufacturing Company)
3. Vent-O-Mat, Series RGX

PART 3 – EXECUTION

3.1 INSTALLATION

A. Air release and vacuum valves shall be installed at high points in piping systems and where indicated.

B. All valves shall be installed in accordance with the manufacturer's printed recommendations.

C. All air and vacuum release valves shall have PVC piped outlets to the nearest sewer manhole as indicated on the drawings.

** END OF SECTION **

SECTION 16030 - ELECTRICAL TESTS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes testing, commissioning and demonstrating electrical WORK.

B The WORK of this Section includes circuit activation, equipment running and installation of temporary jumpers.

C The WORK of this Section includes correction of defects and retesting.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 16050 Electrical Materials and Methods

1.3 CODES

A. The WORK of this Section shall comply with the current editions, with revisions, of the following codes and City of San Diego Supplements:

1. California 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. NETA National Electrical Testing Association, Section 16T: Electrical Acceptance Tests

1.5 SEQUENCE AND SCHEDULING

A. Electrical testing including functional testing of power and controls shall be completed before commencement of the 7-day test indicated.

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Report of testing of electrical WORK.

1.7 MODIFICATIONS TO NETA TEST REQUIREMENTS

A. The following modifications to NETA test requirements apply to the WORK of this Section:

1. The requirements of 16T, part 1, paragraph 1.1 shall be deleted.

2. The requirements of 16T, part 1, paragraph 1.2 shall be changed to read as follows: "The CONTRACTOR shall engage the services of a. . .".

3. The requirements of 16T, part 4, paragraph 4.4 shall be changed to read as follows: "The CONTRACTOR shall supply. . .".

4. The requirements of 16T, part 4, paragraph 4.6 shall be changed to read as follows: "The CONTRACTOR shall notify the RESIDENT ENGINEER 5 days prior to commencement of any testing."

5. The requirements of 16T, part 5, paragraph 5.22 shall be changed to read as follows: "Furnish 12 copies of the complete report to the RESIDENT ENGINEER no later than 30 days after completion of the project."

6. The requirements of 16T, part 6 shall be replaced with the following: "The work shall include the inspection and testing of all electrical devices, equipment and materials provided by the CONTRACTOR."

7. The requirements of 16T, part 7 shall be deleted and replaced with the following: "The CONTRACTOR shall engage an independent testing firm for the purpose of inspecting, setting, testing, and calibrating the protective relays, circuit breakers, fuses and other applicable devices in accordance with Section 16400. The testing firm shall strictly conform to the requirements of these testing specifications."

8. The requirements of 16T, part 9 shall be deleted.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT AND MATERIALS

A. Test instruments shall be calibrated to references traceable to the National Bureau of Standards and shall have a current sticker showing date of calibration, deviation from standard, name of calibration laboratory and technician, and date recalibration is required.

PART 3 – EXECUTION

3.1 TESTING

A. In addition to indicated testing requirements and acceptance criteria, testing shall include the following:

1. Cable Testing: 480-volt circuits shall be tested for insulation resistance with a 1000-volt megohm meter. Testing shall be done after the 480-volt equipment is terminated. Phase-to-phase A-B, B-C, A-C and phase-to-ground insulation resistance tests shall be performed on each 5 kv, 15 kv, and 25 kv cable prior to termination at equipment but subsequent to stress cone makeup. Test results shall be submitted for review 30 days prior to plant operation and any system testing. Equipment which may be damaged during this test shall be disconnected. Tests shall be performed with other equipment connected to the circuit. The cable must withstand the test high voltage without breakdown, and shall exhibit steady or decreasing leakage current during the high potential test, and have satisfactory comparable megger readings in each megger test. Test results shall identify equipment used and time of test. Cable operating at more than 2,000 volts shall be tested in accordance with ICEA publications S-68-61, S-61-402, S-19-81, and S-68-516. Cable testing and reporting shall be performed by an organization recommended by the Manufacturer of the cable to be tested. The testing organization shall have a record of at least one prior successful project of comparable size and complexity. Testing shall verify the quality of cable terminations. Test results for medium and high voltage cable shall be submitted to the RESIDENT ENGINEER 30 days prior to the time schedule for equipment energization.

2. Test ground interrupter (GFI) receptacles and circuit breakers for proper operation by methods recommended by the receptacle Manufacturer.

3. Functional test and testing of electrical components shall be performed prior to subsystem testing and commissioning. Compartments and equipment shall be cleaned before commencement of functional testing. Functional testing shall include:

   Visual and physical check of cables, busswork, circuit breakers, transformers, and connections associated with new and modified equipment.

   Circuit breakers which are specified with adjustable time or pick-up settings for ground current, instantaneous overcurrent, short-time overcurrent, or longtime overcurrent, shall be field adjusted by a representative of the circuit breaker Manufacturer. Time and pickup setting shall correspond to the recommendations of the Short Circuit Study. Setting shall be tabulated and proven for each circuit breaker in its installed position; test results shall be certified and 7 copies shall be submitted to the RESIDENT ENGINEER.

4. Complete ground testing of all grounding electrodes prior to operating the equipment utilizing a three-point ground test.

B. Subsystem testing shall occur after the proper operation of alarm and status contacts has been demonstrated to the RESIDENT ENGINEER and after process control devices have been adjusted. The WORK of this Section includes adjusting limit switches and level switches prior to testing and setting pressure switches, flow switches, and timing relays.

C. After initial settings have been completed, each subsystem shall be operated in the manual mode. Once the manual mode of operation has been proven, automatic operation shall be demonstrated to verify proper start and stop sequence of pumps, proper operation of valves, proper speed control, and similar parameters.

D. Ground resistance tests shall be conducted in the presence of the RESIDENT ENGINEER utilizing ground resistance megger "Earth" tester with a maximum of 050 scale. Tests shall be conducted utilizing the full of potential method or the three terminal method as described by Biddle or Neta.

3.2 COMMISSIONING

A. Commissioning during the 7-day test as indicated in Section 01660 shall not be attempted until all subsystems have been found to operate satisfactorily; commissioning shall only be attempted as a function of normal plant operation in which plant process flows and levels are routine and equipment operates automatically in response to flow and level parameters or computer command, as applicable. Simulation of process parameters shall be considered only upon receipt of a written request by the CONTRACTOR.

** END OF SECTION **

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing the following:

1. Raceways, Fittings and Supports
2. Concrete Pads, Underground Ducts, Manholes and Pull-Boxes
3. Conductors, Wire and Cable
4. Wiring Devices
5. Electrical Identification
6. Cabinets and Enclosures

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02200 Earthwork
2. Section 03310 Cast-In-Place Sitework Concrete
3. Section 05500 Miscellaneous Metalwork
4. Section 16030 Electrical Tests
5. Section 16170 Grounding System

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 CODES

A. The 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. International Building Code

2. California Electrical Code

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. Federal Specifications:

FS W-C-596E/GEN (1)	Connector, Plug, Receptacle and Cable Outlet, Electrical Power
FS WW-C-581E	Conduit, Metal, Rigid, and Intermediate; And Coupling, Elbow, and Nipple, Electrical Conduit: Steel, Zinc Coated Intermediate; and Coupling, Elbow, and Nipple, Electrical Conduit; Zinc Coated

2. Commercial Standards:

ANSI C80.1	Rigid Steel Conduit, Zinc Coated, Specification For
ANSI Z55.1	Gray Finishes for Industrial Apparatus and Equipment
ANSI C80.1	Rigid Steel Conduit-Zinc Coated
ANSI C80.3	Electrical Metallic Tubing-Zinc Coated
NEMA250	Enclosures for Electrical Equipment (1000 volts maximum)
IPCEA S-61-402	Thermoplastic - Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
ASTM B3	Soft or Annealed Copper Wire
ASTM B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
UL 83	Thermoplastic-Insulated Wires and Cable
UL 67	Underwriters Laboratories, Electric Panelboards
UL 489	Molded-Case Circuit Breakers and Circuit Breaker Enclosures
UL 50	Cabinets and Boxes

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. General

a. Shop drawings including the following:

i. Front, side, and rear elevations and top views.
ii. Location of conduit entrances and access plates.
iii. Identification of conductors not indicated on drawings.
iv. Identification numbers of conductors.
v. Manufacturers' equipment drawings.
vi. Details of shielded power cable termination.
vii. Component data.
viii. Connection, terminal and internal wiring diagrams, and conductor sizes.
ix. Layout drawings indicating arrangement, dimensions and weights.
x. Methods of anchoring.
xi. Finish.
xii. Nameplates.
xiii. Temperature limitations, as applicable.

2. Manufacturer's product data including the following:

a. Catalogue cuts, bulletins, brochures, or photocopies of applicable pages for mass produced, non-custom manufactured products stamped to indicate the project name, applicable Specification section and paragraph, model number, ratings and options.

3. Lists of the following:

a. Materials, equipment, apparatus and fixtures proposed for use; with the list including sizes, names of manufacturers, catalog numbers, and such other information required to identify the items.

4. Test reports of the following:

a. Factory-fabricated products.

b. Currents resulting from DC high potential testing.

1.7 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Division 01:

1. Manufacturer's installation instructions.

2. Manufacturer's maintenance procedures.

1.8 PROJECT RECORD DRAWINGS

A. The following shall be included in the PROJECT RECORD DRAWINGS in compliance with Division 01:

1. Accurate location of conductors including depths and routing of concealed below-grade electrical WORK.

2. Accurate location of electrical WORK (raceway and conductors) where the location differs substantially from the locations indicated.

3. Accurate and updated specifications showing work completed.

1.9 AREA DESIGNATIONS

A. **General:** For purposes of delineating electrical enclosure and installation requirements, certain areas are classified as defined below. Electrical installations within these areas shall conform to the indicated code requirements for the area indicated.

B. **General Purpose Locations**: WORK installed in areas which are not otherwise specifically classified shall be "General Purpose." Enclosures shall comply with the requirements of these Specifications and shall be NEMA Type 4X.

C. **Outdoor Locations**: In outdoor locations, raceway shall be rigid galvanized steel conduit; entrances shall be threaded; and fittings shall have gasketed covers. Fittings and conduit shall be drained. Threaded fastening hardware shall be stainless steel. Mounting brackets shall be galvanized. Attachments or welded assemblies shall be galvanized after fabrication. Instruments and control cabinets, panels, switchboards and motor control centers shall be "Weatherproof NEMA Type 3R." Enclosures shall be mounted 1/4-inch from walls to provide an air space unless specifically shown otherwise.

1.10 FACTORY TESTING

A. **Product Testing**: Products shall be tested at the factory for compliance with the indicated requirements and as follows:

1. Cabinets and Enclosures: Each motor control center shall be completed, assembled, wired, and tested at the factory. All buses and wiring shall be given a dielectric test in accordance with the latest IEEE and NEMA Standards.

B. **Witnesses:** The OWNER and the RESIDENT ENGINEER (at the option of either) reserves the right to witness factory tests.

1.11 FIELD TESTING

A. **Testing:** Products shall be field-tested for compliance with the indicated requirements.

B. **Witnesses:** The OWNER and the RESIDENT ENGINEER (at the option of either) reserves the right to witness field tests.

1.12 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. **Delivery of Materials**: Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.

B. **Storage:** Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements. Products shall not be damaged, marred, or splattered with water, foam, plaster, or paint. Moving parts shall be kept clean and dry.

C. **Replacement**: Damaged materials or equipment, including face plates of panels and switchboard sections, shall be replaced or refinished by the manufacturer at no expense to the OWNER.

1.13 REGULATORY REQUIREMENTS

A. In addition to other indicated regulatory requirements, the WORK of this Section shall comply with the requirements of SSPWC Subsection 209-1.

PART 2 – PRODUCTS

2.1 GENERAL

A. **Listing:** Electrical equipment and materials shall be listed for the intended purpose by an independent testing laboratory including Underwriters Laboratories (UL). Independent testing laboratory shall be acceptable to the inspection authority having jurisdiction.

B. **Project/Site Conditions:** Unless otherwise indicated, equipment and materials shall be sized and rated for the ambient conditions in San Diego but not less than an ambient temperature of 40 degrees C at sea level without exceeding the manufacturer's stated tolerances.

C. **Product Qualifications**: Equipment and materials shall be new and shall bear the UL label, where UL requirements apply. Equipment and materials shall be the products of reputable manufacturers specializing in the products indicated in this Section. Similar items in the project shall be products of the same manufacturer. Equipment and materials shall be of industrial grade and standard of construction and shall be of sturdy design and manufacture; and shall be capable of reliable, trouble-free service.

2.2 RACEWAY, FITTINGS AND SUPPORTS

A. **Raceway**: Raceway shall comply with the following:

1. **Rigid Steel Conduit**: Raceway shall be rigid steel conduit complying with ANSI C80.1 unless otherwise indicated. Rigid steel conduit shall be full weight, mild steel, hot-dip galvanized and bichromate coated inside and outside after galvanizing.

2. **Fittings**: Locknuts shall be extra heavy electrogalvanized steel for sizes through 2 inches. Locknuts larger than 2 inches shall be electrogalvanized malleable iron. Bushings shall be electrogalvanized malleable iron with insulating collar. Grounding bushings shall be locking type and shall include a feed-through compression lug for securing the ground cables. Unions shall be electrogalvanized ferrous alloy type. Threadless fittings are not acceptable. Gaskets shall be made of neoprene.

   Expansion fittings in embedded runs shall be watertight and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for 3/4-inch movement in any direction.

3. **Electrical Metallic Tubing**: Electrical metallic tubing shall be electrogalvanized complying with ANSI C80.3. Fittings shall be compression type. Minimum size shall be 3/4 inch. Electrical metallic tubing shall be galvanized inside and out with an enamel coating inside and a chromate coating outside.

4. **Liquidtight Flexible Steel Conduit**: Liquidtight flexible steel conduit shall be formed from spirally wound galvanized steel strip with successive convolutions securely interlocked and jacketed with liquidtight plastic cover. Minimum size shall be 1/2 inch. Fittings for liquidtight conduit shall have cadmium-plated malleable iron body and gland nut with cast-in lug, brass grounding ferrule threaded to engage conduit spiral and O-ring seals around the conduit, box connection and insulated throat. Forty-five and 90-degree fittings shall be used where applicable.

5. **Rigid Nonmetallic Conduit**: Rigid nonmetallic conduit shall be NEMA TC2, type EPC-40-PVC, or EPC-80-PVC high impact, polyvinylchloride (PVC). Fittings used with PVC conduit shall be PVC solvent weld type. Nonmetallic conduits shall be UL listed for applications indicated. Minimum size shall be 3/4 inch.

6. **PVC-Coated Steel Conduit:** PVC-coated rigid steel conduit. Comply with NEMA RN 1. Coating Thickness: 0.040 inch (1 mm), minimum.

B. **Boxes and Fittings:** Boxes and fittings shall comply with the following:

1. **Sheet Metal Boxes**: Boxes and fittings installed in areas where electrical metallic tubing is indicated shall be standard UL approved electro-galvanized sheet steel.

2. **Cast Ferrous Alloy Boxes**: Boxes shall be hot-dip galvanized cast ferrous alloy unless otherwise indicated. Integrally cast threaded hubs or bosses shall be provided for conduit entrances and shall provide for full 5-thread contact on tightening. Drilling and threading shall be done before galvanizing. A full body neoprene gasket shall be included with the cover. Type 304 stainless steel screws shall be provided for covers. Where two or more devices are located together, outlet and device boxes shall be gang type. Cover plates shall be hot-dip galvanized cast ferrous alloy unless the particular device requires a cover that is not manufactured in this material

3. **Hubs:** Threaded hubs for connection of conduit to junction, device or terminal boxes shall be made of cast ferrous alloy, electroplated with zinc and shall have insulated liner and insulating bushings. The hubs shall utilize a neoprene O-ring and shall ensure a watertight connection.

4. **Coating for Fittings for PVC-Coated Conduit**: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

C **Raceway Supports**: Raceway supports shall comply with the following:

1. **Conduit Supports:** Hot-dip galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe straps used with galvanized clamp backs and nesting backs where required. Conduit supports for PVC coated rigid steel and PVC conduit systems shall be one-hole PVC coated clamps or PVC conduit wall hangers.

2. **Ceiling Hangers:** Ceiling hangers shall be adjustable galvanized carbon steel rod hangers. Straps or hangers of plumber's perforated tape are not acceptable. Unless otherwise indicated hanger rods shall be 1/2-inch full-threaded rods and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

2.3 CONCRETE PADS, UNDERGROUND DUCTS, MANHOLES AND PULL-BOXES

A. **General:** The WORK of this Section includes concrete pads, manholes, pull-boxes and concrete required for encasement, installation, or construction and shall be 2500-psi concrete conforming to the requirements of Division 03.

B. **Concrete Pads:** Concrete housekeeping pads shall be provided for floor-standing electrical equipment. Housekeeping pads shall be 2 inches above surrounding finished floor or grade and shall be 2 inches larger in both dimensions than the supported equipment unless otherwise indicated.

2.4 CONDUCTORS, WIRE AND CABLE

A. **General**: The type, size and number of conductors shall comply with the indicated requirements. Number and types of communication, paging, and security cables shall be as required for the particular equipment provided.

Conductors, including ground conductors, shall be copper. Insulation shall bear the manufacturer's trademark, type, voltage rating, and conductor size.

B. **Color Coding:** Color coding shall comply with the following:

1. **Control Conductors:** Control conductors color coding shall be manufacturer's standard.

2. **Power Conductors:** Single-conductor power conductors shall have the following colors for 600V or less:

	120/208V	480/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Ground	Green	Green
Neutral	White	Grey

Color coding tape shall be used where colored insulation is not available. Branch circuit switch shall be yellow. Insulated ground wire shall be green, and neutral shall be gray. Color coding and phasing shall be consistent throughout the site, but bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs.

Cables sized No. 4 AWG and larger may be black with colored 3/4-inch vinyl plastic tape applied in 3-inch lengths around the cable at each end. The cables shall be tagged at terminations and in pull boxes, handholes and manholes.

C. **Lighting and Receptacle Branch Circuit Conductors:** Lighting conductors shall be stranded except for No. 12 AWG which shall be solid.

1. Conductors shall comply with the following characteristics:

   a. Voltage: 600 volts.

   b. Conductor: Bare annealed copper; stranded in accordance with ASTM B8.

   c. Insulation: THHN/ THWN-2, 90 degree C dry, 75 degree C wet, polyvinylchloride (PVC) per UL 83.

   d. Jacket: Nylon.

   e. Flame resistance: UL 83.

D. **Power and Control Conductors and Cable, 600 Volts:** Conductors and cable shall comply with the following:

1. Single Conductors: Single conductor cable shall be stranded THHN/ THWN-2 and shall be installed in conduits for power and control circuits. Conductors shall comply with the following characteristics: Voltage: 600 volts. Conductor: Coated, Class B, stranded, annealed copper per ASTM B8.

E. **Splicing and Terminating Materials:** Splicing and terminating materials shall comply with the following:

1. 600 Volt Conductor and Cable Connectors: Connectors shall be compression type of correct size and UL listed for the specific application. Connectors shall be tin-plated high conductivity copper. Connectors for wire sizes No. 10 AWG and smaller shall be nylon self-insulated, ring tongue or locking-spade terminals. Connectors for wire sizes No. 8 AWG and larger shall be one-hole lugs up to size No. 3/0 AWG, and two-hole or four-hole lugs for size No. 4/0 and larger. Mechanical clamp, dimple, screw-type connectors are not acceptable.

   In-line splices and taps shall be used only where indicated, or shown on the shop drawings. When used, they shall be of the same construction as other connectors. Splices shall be compression type, made with a compression tool die designed for the purpose. Splice shall be covered with a heat-shrinkable sleeve or boot.

2.5 WIRING DEVICES

A. **General:** Wiring devices shall be UL approved for the current and voltage indicated and shall comply with NEMA WD-1. Devices shall contain provisions for back wiring and side wiring with captively held binding screws.

Receptacles and switches shall conform to Federal Specifications W-C-596E and W-S-896E, respectively, and the indicated standards.

B. **Receptacles and Plugs:** Receptacles and plugs shall comply with the following:

1. General: Receptacles shall be grounding type.

2. Ground Fault Interrupter Receptacles: Receptacles shall be NEMA 5-20R configured and shall mount in a PVC Jacketed cast outlet box. Units shall trip at 5 milliamperes of ground current and shall comply with NEMA WD-1-1.10 and UL 943. GFI receptacles shall be capable of individual as well as "downstream" operation.

C. **Device Plates:** Device plates shall be provided with switches and receptacles. Device plates shall be made of brushed stainless steel.

Device plates shall include engraved laminated phenolic nameplates with 1/8-inch white characters on black background.

Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single phase and fastened with machine screws, not self-adhesive tape.

2.6 LIGHTING AND POWER DISTRIBUTION PANELBOARDS

A. The number of circuit breakers and the ampere ratings for lighting panelboard shall be in accordance with panel schedules indicated. The panelboard circuit breakers shall be group mounted and shall be Type NQOB with 3- or 2-pole main breakers as required and branch circuit breakers with 10,000 AIC, minimum or as indicated.

Panelboards shall comply with the following:

1. A directory holder with clear plastic plate and metal frame shall be mounted on the inside of the door.

2. Circuit Breakers: Circuit breakers for power panelboard shall be molded-case type designed for the current ratings and pole configurations indicated on the panelboard schedule. Circuit breakers rated 120/208 volt and 120/240 volt alternating current shall have a minimum interrupting current rating of 18,000 amperes (symmetrical) at 240V AC. Circuit breakers rated 277/480 volt

alternating current shall have a minimum interrupting current rating of 25,000 amperes (symmetrical) at 480V AC or as indicated on the panelboard schedule.

Circuit breakers shall be bolt-on type and shall be listed in accordance with UL 489 for the service indicated.

2.7 ELECTRICAL IDENTIFICATION

A. **Nameplates:** Nameplates shall be fabricated from white-center, black-face laminated plastic engraving stock. Nameplates shall be fastened securely, using fasteners of brass, cadmium plated steel, or stainless steel, screwed into inserts or tapped holes, as required. Engraved characters shall be block style of adequate size to be read easily at a distance of 6 feet with no characters smaller than 1/8inch high.

B. **Conductor and Equipment Identification**: Conductor and equipment identification devices shall be either imprinted plastic-coated cloth marking devices or shall be heat-shrink plastic tubing, imprinted split-sleeve markers cemented in place.

C. **Identification Tape (Buried)**: Identification tape for protection of buried installation shall be a 6inch wide green polyethylene tape imprinted "CAUTION - ELECTRIC UTILITIES BELOW".

2.8 CABINETS AND ENCLOSURES

A. **General:** The WORK of this Section includes the following requirements for control compartments of motor control sections, for control cabinets of lighting panelboards, and for separate terminal and control cabinets:

1. Terminal Cabinets: Terminal cabinets located indoors shall be NEMA 12. Cabinets located outdoors and in corrosive areas shall be NEMA 4X. Cabinets shall be provided with hinged doors. Cabinets shall be provided with channel mounted terminal blocks rated 30 amperes, 600 volt AC. Terminals shall be No. 8 minimum strap-screw type, suitable for ring tongue or locking spade terminals. Sufficient terminal blocks to terminate 25 percent more conductors than are indicated shall be provided.

2. Components: Compartments of motor control centers containing terminal blocks and control components shall be isolated from other compartments of the control center and shall have a separate hinged door with locking handle. Internal control components shall be mounted on a removable mounting pan.

3. Relay and Control Cabinets: Relay and control cabinets shall comply with NEMA 12 for enclosures. Floor-standing cabinets shall have locking handles with 3-point catches. Bottom conduit entrances shall be located accurately and cut to the conduit diameter using a circle cutter (not a torch). Interiors of relay

and control compartments shall be finished white. Terminal block requirements shall comply with the requirements for Terminal Cabinets.

B. **Wiring:** Wiring of terminal cabinets and control cabinets shall be accomplished with stranded copper conductor rated for 600-volts and UL listed as Type THHN/ THWN-2. Wires for annunciator and indication circuits shall be No. 16 AWG. Other wiring shall be No. 14 AWG. Color coding shall comply with the indicated requirements. Incoming wires to terminal or relay cabinets shall be terminated on a master set of terminal blocks. All wiring from the master terminals to internal components shall be factory-installed and shall be contained in plastic raceways with removable covers. Wiring to door mounted devices shall be extra flexible and anchored to doors using wire anchors cemented in place. Exposed terminals of door-mounted devices shall be guarded to prevent accidental personnel contact with energized terminals.

C. **Engraving:** Nameplates shall comply with the indicated requirements.

2.9 MANUFACTURERS

A. Products of the type or model number indicated shall be manufactured by one of the below listed manufacturers (or equal):

1. Unions:
   Appleton UNF or UNY
   Crouse-Hinds UNF or UNY

2. Device Boxes:
   Appleton FD
   Crouse-Hinds FD

3. Sealing Compound:
   Chico A

4. Watertight Seals:
   O.Z. Gedney Co., Type CSMC
   Thunderline Corp.
   Link Seal

4. Lighting and Receptacle Branch Circuit Conductors:
   Okoseal-N, Series 116-67-XXXX

5. Single Power and Control Conductors and Cable, 600V:
   Okonite-Okolon, Series 112-11-XXXX
   Anaconda
   Durasheath EP

6. Single Circuit Signal Cable:
   Okoseal-N Type P-OS

7. Multiple Circuit Signal Cable:
   Okoseal-N Type SP-OS

8. Thermocouple Extension:
   Okonite P-OS, Type PLTC

9. Compression Tool Die For Splicing:
   Thomas and Betts Corp.

10. Heat Shrinkable Moisture Seal Caps:
    Raychem Corp. "Thermofit"

11. 120V Receptacles (Outdoor, Process or Corrosive Areas):
    Hubbell 53CM62/53CM21
    General Electric GE5262-C

12. Electrical Identification:
    Nameplates
        Formica Type ES-1
    Imprinted Plastic Coated Cloth
        Brady
        Thomas & Betts

13. Device Plates:
    Crouse-Hinds
    Appleton

14. Flexible Conduit:
    American Brass
    Anaconda
    Electroflex

15. Compression Connectors:
    Burndt "Hi Lug"
    Thomas & Betts "Shure Stake"

16. Spring Connectors (Wire Nuts):
    3M "Scotch Lok"
    Ideal "Wing Nuts"

17. Insulating Tape:
    Scotch No. 33
    Plymouth "Slip knot"

18. High Temperature Insulating Tape (Polyvinyl):
    Plymouth
    3M

19. Epoxy Resin Splicing Kits:
3M Scotchcoat 82 Series
Burndy "Hy Seal"

20. Stainless Steel Covers:

Sierra S-line
Hubbell

21. Products For Cast Boxes:

Switches at outdoor locations
Crouse-Hinds DS 128
Mackworth Rees Style 3845
Joy Flexitite

23. Receptacles at outdoor locations

Crouse-Hinds
Hubbell

24. Cast Boxes Required for Pull or Junction Boxes:

Surface boxes
O-Z type "YH"

25. Insulated Bushings:

O-Z Type A and B
Thomas & Betts
Steel City
Appleton
Efcor
Gedney

26. Insulated Grounding Bushings:

O-Z Type BL
Thomas & Betts
Steel City
Efcor
Gedney

27. Erickson Couplings:

Appleton Type EC
Thomas & Betts
Steel City
Efcor
Gedney

28. Liquid-tight Fittings:

    Appleton Type ST
    Thomas & Betts
    Crouse-Hinds
    Efcor
    Gedney

29. Hubs:
    Appleton Type HUB
    Thomas & Betts
    Myers Scrutite
    Efcor

30. Sealing Fittings:
    Appleton Type EYS
    O-Z Type FSK

31. Expansion Couplings:
    O-Z Type D
    Crouse-Hinds Type

PART 3 – EXECUTION

GENERAL

A. **Field Control of Location and Arrangement**: The Drawings diagrammatically indicate the location and arrangement of outlets, conduit runs, equipment, and other items. Exact locations shall be determined in the field based on the physical size and arrangement of equipment, finished elevations, and obstructions. Locations shown on the Drawings shall be adhered to as closely as possible. Omissions or conflicts on Drawings or between Drawings and Specifications shall be brought to the attention of the RESIDENT ENGINEER for clarification before proceeding with the WORK.

B. **Installation:** The CONTRACTOR shall make all necessary provisions throughout the site to receive the work as construction progresses and shall furnish and install adequate backing, supports, inserts, and anchor bolts for the hanging and support of all electrical fixtures, conduit, panelboard, and switches, and shall furnish and install sleeves through walls, floors, or foundations where electrical lines are required to penetrate.

Conduit and equipment shall be installed in such a manner as to avoid all obstructions and to preserve head room and keep openings and passageways clear. Fixtures, switches, convenience outlets, and similar items shall be located within finished rooms, as shown. Where the Drawings do not indicate exact locations, locations of concealed conductors shall be as indicated on the shop drawings.

C. **Workmanship:** Materials and equipment shall be installed in accordance with printed recommendations of the manufacturer. The installation shall be accomplished by workmen skilled in this type of work and installation shall be coordinated in the field with other trades so that interferences are avoided.

D. **Tests:** The WORK of this Section includes tests required by the authority having jurisdiction. Tests shall be performed in the presence of the RESIDENT ENGINEER. The WORK includes testing equipment, replacement parts and labor necessary to repair damage resulting from damaged equipment or from testing and correction of faulty installation. The following tests shall be performed:

Insulation resistance tests.
Operational testing of equipment.

E. **Field Quality Control**: Conduit shall be provided with a number tag at each end and in each manhole and pullbox. Trays shall be identified by stencils at intervals not exceeding 50 feet, at intersections, and at each end.

3.2 RACEWAY, FITTINGS AND SUPPORTS

A. **General**: Except as otherwise indicated, conduit installed in direct contact with earth and in concrete slabs on grade shall be corrosion-protected.

Raceways shall be installed as indicated. Exterior surface mounted raceways above grade shall be RMC. Surface mounted raceways inside the dry-well shall be PVC Jacketed Steel conduits. Buried raceways or raceways inside concrete shall be PVC Schedule 40 electrical. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for the purpose intended. Factory elbows shall be used for all 3/4-inch conduits. Bends in larger sizes of metallic conduit shall be accomplished by field bending or by the use of factory elbows.

Non-metallic conduit may be cast integral with horizontal slabs with placement criteria as stated in the previous paragraph. Non-metallic conduit may be run beneath structures or slabs on grade, without concrete encasement. In these instances conduit shall be placed at least 12 inches below the bottom of the structure or slab. Non-metallic conduit may be buried 24 inches minimum below grade, with a 3-inch concrete cover, in open areas or where otherwise not protected by concrete slab or structures. Top of concrete cover shall be colored red. Non-metallic conduit shall be permitted only in concealed locations as described above.

Where a run of concealed PVC conduit becomes exposed, a transition to rigid steel conduit is required. Such transition shall be accomplished by means of a factory elbow or a minimum 3-foot length of rigid steel conduit, either terminating at the exposed concrete surface with a flush coupling.

Piercing of concrete walls by non-metallic runs shall be accomplished by means of a short steel nipple terminating with flush couplings.

Flexible conduit may be used in lengths required for the connection of recessed lighting fixtures; otherwise the maximum length of flexible conduit shall be 18 inches.

1. Final raceway connections to Flexible metallic lighting fixtures, equipment and pressure switches subject to vibration-DRY AREAS

   Final raceway connections to Liquidtight, flexible equipment metallic

2. Conduit Runs Between Boxes: The number of directional changes of the conduit shall be limited to total not more than 270 degrees in any run between pull boxes. Conduit runs shall be limited to 400 feet, less 100 feet or fraction thereof, for every 90 degrees of change in direction. Bends and offsets shall be avoided where possible but, where necessary, shall be made without flattening or kinking, or shall be factory preformed bends. Turns shall be made

   with cast metal fittings or conduit bends. Welding, brazing or otherwise heating of conduit is not acceptable.

3. Junction and Pull Boxes: Cast junction or pull boxes shall be installed where required for pulling cable and as necessary to meet the indicated requirements. Pull boxes used for multiple conduit runs shall not combine circuits of different motor control centers, switchboards, or switchgear.

4. Matching Existing Facilities: When new conduit is added to areas which are already painted, the conduit and its supports shall be painted to match the existing facilities. Where new conduit is used to replace existing conduit, the existing conduit and supports shall be removed, resulting blemishes shall be patched and repainted to match original conditions. Similarly, if existing conduits are to be reused and rerouted, resulting blemishes shall be corrected in the same manner. Coating system shall comply with Section 09900.

5. Conduit Support: Exposed rigid steel or plastic coated conduit shall be run on supports spaced not more than 10 feet apart and shall be constructed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceiling. Exposed PVC conduit shall be run on supports spaced not more than 3 feet apart for conduits up to 1 inch, 5 feet apart for conduits 1 1/4 inches to 2 inches and 6 feet apart for conduits 2 1/2 inches and larger. No conduit shall approach closer than 6 inches to any object operating above 30 degrees C. PVC conduit shall not be provided where it will be damaged by heat.

6. Conduit Separation: Signal conduits shall be separated from AC power or control conduits. The separation shall be a minimum of 12 inches for metallic conduits and 24 inches for nonmetallic conduits.

7. Liquidtight Flexible Conduit: The length of flexible liquidtight conduit shall not exceed 15 times the trade diameter of the conduit. The length of liquidtight conduit shall not exceed 36 inches.

8. Conduit Fittings: Fittings shall comply with the same requirements as the raceway with which they will be used. Fittings having a volume less than 100 cubic inches for use with rigid steel conduit, shall be cast or malleable non-ferrous metal. Fittings larger than one inch shall be "mogul size." Fittings shall be of the gland ring compression type. Covers of fittings, unless in "dry" locations, shall include gaskets. Surface-mounted cast fittings, housing wiring devices in outdoor and damp locations, shall have mounting lugs.

   Erickson couplings shall be used at all points of union between ends of rigid steel conduits which cannot be coupled. Running threads and threadless couplings shall not be used. Couplings shall be 3-piece type.

   Transition fittings to mate steel to PVC conduit, and PVC access fitting, shall be as furnished or recommended by the manufacturer of the PVC conduit.

3.3 UNDERGROUND DUCTS, MANHOLES AND PULL-BOXES

A. **Underground Ducts**: Where an underground distribution system is indicated, installation shall comply with the following:

1. Ducts shall be laid on a grade line of at least 4 inches per 100 feet, sloping towards pullboxes or manholes. Duct shall be installed and pullbox and manhole depths adjusted so that the top of the concrete envelope is a minimum of 24 inches below grade. Changes in direction of the duct envelope by more than 10 degrees horizontally or vertically shall be accomplished using bends with a minimum radius 24 times the duct diameter. Couplings shall be staggered at least 6 inches vertically. Bottom of trench shall be of select backfill or sand. Horizontal and vertical duct separation shall be maintained by plastic spacers set every 5 feet. The duct array shall be anchored every 4 feet to prevent movement during placement of the concrete envelope. Each bore of the completed duct bank shall be cleaned by drawing through it a standard flexible mandrel one foot long and 1/4-inch smaller than the nominal size of the duct through which the mandrel will be drawn. After passing of the mandrel, a wire brush and swab shall be drawn through. A raceway, in the duct envelope, which does not require conductors, shall have a 1/8inch polypropylene pull cord installed throughout the entire length of the raceway.

2. Duct bank markers shall be installed every 200 feet along run of duct bank, at changes in horizontal direction of duct bank, and at ends of duct bank. Concrete markers, 6 by 6 inches square and one foot long, shall be set flush with grade. The letter "D" and arrow set in the concrete shall be facing in the direction of the duct alignment

3.4 CONDUCTORS, WIRE AND CABLE

A. **General:** Pulling wire and cable into conduit or trays shall be completed without damaging or putting undue stress on the cable insulation. Soapstone, talc or UL listed pulling compounds are acceptable lubricants for pulling wire and cable. Grease is not acceptable. Raceway construction shall be complete, cleaned, and protected from the weather before cable is installed.

Whenever a cable leaves a raceway, a cable support shall be provided.

B. **600 Volt Conductor and Cable:** Conductors in panels and electrical equipment, No. 6 AWG and smaller, shall be bundled and laced at intervals not greater than 6 inches, spread into trees and connected to their respective terminals. Lacing shall be made up with plastic cable ties. Lacing is not necessary in plastic panel wiring duct. Conductors crossing hinges shall be bundled into groups not exceeding 12 and shall be so arranged that they will be protected from chafing when the hinged member is moved.

Slack shall be provided in junction and pull boxes, handholes and manholes. Slack shall be sufficient to allow cables or conductors to be routed along the walls of the box. Amount of slack shall be equal to largest dimension of the box. Where plastic panel wiring duct is installed for wire runs, lacing is not required. Plastic panel wiring duct shall not be used in manholes and handholes.

Stranded conductors shall be terminated. Conductors shall be terminated directly on the terminal block. Compression lugs and connectors shall be installed using manufacturer's recommended tools.

Lighting and receptacle circuits may be in the same conduit in accordance with derating requirements of the NEC. However, lighting and receptacle circuits shall not be installed in conduits with power or control conductors.

Solid wire shall not be lugged nor shall electrical spring connectors be used on any except for solid wires in lighting and receptacle circuits. Lugs and connectors shall be installed with a compression tool.

Terminations at 460 volt motors shall be made by bolt-connecting the lugged connectors. Connections shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of heat-shrinkable, polymeric insulating material over the connection area and a high dielectric strength mastic to seal the ends. Bolt connection area shall be kept free of mastics and fillers to facilitate rapid stripping and re-entry. Motor connection kits shall accommodate a range of cable sizes for both in-line and stub-type configurations. In-line splices and tees shall be made with tubular compression connectors and insulated as for motor terminations, except that

conductors No. 10 AWG and smaller may be spliced using self-insulating connectors. Splices and tees in underground handholes or pull boxes shall be insulated using Scotch-cast epoxy resin splicing kits. Terminations at devices with 120V pigtail leads, at solenoid valves, 120 volt motors, and other devices furnished with pigtail leads shall be made using self-insulating tubular compression connectors.

Conductor and cable markers shall be provided at splice points.

3.5 WIRING DEVICES

A. **General**: Boxes shall be independently supported by galvanized brackets, expansion bolts, toggle bolts, or machine or wood screws as appropriate. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure boxes, nor shall welding or brazing be used for attachment.

Unless otherwise indicated, receptacles and switches installed in sheet steel boxes shall be flush mounted and shall be located 18 inches above the floor unless otherwise indicated.

Switch boxes and receptacles installed in cast device boxes shall be mounted 48 inches above the floor.

B. **Application of Boxes and Covers**: Boxes and covers shall be installed as follows:

1. Outlet, switch, and junction boxes where surface mounted in exposed locations shall be cast alloy ferrous boxes with mounting lugs, zinc or cadmium plating, and enamel finish. Surface mounted boxes in concealed locations may be welded sheet steel boxes.

2. Sheet metal or cast ferrous alloy boxes for flush-mounting in concrete shall include with cast, malleable box covers and gaskets. Covers for pressed steel boxes shall be one-piece pressed steel, cadmium plated, except that boxes for installation in plastered areas shall be stainless steel over plaster rings.

3. Outlet boxes shall be used as junction boxes wherever possible. Where separate pullboxes are indicated, they shall include screw covers. Outdoors boxes shall be galvanized and shall be provided with gasketed covers and threaded hubs. Indoor boxes shall be painted.

3.6 CABINETS AND ENCLOSURES

1. Cabinets: Cabinets shall be set plumb at an elevation such that the maximum circuit breaker height shall be less than 5 ft 6 inches. Top edge of trim of adjacent panels shall be at the same height. Panels which are indicated as flush mounted shall be set so cabinet is flush and serves as a "ground" for plaster application.

2. Connections: Factory bus and wire connections shall be made at shipping splits, and all field wiring and grounding connections shall be made after the assemblies are anchored.

3. Finishes: Enclosures smaller in volume than 500 cubic inches shall be finished in accordance with the manufacturer's standard procedures. Finish color shall be No. 61 complying with ANSI Z55.1.

   Enclosures larger in volume than 500 cubic inches shall comply with Section 09800 or the indicated for transformers, distribution switchboards, and motor control centers.

3.7 EQUIPMENT ANCHORING

A. Freestanding or wall-hung equipment shall be anchored in place by methods that will meet seismic requirement in the area where project is located. Wall-mounted panels that weigh more than 500 pounds or which are within 18 inches of the floor shall be provided with fabricated steel support pedestal(s). Pedestals shall be of welded steel angle sections. If the supported equipment is a panel or cabinet and enclosed with removable side plates, it shall match supported equipment in physical appearance and dimensions. Transformers hung from 4-inch stud walls and weighing more than 300 pounds, shall have auxiliary floor supports.

B. Anchoring methods and leveling shall comply with the printed recommendations of the equipment manufacturers.

3.8 CONDUCTOR AND EQUIPMENT IDENTIFICATION

A. The completed electrical installation shall include adequate identification to facilitate proper control of circuits and equipment and to reduce maintenance effort.

B. Control and instrumentation wire and cable shall be assigned a unique identification number. Numbers shall be assigned to conductors having common terminals. Identification numbers shall appear within 3 inches of conductor terminals. "Control" shall be defined as any conductor used for alarm, annunciator, or signal purposes or any connect switch or relay contacts or any relay coils.

   1. Multiconductor cable shall be assigned a number which shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath free-standing equipment. It is expected that the cable number will form a part of the individual wire number. All individual control conductors and instrumentation cable shall be identified at pull points as described above.

   2. The instrumentation cable numbers shall incorporate the loop numbers shown.

C. Nameplates shall be provided for panelboards, panels, starters, switches, and pushbutton stations. In addition to the name plates indicated, control devices shall be equipped with standard collar-type legend plates, as required.

D. Terminal strips shall be identified by imprinted, varnished, marker strips attached under the terminal strip.

E. Empty conduits shall be tagged at both ends to indicate the destination at the far end. Where it is not possible to tag the conduit, destination shall be identified by marking an adjacent surface.

F. Identification tape shall be installed directly above buried raceway. Tape shall be installed 8 inches below grade and parallel with raceway. Identification tape shall be installed for buried raceway not under buildings or equipment pads except identification tape is not required for protection of street lighting raceway.

** END OF SECTION **

SECTION 16170 - GROUNDING SYSTEM

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing grounding for electrical systems, exposed non-energized metal surfaces of equipment and metal structures.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

Section 03300 Cast-In-Place Concrete

Section 05500 Miscellaneous Metalwork

Section 16050 Basic Electrical Materials and Methods

1.3 CODES

A. The WORK of this Section shall comply with the current editions, with revisions, of the following codes and City of San Diego Supplements:

1. California 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. IEEE 81 Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System, Guide for

2. UL 467 Standard for Grounding and Bonding Equipment

1.5 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Division 01:

1. Shop drawings showing details of grounding system.

2. Product data for grounding electrodes and connections.

1.6 OWNER'S MANUAL

A. The following shall be included in the OWNER'S MANUAL in compliance with Division 01:

1. Manufacturer's instructions including instructions for storage, handing, protection, examination, preparation and installation of exothermic welded connectors.

2. Test reports indicating overall resistance to ground [and resistance of each electrode.

1.7 PROJECT RECORD DRAWINGS

A. The following shall be included in the PROJECT RECORD DRAWINGS in compliance with Division 01:

1. Accurate record of actual locations of grounding electrodes.

2. Accurate and updated specifications showing work completed.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. **Delivery of Materials:** Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.

B. **Storage:** Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.

PART 2 – PRODUCTS

2.1 GENERAL

A. The WORK of this Section includes the following:

1. Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

2. Except as otherwise indicated, grounding products and systems shall comply with the NEC.

2.2 ROD ELECTRODE

A. Rod electrodes shall be 3/4 inch copper-clad steel, sectional type, joined by threaded copper alloy couplings. Length of rods forming an individual ground array shall be equal in length and shall be of the length required to obtain a minimum ground resistance of 5 ohms. Top of ground rod shall be fitted with a coupling and steel driving stud. Rods shall be of sufficient length to ensure contact with ground water and shall be not less than 10 feet.

2.3 CABLE

A. Ground cable shall be annealed bare copper, concentric stranded wire.

2.4 MECHANICAL CONNECTORS

A. Compression connectors shall comply with the following:

1. Material: Cast Copper

2.5 GROUNDING WELL COMPONENTS

A. Grounding well components shall comply with the following:

1. Well Pipe: 8 inch diameter by 24 inch long concrete pipe with belled end.

2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

2.6 MANUFACTURERS

A. Products indicated shall be manufactured by one of the following (or equal):

1. Rods and Fittings:

Copperweld
Blackburn
Weaver

2. Compression Connectors:

a. Thomas and Bett

PART 3 – EXECUTION

3.1 GENERAL

A. Embedded and buried ground connections shall be made by compression connectors utilizing diamond or hexagon dies and a hand compression tool for wire sizes 2 AWG and smaller and a hydraulic pump and compression head for wire sizes 2/0 AWG and

larger. Compression connections shall be prepared in accordance with the manufacturer's instructions. Exposed ground connections to equipment shall be made by bolted clamps unless otherwise indicated. Solder shall not be used in any part of the ground circuits.

B. Embedded ground cables and fittings shall be securely attached to concrete reinforcing steel with tie wires and prevented from displacement during concrete placement. As each part of the grounding system which is laid below finished grade is completed, the RESIDENT ENGINEER shall be notified 2 hours prior to backfilling.

C. Grounding conductors which are extended beyond concrete surfaces for equipment connection shall be extended a sufficient length to reach the final connection point without splicing. Minimum extension shall be 3 feet. Grounding conductors which project from a concrete surface shall be located as close as possible to a corner of the equipment pad, protected by conduit, or terminated in a flush grounding plate. Exposed grounding conductors shall be supported by noncorrosive metallic hardware at 4-foot intervals maximum Grounding conductors for future equipment shall be terminated using a two-hole copper flush mounted grounding plate.

D. Grounding conductor shall not be used as a system neutral.

3.2 FACILITY GROUNDING

A. Ground continuity throughout the facility shall be maintained by installing an electrically-continuous metallic raceway system, or a non-metallic raceway with a grounding conductor.

B. Metallic raceway shall be installed with double lock nuts or hubs at enclosures. Metallic conduits shall be assembled to provide a continuous ground path. Metallic conduits shall be bonded using insulated grounding bushings and shall be connected to the grounding system. Cable trays shall have No. 2/0 AWG bare copper ground conductor run on the outside of each tray. Conductor shall be connected to each section or fitting using a carriage bolt and clamp.

3.3 EQUIPMENT AND ENCLOSURE GROUND

A. Electrical and distribution equipment and metal equipment platforms which support any electrical equipment shall be bonded to the nearest ground bus or to the nearest switchgear ground bus. This grounding requirement is in addition to the indicated raceway grounding.

B. Connection to ground electrodes and ground conductors shall be exothermic welded where concealed and shall be bolted pressure type where exposed. Bolted connectors shall be assembled wrench-tight.

C. Insulated grounding bushings shall be employed for all grounding connections to steel conduits in switchboards, in motor control centers, in pullboxes, and elsewhere where conduits do not terminate at a hub or a sheet metal enclosure.

D. Where insulated bushings are required, they shall be installed in addition to double lock-nuts.

E. Nonelectrical equipment with metallic enclosures shall be connected to the grounding system.

3.5 EXAMINATION

A. The WORK of this Section includes verification that final backfill and compaction has been completed before driving rod electrodes.

3.6 INSTALLATION

A. Rod electrodes and additional rod electrodes as required to achieve specified resistance to ground shall be installed at locations indicated.

B. Grounding well pipes with cover shall be installed at rod locations where indicated with well pipe top flush with finished grade.

C. Metal siding not attached to grounded structure shall be bonded together and to ground.

D. Reinforcing steel and metal accessories shall be bonded to structures.

3.7 FIELD QUALITY CONTROL

A. Grounding and bonding system conductors and connections shall be inspected for tightness and proper installation.

3.8 GROUNDING SYSTEM TESTS

A. Suitable test instruments shall be used to measure resistance to ground of system. Testing shall be performed in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

B. The grounding test shall comply with IEEE Standard 81. A plot of ground resistance readings for each isolated ground rod or ground mat shall be submitted on 8-1/2 x 11 inch size graph paper. The current reference rod shall be driven at least 100 feet from the ground rod or grid under test. The measurements shall be made at 10-foot intervals beginning 25 feet from the test electrode and ending 75 feet from it, in direct line between the ground rod or center of grid and the current reference electrode.

C. A grounding system that shows greater than 2 ohm resistance for the flat portion of the plotted data shall be considered inadequately grounded. Additional parallel connected ground rods and/or deeper driven rods shall be provided until the ground resistance measurements complies with the indicated requirements. Use of salts, water or compounds to attain the specified ground resistance is not acceptable.

** END OF SECTION **

SECTION 16230 - STANDBY ENGINE-GENERATOR

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

A. The Work of this Section includes providing one complete engine-generator unit(s) mounted on a structural steel base, an attached to a monolithic concrete foundation block by means of spring vibration isolators. This unit includes, but is not limited to, a diesel engine, generator frame-mounted generator control panel, starting and control equipment, radiator, fan, exhaust system, exhaust piping, intake air cleaner and piping, oil pumps, lubricating oil, air intake system and engine jacket water heater, and all other parts, instruments, and auxiliary equipment necessary to make a complete unit. The engine-generator shall be a heavy-duty, industrial type, suitable for a standby operation in the event of a utility outage under the conditions indicated, electric motor started, with engine-mounted radiator. The generator shall be a revolving field, brushless, synchronous type. The engine shall be started and stopped in both manual and automatic modes by means of control signals from the engine-generator switchboard control section. The engine-generator, piping, and all accessories shall be coated with the manufacturer's standard finish. The engine-generator manufacturer shall provide a base-frame tank fuel storage and supply system. The engine-generator shall be equipped with a sound attenuating enclosure as described in Section 2.11.

B. The expected minimum ambient temperature at the project site is 30 degrees F and the expected maximum ambient temperature is 100 degrees F. The altitude of the project site is 740 feet. Relative humidity is 0 to 95 percent.

C. The design and layout was based on an engine-generator manufactured by Kohler and therefore all pipe routing connections, trench location and positions of other engine accessories may not be identical to units from other manufacturers. If the substitution of equipment is approved by the RESIDENT ENGINEER, CONTRACTOR shall be responsible for all modifications required to complete the installation without additional cost to the OWNER.

D. The Work also requires that one single manufacturer be made responsible for furnishing the Work of this Section but without altering or modifying the CONTRACTOR’s responsibilities under the Contract Documents. The CONTRACTOR shall furnish a written, notarized certification signed by an officer of the manufacturing corporation, stating that the unloading, installation, testing, and inspection of the materials of all major equipment components and instrumentation meet or exceed the values indicated herein and in the referenced standards.

E. All equipment shall be new equipment and of the current production of the manufacturer. All materials and parts shall be new and unused.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Electrical Materials 16050.

B. Transfer Switch 16415

1.3 STANDARDS

Construct equipment in accordance with the applicable requirements of the following standards:

A. California Electrical Code (NEC).

B. American National Standards Institute (ANSI).

C. National Electrical Manufacturers Association (NEMA).

D. Institute of Electrical and Electronic Engineers (IEEE).

E. Insulated Cable Engineers Association (ICEA).

F. American Society for Testing and Materials (ASTM).

G. Underwriters' Laboratories, Inc. (UL) excluding generator and generator-mounted control panel.

1.4 WORK INCLUDED

A. Installation: The work includes supplying, delivering, installing, and testing a complete integrated generator system. The system consists of a diesel generator set with related component accessories mounted. Generator shall be installed on level grade. Contractor shall adjust grade accordingly.

B. Fuel System: The Contractor shall provide all fuel for testing and a full tank of diesel fuel at the completion of all testing.

C. System Test: A complete system load test shall be performed after all equipment is installed. System test shall include 1 hour at 25%, 50%, 75%, and 100% load.

D. Requirements, Codes, and Regulations: The equipment supplied and installed shall meet the requirements of the National Electrical Code (NEC) and all applicable local codes and regulations. All equipment shall be of new and current production by a manufacturer who has 25 years of experience building this type of equipment. Manufacturer shall be ISO9001 certified.

1.5 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop and installation drawings and catalog data for the following equipment. Show applicable ratings, sizes, materials, manufacturers and part numbers, and overall dimensions and weights.

1. Itemized Bill of Material.

2. Engine-generator base with anchor bolt sizes and layout. Submit anchor bolt material listing. Submit catalog data for vibration isolators and calculations for size and number of anchor bolts.

3. Engine.

4. Generator.

5. Voltage regulator.

6. Silencer with insulation.

7. Base fuel tank and spill basin.

8. Control panel, generator mounted.

9. Battery charger.

10. Batteries.

11. Jacket water heater.

12. Weatherproof and sound attenuated enclosure.

C. Submit installation fact sheet giving fuel, coolant, lubricating oil, and exhaust and ventilation requirements.

D. Submit torsional vibration analysis.

E. Submit factory test report.

F. Submit a start-up inspection report signed by the engine manufacturer's authorized field service representative.

G. Manufacturer’s generator set installation checklist.

H. Manufacturer’s generator set start-up checklist.

I. Provide an information copy of the standard engine inspection and maintenance service contract. The contract shall be for the complete system including all auxiliary support systems.

J. Upon engine-generator delivery, submit operation and maintenance manuals describing the equipment including the following:

1. Project-specific layout drawings of components specified.

2. Project-specific narrative and tables for the following:

   a. Replacement parts list.
   b. Lubrication (each type, location, and frequency).
   c. Common problems and troubleshooting.
   d. Personnel safety/issues.
   e. Listing of low-normal-high levels for all fluids, pressures, and temperatures.
   f. Control panel and instruments.

3. Control schematics, ladder diagrams, and interconnection drawings.

4. Catalog cuts and technical manuals for system components.

5. Copy of guarantees and warranties issued for the various items of equipment, showing dates of expiration.

6. Copies of test results.

7. Information copy of the standard engine inspection and maintenance service contract as described above. Service contract shall cover the complete system, including all auxiliary support systems.

8. Marked tab dividers for each of the following sections:

   a. List of equipment furnished for project with name, address, and telephone number of vendor.
   b. List of serial numbers of equipment furnished.
   c. A copy of shop drawings for mechanical, electrical, and instrument equipment in final form.
   d. Manufacturer's operation and maintenance instructions and parts lists.

9. Documentation of permit to construct/operate for the air quality management district.

10. Line out non-applicable text and illustrations. The section of the manual on operation shall describe the functions and limitations of each component and its relationship to the system of which it is a part. Where several models, options, or styles are described, the manual shall identify the items actually provided.

11. Provide complete operating and maintenance instructions for each item of equipment, setting forth a detailed, step-by-step procedure for starting, stopping, operating, and maintaining the entire system as installed. Include a schedule of recommended maintenance intervals.

K. Warranty: Warranty as specified in this section.

1.6 OPERATION AND MAINTENANCE INFORMATION

A. The following shall be submitted:

1. Operation and maintenance information as indicated for each separate subassembly and separately furnished item of equipment provided under this Section. Information on the following items shall be specific to the entire engine generator furnished under this Section: startup, operating, shut down, short and long-term inactivation, and preventive maintenance procedures; lubricant list with recommended lubrication intervals; spare parts list; tool list; and overhaul instructions.

2. Copies of all factory engine tests, in quintuplicate, certified by an officer of the manufacturing corporation.

3. Copies of all generator test documentation, in quintuplicate, certified as above.

4. Point-to-point wiring diagrams for all controls.

5. Details of the engine starting system, including electrical schematics.

1.7 TOOLS AND ACCESSORIES

A. The CONTRACTOR shall furnish and deliver all special tools, instruments, accessories, and special lifting and handling devices shown in the approved instruction manuals. Unless otherwise specified or directed by the OWNER, the items shall be delivered to the OWNER, with written transmittal accompanying each shipment, in the manufacturers' original container labeled to describe the contents and the equipment for which it is furnished. The CONTRACTOR shall deliver a copy of each transmittal to the OWNER for record purposes.

1.8 SERVICES OF MANUFACTURER

A. Instruction of OWNER's Personnel: At no additional cost to the OWNER, the manufacturer's authorized representative shall instruct the OWNER's personnel in the operation and maintenance of the system including step-by-step troubleshooting procedures with necessary test equipment for not less than 4 days. In addition, the OWNER's personnel will be present during field testing and shall receive instruction on

the startup and testing procedure. The CONTRACTOR shall give the OWNER written notice of the proposed field testing period at least two weeks prior to the commencement of field testing.

B. The manufacturer shall submit a written training program to the RESIDENT ENGINEER for approval. Training shall include 8 hours of classroom time instruction and 4 hours of equipment-demonstration time. Training shall not start until 30 days after written approval by the RESIDENT ENGINEER. A minimum of 5 trainees of each respective trade shall receive a training manual specific to their trade, as follows:

1. Mechanics

2. Electricians

3. Instrument Machinery

4. Operators

The training manuals will be retained by the trainees and will not returned to the manufacturer.

C. Manufacturer's Certified Reports: The manufacturer or its authorized representative shall submit a notarized written report certifying that: (1) the equipment was properly installed, wired and connected, (2) the equipment is in accurate alignment, (3) the manufacturer or its authorized representative was present when the equipment was placed in operation, (4) the manufacturer or its authorized representative checked, inspected and adjusted the equipment as necessary, (5) the equipment was operated under full load conditions and operated satisfactorily, (6) the exhaust emission and noise level is in compliance with applicable regulations, and (7) the equipment is fully covered under the terms of the warranty.

D. Service: Maintain a service center capable of emergency maintenance and repair at the project site within eight hours maximum response time.

1.9 FACTORY TESTING

A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for one OWNER-designated inspectors for 1 day required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than 50 miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400 - Quality Control. The CONTRACTOR shall notify the OWNER two weeks in advance of the factory testing.

Before delivery to the job site, the products shall be tested at the factory. The test shall verify that products are free of any defects, and verify guaranteed performance. The CONTRACTOR shall not ship equipment before approval.

B. The engine-generator set shall be subject to both static and operating tests as described below:

1. Static Testing. The entire unit, including control panels and accessories, shall be set up and tested, using static methods to ensure that all safety devices and control circuits are properly installed, aligned, and connected. All trim piping shall be pressure tested, and all regulators and solenoid valves shall be tested for proper function.

2. Operating Tests. The complete unit shall be set up in a test cell and operated to determine its characteristics under various loads. The engine tests shall be conducted in accordance with applicable portions in ASME PTC 17. The generator tests shall be conducted in accordance with applicable portions of the test procedure in NEMA MG-1, through the use of dry type load banks. The test shall be conducted over minimum 4 hours, including full load operating test of at least 1 hour. Records, in addition to the information required by ASME PTC 17 and NEMA MG-1, shall include the average starting time for not less than 19 cold starts, test cell temperatures, the and number of cranking cycles before successful start. The CONTRACTOR shall submit four copies of the certified test reports in typed form to the OWNER.

C. **Factory Prototype Testing**: Components of the emergency system, such as the engine/generator set, transfer switch, and accessories, shall not be subjected to prototype tests because the tests are potentially damaging. Rather, similar design prototypes and preproduction models shall be subject to the following tests:

1. Maximum power (kW).

2. Maximum motor starting (kVA) at 35% instantaneous voltage dip.

3. Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-32.6.

4. Governor speed regulation under steady-state and transient conditions.

5. Voltage regulation and generator transient response.

6. Harmonic analysis, voltage waveform deviation, and telephone influence factor.

7. Three-phase short circuit tests.

8. Alternator cooling air flow.

9. Torsional analysis to verify that the generator set is free of harmful torsional stresses.

10. Endurance testing.

D. **Final Production Tests**. Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

1. Single-step load pickup.

2. Safety shutdown device testing.

3. Rated Power @ 0.8 PF.

4. Maximum power.

5. Upon request, a witness test, or a certified test record sent prior to shipment.

E. **Site Tests.** The manufacturer's distribution representative shall perform an installation check, startup, and building load test. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.

2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery chargers, alternator strip heaters, remote annunciators, etc.

3. Generator set startup under test mode to check for exhaust leaks, cooling air flow, movement during starting and stopping, vibration during operation, normal and emergency line-to-line voltage and frequency, and phase rotation.

4. Automatic start by means of a simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator set voltage, amperes, and frequency shall be monitored throughout the test.

1.10 WARRANTY

A. The generator set shall include a standard one year warranty to guarantee against defective material and workmanship in accordance with the manufacturer's published warranty from date of startup. Optional warranties shall be available upon request.

B. The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall regularly engage in maintenance contract programs to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions; adjustment to the generator set, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and function tests performed on all systems.

1.11 PARTS AND SERVICE QUALIFICATIONS

A. Service Facility: The engine-generator supplier shall maintain 24-hour parts and service capability within 100 miles of the project site. The distributor shall stock parts as needed to support the generator set package for this specific project. The supplier must carry sufficient inventory to cover no less than 80% parts service within 24 hours and 95% within 48 hours.

B. Service Personnel: The dealer shall maintain qualified factory-trained service personnel.

1.12 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at substantial completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment. Quarterly exercising to be scheduled with the City at least one week in advance.

1.13 SYSTEM RESPONSIBILITY

A. Generator Set Distributor: The completed engine-generator set shall be supplied by the manufacturer's authorized distributor only.

B. Requirements, Codes, and Regulations: The equipment supplied and installed shall meet the requirements of NEC and all applicable local codes and regulations. All equipment shall be new, of current production. There shall be one source responsibility for warranty; parts and service through a local representative with factory-trained service personnel.

C. Automatic Transfer Switch: The automatic transfer switch, specified in Section 16145 shall be supplied by the generator set manufacturer in order to establish and maintain a single source of system responsibility and coordination.

1.14 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.

2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.

3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

1.15 QUALITY ASSURANCE

A. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

B. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

C. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling air intake and discharge, and other components of installation. The maximum noise level at the adjacent property boundaries shall not exceed 40 dB(A).

PART 2 – MATERIALS

2.1 MANUFACTURERS

A. The engine, generator, generator control panel, and fuel tank unit shall be manufactured in the U.S. by manufacturers currently engaged in the production of such equipment. An authorized distributor maintaining a parts depot and service facility shall be located within 100 miles of the project site.

B. The engine-generator shall be manufactured by Caterpillar Inc., Cummins, Kohler, modified as necessary to meet requirements as indicated herein, or approved equal.

2.2 RATING

A. The rating of the standby engine-generator shall be as listed below, based on operation of the set when equipped with all operating accessories, such as air cleaners, lubricating oil pump, fuel injection pump, and jacket water pump. The specified standby kw shall be for continuous electrical service during interruption of the normal utility source.

1. Standby: 83kW (minimum).

2. Engine Speed: 1,800 rpm (maximum).

3. Voltage: 208/120 volts, 3 phase, 4 wire.

4. Frequency: 60 hertz.

5. Power Factor: 0.8.

6. Ambient Temperature: 110°F maximum, 25°F minimum.

7. Humidity at Maximum Temperature: 90%.

8. The momentary rms voltage dip shall not be greater than 25% of rated voltage when full load at rated power factor is applied to the generator.

9. The engine-generator shall be capable of starting and running the following loads in the sequence listed (see note below). Maximum voltage dip shall be 25%. Provide oversized generator or engine-generator unit to comply with this requirement.

Load	Kva, hp, or kw	Starting Method
Pump P1	25 hp	
Pump P2 (load step)	25 hp	
Lighting	.2kW	

10. The engine-generator shall be pre-certified by SDAPCD to meet District rules and BACT.

2.3 ENGINE

A. General: The engine shall be the standard low-emission version of the product of the manufacturer, a current production model, and have the following features:

1. Electronic isochronous governor capable of 0.25% steady-state frequency regulation.

2. 12-volt positive-engagement solenoid shift-starting motor.

3. 65-ampere automatic battery charging alternator with a solid-state voltage regulation.

4. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.

5. Dry-type replaceable air cleaner elements for normal applications.

6. Engine-driven or electric fuel-transfer pump including fuel filter and electric solenoid fuel shutoff valve capable of lifting fuel.

7. The turbocharged, air-cooled engine shall be fueled by diesel.

8. The engine shall have a minimum of 4 cylinders and be liquid-cooled by Unit Mounted Radiator 122°F/50°C.

9. The engine shall be EPA certified from the factory.

B. Provide the engine with the following accessories:

1. Fuel, lube oil, and intake air filters.

2. Intake air silencer, high frequency type or combination intake filter/silencer.

3. Lube oil cooler, fuel cooler, radiator mounted.

4. Fuel transfer pump.

5. Flexible fuel lines.

6. Particulate filter

7. Engine-mounted water pump for jacket water and aftercooler.

8. Coolant and oil drain valves extended to the edge of engine rails, with valve and cap.

2.4 ALTERNATOR

A. The alternator shall be salient-pole, brushless, 2/3-pitch, 12 lead, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature rise limits. The insulation shall be class H per UL1446 and the varnish shall be a fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to Standby 150°C. The excitation system shall be of brushless construction controlled by a solid- state voltage regulator capable of maintaining voltage within ±2.0% at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.

B. The alternator shall have a single maintenance-free bearing, designed for 40000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

C. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

2.5 CONTROLLER

A. Kohler Decision-Maker® 550 Controller or equal:

1. The generator set controller shall meet NFPA 110 Level 1 requirements (1996 version) and shall include an integral alarm horn as required by NFPA.

2. The controller shall meet NFPA 99 and NEC requirements.

3. The controller shall be UL 508 listed.

B. Applicability.

1. The controller shall be standard on a Kohler 80REOZJF or equal.

2. The controller shall support 12-volt starting systems.

3. The controller's environmental specification shall be: -40°C to 70°C operating temperature range and 5-95% humidity, non-condensing.

4. The controller shall mount on the generator or remotely within 40 feet with viewable access.

C. Hardware Requirements.

1. Control Panel shall include:

a. The control shall have a run-off/reset-auto three-position selector switch.
b. A controller-mounted, latch-type emergency stop pushbutton.
c. Five indicating lights: System Ready - green
Not in Auto - yellow
Programming Mode - yellow
System Warning - yellow
System Shutdown – red.
d. Display with two lines of 20-alphanumeric characters, viewable in all light conditions.
e. Sixteen position snap action sealed keypad for menu selection and data entry.
f. For ease of use, an operating guide shall be printed on the controller faceplate.

g. An audible alarm with alarm silence capability.
h. Panel lights shall be supplied as standard.

D. Control Functional Requirements.

1. Field-programmable time delay for engine start. Adjustment range 0-5 minutes in 1 second increments.

2. Field-programmable time delay engine cooldown. Adjustment range 0-10 minutes in 1 second increments.

3. Capability to start and run at user-adjustable idle speed during warmup for a selectable time period (0-10 minutes), until engine reaches preprogrammed temperature, or as supported by ECM-equipped engine.

4. The idle function including engine cooldown at idle speed.

5. Real-time clock and calendar for time stamping of events.

6. Output with adjustable timer for an ether injection starting system. Adjustment range, 0-10 seconds.

7. Output for shedding of loads if the generator set reaches a user programmable percentage of its kW rating. Load shed shall also be enabled if the generator set output frequency falls below 59Hz.

8. Programmable cyclic cranking that allows up to six crank cycles and up to 35 seconds of crank time per crank cycle.

9. The capability to reduce controller current battery draw, for applications where no continuous battery charging is available. The controller vacuum fluorescent display should turn off automatically after the controller is inactive for 5 minutes.

10. Control logic with alternator protection for overload and short circuit matched to each individual alternator and duty cycle.

11. Control logic with RMS digital voltage regulation. A separate voltage regulator is not acceptable. The digital voltage regulator shall be applicable to single- or three-phase systems.

12. The capability to exercise the generator set by programming a running time into the controller. This feature shall also be programmable through the PC software.

13. Control function shall include output voltage adjustment.

14. Battle switch function selection to override normal fault shutdowns, except emergency stop and overspeed shutdown.

15. The control shall detect the following conditions and display on control panel:

    a. Customer programmed digital auxiliary input ON (any of the 21 inputs available).
    b. Customer programmed analog auxiliary input out of bounds (any of 7 inputs for ECM equipped engines and 5 inputs for non ECM engines).
    c. Emergency stop.
    d. High coolant temperature.
    e. High oil temperature.
    f. Controller internal fault.
    g. Locked rotor - fail to rotate.
    h. Low coolant level.
    i. Low oil pressure.
    j. Master switch error
    k. NFPA common alarm
    l. Overcrank.
    m. Overspeed with user-adjustable level, range 60-70 Hz.
    n. Overvoltage with user adjustable level, range 105% to 135%
    o. Overfrequency with user adjustable level, range 102% to 140%
    p. Underfrequency with user adjustable level, range 80% to 90%
    q. Undervoltage with user adjustable level, range 70% to 95%
    r. Coolant temperature signal loss
    s. Oil pressure gauge signal loss

    Conditions resulting in generator warning (generator will continue to operate):

    a. Battery charger failure
    b. Customer programmed digital auxiliary input on (any of the 21 inputs available)
    c. Customer programmed analog auxiliary input on (any of the 7 inputs available on ECM engines and 5 inputs for non ECM engines)
    d. Power system supplying load
    e. Ground fault detected - detection by others
    f. High battery voltage - Level shall be user adjustable.
    g. Range 29-33 volts for 24-volt systems.
    h. High coolant temperature
    i. Load shed
    j. Loss of AC sensing
    k. Underfrequency
    l. Low battery voltage - level shall be user adjustable, range 20-25 volts for 24-volt systems.
    m. Low coolant temperature
    n. Low fuel level or pressure
    o. Low oil pressure
    p. NFPA common alarms
    q. Overcurrent
    r. Speed sensor fault

s. Weak battery
t. Alternator protection activated

E. Control Monitoring Requirements.

1. All monitored functions must be viewable on the control panel display.

2. The following generator set functions shall be monitored:

a. All output voltages - single phase, three phase, line to line, and line to neutral, 0.25% accuracy.
b. All single phase and three phase currents, 0.25% accuracy.
c. Output frequency, 0.25% accuracy
d. Power factor by phase with leading/lagging indication
e. Total instantaneous kilowatt loading and kilowatts per phase, 0.5% accuracy
f. kVARS total and per phase, 0.5% accuracy
g. kVA total and per phase, 0.5% accuracy
h. kW hours
i. A display of percent generator set duty level (actual kW loading divided by the kW rating)

3. Engine parameters listed below shall be monitored: (*available with ECM equipped engines):

a. Coolant temperature both in English and metric units.
b. Oil pressure in English and metric units.
c. Battery voltage
d. RPM
e. Lube oil temperature*
f. Lube oil level*
g. Crankcase pressure*
h. Coolant level*
i. Coolant pressure*
j. Fuel pressure*
k. Fuel temperature*
l. Fuel rate*
m. Fuel used during the last run*
n. Ambient temperature*

4. Operational records shall be stored in the control beginning at system startup.

a. Run time hours.
b. Run time loaded hours.
c. Run time unloaded hours
d. Number of starts
e. Factory test date

f. Last run data including date, duration, and whether loaded or unloaded
g. Run time kilowatt hours

5. The following operational records shall be a resettable for maintenance purposes:

a. Run time loaded hours.
b. Run time unloaded hours
c. Run time kilowatt hours
d. Days of operation
e. Number of starts
f. Start date after reset

6. The controller shall store the last one hundred generator set system events with date and time of the event.

7. For maintenance and service purposes, the controller shall store and display on demand the following information:

a. Manufacturer's model and serial number.
b. Battery voltage
c. Generator set kilowatt rating
d. Rated current
e. System voltage
f. System frequency
g. Number of phases

F. Inputs and Outputs.

1. Inputs

a. There shall be 21 dry contact inputs that can be user-configured to shut down the generator set or provide a warning.
b. There shall be 7 user-programmable analog inputs for ECM-equipped engines (5 for non-ECM engines) for monitoring and control.
c. Each analog input can accept 0-5 volt analog signals
d. Resolution shall be 1:10,000
e. Each input shall include range settings for 2 warnings and 2 shutdowns.
f. All values shall be on the control panel display.
g. Shall be user-assigned.
h. Additional standard inputs required:
• Input for an external ground fault detector. Digital display shall show "ground fault" upon detection of a ground fault.
• Reset of system faults.
• Remote two-wire start.
• Remote emergency stop.

i. Idle mode enable.

2. Outputs

a. All NFPA 110 Level 1 outputs shall be available.
b. Thirty outputs shall be available for interfacing to other equipment:
   • All outputs shall be user-configurable from a list of 25 functions and faults.
   • These outputs shall drive optional dry contacts.
c. A programmable user-defined common fault output with over 40 selections shall be available.

Communications

1. If the generator set engine is equipped with an ECM (engine control module), the controller shall communicate with the ECM for control, monitoring, diagnosis, and meet SAE J1939 standards.

2. Industry standard Modbus communication shall be available.

3. A Modbus master shall able to monitor and alter parameters, and start or stop a generator.

4. The controller shall have the capability to communicate to a personal computer (IBM or compatible) running Windows ’9X or Windows NT.

5. Communications shall be available for serial, CAN, and Ethernet bus networks.

6. A variety of connections shall be available based on requirements:

a. A single control connection to a PC.
b. Multiple controls on an intranet network connected to a PC.
c. A single control connection to a PC via phone line.
d. Multiple controls to a PC via phone line.

7. Generator and transfer switch controls shall be equipped with communications modules capable of connecting to the same communication network.

8. The capability to connect up to 128 controls (any combination of generator sets and transfer switches) on a single network shall be supported.

9. Cabling shall not be limited to the controller location.

10. Network shall be self-powered.

2.6 GENERATOR

A. General:

1. The generator shall provide 83kW/103.75 kVA when operating at 120/208 volts, 60 Hz, .8 power factor. The generator set shall be capable of a Standby 150°C rating while operating in an ambient condition of less than or equal to 77° F and a maximum elevation of 8200 feet above sea level.

2. Motor starting performance and voltage dip determinations shall be based on the complete generator set. The generator set shall be capable of supplying 289 LR KVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip i.e. engine, alternator, voltage regulator and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.

3. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

2.7 ACCESSORIES

A. **Battery Charger.** A 10-ampere automatic float to equalize battery charger with the following features:

1. 12 or 24 VDC output

2. Voltage regulation of 1% from no to full load over 10% AC input line voltage variations.

3. Ammeter and voltmeter with 5% full-scale accuracy.

4. LED lamp for power indication

5. Current limited during engine cranking, short circuit, and reverse polarity conditions

6. Temperature compensated for ambient temperatures for -40°C to 60°C

7. UL Listed

B. **Battery Rack and Cables.** Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.

C. **Circuit Breaker.** The generator shall come with a primary, factory installed, 80% rated line circuit breaker of 200 amperes that is UL2200 listed. Line circuit breakers shall be

sized for the rated ampacity of the genset. Load side lugs shall be provided from the factory. The line circuit breaker shall include auxiliary contacts, shunt trip, undervoltage trip, alarm switch, and overcurrent switch functionality. Load side breaker connections made at the factory shall be separated from field connections. When GFI breakers are required, additional neutrals shall be factory installed.

D. **Circuit Breaker.** The generator shall come with a second, factory installed, 80% rated line circuit breaker of 200 amperes that is UL listed. Load side lugs shall be provided from the factory. The line circuit breaker shall have auxiliary contacts, shunt trip, undervoltage trip, alarm switch, and overcurrent switch functionality. Separators shall be installed at the factory between breakers when multiple breakers and specified. Load side breaker connections made at the factory shall be separated from field connections. When GFI breakers are required, additional neutrals shall be factory installed.

E. **Rodent Guards.** Generator rodent guards shall prevent intrusion and protect internal components

F. **Standard Air Cleaner.** The air cleaner shall provide engine air filtration which meets the engine manufacturer's specifications under typical operating conditions.

G. **Block Heater.** The block heater shall be thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level 1.

2.8 DOUBLE WALL SECONDARY CONTAINMENT SUB BASE FUEL TANK

A. A subbase fuel tank used in conjunction with a diesel powered generator set of 80kW will contain enough fuel to support the generator set for a period of 72 hours at 100% of rated load and 89 hours at 75% of rated load.

B. The subbase fuel system is listed under UL 142, subsection entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.

C. The above ground steel secondary containment rectangular tank for use as a sub base for diesel generators is manufactured and intended to be installed in accordance with the Flammable and Combustible Liquids Code—NFPA 30, the Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.

D. **Primary Tank**. It will be rectangular in shape and constructed in clam shell fashion to ensure maximum structural integrity and allow the use of a full throat fillet weld.

Steel Channel Support System. Reinforced steel box channel for generator support, with a load rating of 5,000 lbs. per generator mounting hole location. Full height gussets at either end of channel and at generator mounting holes shall be utilized.

Exterior Finish. The exterior coating has been tested to withstand continuous salt spray testing at 100 percent exposure for 244 hours to a 5 percent salt solution at 92-97° F. The coating has been subjected to full exposure humidity testing to 100 percent humidity at 100° F for 24 hours. Tests are to be conducted in accordance with The American Standard Testing Methods Society.

E. **Venting.** Normal venting shall be sized in accordance with the American Petroleum Institute Standard No 2000, Venting Atmospheric and Low Pressure Storage Tanks not less than 1-1/4" (3 cm.) nominal inside diameter.

F. **Emergency Venting.** The emergency vent opening shall be sized to accommodate the total capacity of both normal and emergency venting and shall be not less than that derived from NFPA 30, table 2-8, and based on the wetted surface area of the tank. The wetted area of the tank shall be calculated on the basis of 100 percent of the primary tank. The vent is spring-pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.

G. **External Fuel Fill.** There shall be a 2" NPT opening within the primary tank and lockable manual fill cap. Provide spill bucket and cover at the fuel fill line of the fuel base tank to avoid containment for the whole generator unit. Spill bucket shall not be built-in type.

H. **Fuel Level.** A direct reading, UL listed, magnetic fuel level gauge with a hermetically sealed vacuum tested dial shall be provided to eliminate fogging.

I. **Low Fuel Level Switch.** Consists of a 30 watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

2.9 EXHAUST SYSTEM

A. Exhaust system shall consist of a silencer, flexible exhaust fitting, exhaust piping, insulation, and mounting hardware.

B. Provide an internally or externally mounted, super critical-grade silencer constructed of 316 Stainless Steel. Exhaust noise shall not exceed 40 dB(A) at 25 feet. Provide brackets, companion flanges, gaskets, and fasteners for mounting. Silencer shall be as manufactured by Silex or approved equal.

C. Silencer and exhaust pipe size shall be sufficient to ensure that measured exhaust backpressure does not exceed the maximum limitations specified by the engine manufacturer.

D. Provide a seamless Type 316 stainless steel bellows-type flexible exhaust fitting at least 18 inches long.

E. Pipe and Coupling: The engine exhaust coupling shall be stainless steel heavy duty, convoluted pressure hose-type. The flexible coupling shall have an overall length of

not less than 16 inches and 150 lb ANSI steel flanges, and it shall be designed for 1250 degrees F service. All bolts, nuts, and clamps necessary for the installation of the flexible coupling and exhaust piping shall be provided. All parts of the exhaust system, except flanges, shall be of Type 316 stainless steel. Exhaust piping inside of buildings shall be Schedule 20 stainless steel. The pipe shall be supported by steel saddles welded to the pipe and extending through the insulation.

F. Cover the exhaust manifolds, turbochargers, and flexible exhaust fitting with heat-shielding material or thermal blankets provided by the engine supplier. Exterior surface temperatures shall not exceed 200°F. Install insulation so that it does not interfere with the functioning of the flexible exhaust fitting.

G. Provide NFPA 37 and UL-103 compliant factory built ventilated roof thimble rated for 1250 degrees F. The roof thimble shall include vent flashing and a storm collar. The thimble shall be Selkirk Metalbestos Model P-MVT or equal.

2.10 ENCLOSURE

A. Provide a sound attenuated enclosure to completely enclose the engine-generator, radiator, control panel, battery box, battery charger, day tank, fuel level indicating instrument, heaters, and other equipment as shown. The sound attenuated enclosure shall reduce sound to 65 dB(A) at 3 feet. The enclosure design shall permit continuous full load operation of the engine-generator with access doors closed.

B. All enclosures shall be constructed from high strength, low alloy steel, aluminum or galvanized steel.

C. The enclosure shall be finish coated with powder baked paint for superior finish, durability, and appearance. Enclosures will be finished in the manufacturer's standard color.

D. The enclosures shall allow the generator set to operate at full load in an ambient temperature of 40 - 45°C with no additional derating of the electrical output.

E. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker shall meet the requirements of the National Electric Code.

F. Doors shall be equipped with lockable latches. Locks shall be keyed alike.

G. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.

H. The complete exhaust system shall be internal to the enclosure or optional with external mounted silencer.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Coordinate the construction of engine-generator set foundations, piping systems, and conduit stub-ups with the generator set manufacturer's written requirements. Foundation blocks, anchor bolt layouts, and piping and quantity and locations of conduit stub-ups may have to be modified from those shown in the drawings. Such work shall be at the Contractor's expense.

B. Contractor to contact the Fire Marshal for additional requirements for installation of fuel tank. Contractor to comply with all requirements set forth by the Fire Marshal. Contact person: Deputy David Williamson.

C. Contractor to obtain a permit from the Fire Marshall prior to work. Contractor shall secure and pay for all permits and fees necessary for execution and completion of electrical work, including all chargers by the local government agencies.

D. Type 316 stainless steel anchor bolts for the engine-generator set bases shall be cast-in-place.

E. Ground the generator frame in accordance with the NEC.

3.2 PIPING

A. Pitch horizontal runs of exhaust pipe away from the engine. Provide condensate traps with petcocks or valves at low spots in the exhaust system.

B. Extend the crankcase ventilator pipe from the engine to discharge crankcase fumes outside the equipment room. Pipe size shall be as recommended by the generator set manufacturer to prevent excessive crankcase pressure. Provide condensate traps with petcocks at all low places in the pipe to collect oil condensate without blocking fumes passage.

3.3 PAINTING AND COATING

A. Coat non-insulated carbon steel exhaust pipes and silencers with a baked silicon-based coating rated for 1100°F. Follow the paint manufacturer's recommendations for curing the coating.

3.4 START-UP AND FIELD TESTING

A. Provide a start-up plan to the RESIDENT ENGINEER for review and approval prior to the initial start-up and field testing.

B. Contractor shall provide seven days' written notice to the RESIDENT ENGINEER prior to conducting the start-up and field test of the generator.

C. Fill the fuel tanks with No. 2-D diesel fuel complying with ASTM D975. After field testing is complete, refill the tanks. The cost of all fuel shall be included in the Contractor's original bid amount.

D. Fill the engine-cooling system with a solution of 25% by volume propylene glycol for freeze protection and 5% by volume of a borate-nitrite solution (NALCO 2000 or equal) to prevent rust and corrosion.

E. On completion of the installation, the initial start-up shall be performed by a factory-trained service representative of the engine supplier, who shall thoroughly inspect, operate, test, and adjust the equipment. The inspection shall include the soundness of all parts, the completeness of all details, the proper operation of all components with special emphasis on safety devices, the correctness of settings, proper alignments, and correct phase rotation to match other sources. Energize the jacket water heater 24 hours prior to the initial start-up.

F. Field tests shall include the following:

1. Perform tests recommended by manufacturer.

2. Simulate power failure by tripping the main breaker and demonstrate complete manual and automatic start, load, unload, and stop sequence of the engine-generator.

3. Conduct a two-hour run, utilizing maximum available load. If available load is less than 75% of the generators' rating, then add loads to obtain 75% generator loading (minimum).

4. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.

5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.

7. Exhaust System Backpressure Test: Use a manometer with a scale exceeding 40-inch wg (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that backpressure at full-rated load is within manufacturer's written allowable limits for the engine.

8. Exhaust Emissions Test: Comply with applicable government test criteria.

9. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50% and 100% step-load increases and decreases, and verify that performance is as specified.

10. Harmonic Content Tests: Measure harmonic content of output voltage under 25% and at 100% of rated linear load. Verify that harmonic content is within specified limits.

11. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling air intake and discharge, at four locations on the property line, and compare measured levels with required values.

12. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

13. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

G. Coordinate tests with tests for transfer switches and run them concurrently.

H. All tests shall be in the presence of the RESIDENT ENGINEER, CONTRACTOR and manufacture representative.

I. A written operational report including start-up inspection and field tests, signed by the manufacturer's representative, shall be submitted to the RESIDENT ENGINEER prior to acceptance.

** END OF SECTION **

SECTION 16415 - TRANSFER SWITCHES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

B. This Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.
2. Bypass/isolation switches.
3. Remote annunciation systems.
4. Remote annunciation and control systems.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

C. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches accessories, and components will withstand seismic forces. Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Qualification Data: For manufacturer.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals include the following:

1. Features and operating sequences, both automatic and manual.

2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

C. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Comply with NEMA ICS 1.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110.

I. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
   1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
   2. Do not proceed with interruption of electrical service without Owner's written permission.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. Contactor Transfer Switches:

      a. Caterpillar; Engine Div.
      b. Emerson; ASCO Power Technologies, LP.
      c. Kohler Power Systems; Generator Division.
      d. Russelectric, Inc.
      e. Cummins

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

   1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.

2. Switch Action: Double throw; mechanically held in both directions.

3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.

I. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.

J. Battery Charger: For generator starting batteries.

1. Float type rated 2 10 A.
2. Ammeter to display charging current.
3. Fused ac inputs and dc outputs.

K. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

L. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 16 Section "Electrical Identification."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.

2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.

3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

L. Enclosures: General-purpose NEMA 250, Type 3R, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

C. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.

D. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

E. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.

F. Automatic Closed-Transition Transfer Switches: Include the following functions and characteristics:

1. Fully automatic make-before-break operation.

2. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.

3. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.

a. Initiation occurs without active control of generator.

b. Controls ensure that closed-transition load transfer closure occurs only when the 2 sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.

4. Failure of power source serving load initiates automatic break-before-make transfer.

G. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can

be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.

H. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.

I. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.

3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

5. Test Switch: Simulate normal-source failure.

6. Switch-Position Pilot Lights: Indicate source to which load is connected.

7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.

12 Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

a. Push-button programming control with digital display of settings.
b. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details.

B. Switch Mounting: Anchor to existing Unistrut frame.

1. Provide Unistruts, as required, to mount switch on existing Unistrut frame.

C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

D. Identify components according to Division 16.

E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Ground equipment according to Division 16 Section "Grounding System."

C. Connect wiring according to Division 16 Section "Basic Electrical Material and Methods"

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.

b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.

b. Simulate loss of phase-to-ground voltage for each phase of normal source.

c. Verify time-delay settings.

d. Verify pickup and dropout voltages by data readout or inspection of control settings.

e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.

f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

5. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.

a. Verify grounding connections and locations and ratings of sensors.

B. Coordinate tests with tests of generator and run them concurrently.

C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

D. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 1.

B. Coordinate this training with that for generator equipment.

** END OF SECTION **

SUPPLEMENTARY SPECIAL PROVISIONS

APPENDICES

APPENDIX A

CEQA NOTICE OF EXEMTIONS AND CA COASTAL COMMISSION COAST DEVELOPMENT PERMIT WAIVER

NOTICE OF EXEMPTION

TO: __X__ RECORDER/COUNTY CLERK
P.O. BOX 1750, MS A-33
1600 PACIFIC HWY, ROOM 260
SAN DIEGO, CA 92101-2422
_____ OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET, ROOM 121
SACRAMENTO, CA 95814

FROM: CITY OF SAN DIEGO
DEVELOPMENT SERVICES DEPARTMENT
1222 FIRST AVENUE, MS 501
SAN DIEGO, CA 92101

PROJECT NO.: WBS # B-00501.02.06

PROJECT TITLE: Sewer Pump Stations (SPSs) 13, 25A, and 85 Dual Force Main Improvements and Sewer Pump Station 76 Generator Replacement

PROJECT LOCATION-SPECIFIC: SPS 13: 633 Tourmaline St.; SPS 25A: 6301 Via Cabrera; SPS 76: 18695 Pomerado Rd.; and SPS 85: 11513 Alborada Dr., San Diego, CA (La Jolla, Pacific Beach, San Pasqual, & Rancho Bernardo Community Planning Areas and Council Districts 1, 2 & 5).

PROJECT LOCATION-CITY/COUNTY: San Diego City/San Diego County

DESCRIPTION OF NATURE AND PURPOSE OF THE PROJECT: This project proposes to add an 11,800 gallon at-grade emergency storage tank to an existing SPS and approximately 2,533 ft. of 4 inch to 10 inch redundant PVC force main pipe to three SPSs within the La Jolla, Pacific Beach, and Rancho Bernardo Communities. Installation of manholes is proposed at the termini of the force mains, as is the replacement of valves and pipes inside the existing SPSs. Most of the proposed redundant mains will be located within the existing developed right-of-way. Within areas of uneven or steep terrain, pipe abandonment will be accomplished via existing manholes outside of the slopes or underground directional drilling. Trenched areas will be re-vegetated following construction and areas that contained ornamental vegetation will be replaced in-kind. The project also proposes to replace the existing diesel back-up portable generator at SPS 76 within the San Pasqual Community.

NAME OF PUBLIC AGENCY APPROVING PROJECT: City of San Diego

NAME OF PERSON OR AGENCY CARRYING OUT PROJECT: Rolf Lee
525 B Street, Suite 750 (MS 908A)
San Diego, CA 92101
619-533-4660

EXEMPT STATUS: (CHECK ONE)

( ) MINISTERIAL (SEC. 21080(b)(1); 15268);
( ) DECLARED EMERGENCY (SEC. 21080(b)(3); 15269(a));
( ) EMERGENCY PROJECT (SEC. 21080(b)(4); 15269 (b)(c)
(X) CATEGORICAL EXEMPTIONS: 15301 EXISTING FACILITIES, 15302 REPLACEMENT OR RECONSTRUCTION, AND 15303 NEW CONSTRUCTION OR CONVERSION OF SMALL STRUCTURES

REASONS WHY PROJECT IS EXEMPT: The City of San Diego conducted an environmental review and determined that this project meets the criteria set forth in CEQA State Guidelines, Section 15301, which allows for the operation, repair, maintenance, or minor alteration of existing public or private structures, and facilities. The project also meets the criteria set forth in CEQA State Guidelines, Section 15302, which allows for the replacement of existing structures or facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced; and Section 15303, which allows for minor alteration of facilities involving a negligible expansion of use, and construction and location of limited numbers of new small facilities or structures. The installation of the emergency storage tank, redundant PVC force main pipe, and manholes will occur primarily previously disturbed areas or within existing rights-of-way and underground directional drilling will be utilized in uneven or areas of steep terrain. Any trenching that occurs in vegetated areas would be re-vegetated. Therefore, no significant environmental impacts would occur. In addition the project does not trigger any of the exceptions to categorical exemptions listed in CEQA State Guidelines, Section 15300.2.

LEAD AGENCY CONTACT PERSON: TELEPHONE:

IF FILED BY APPLICANT:

1. ATTACH CERTIFIED DOCUMENT OF EXEMPTION FINDING.
2. HAS A NOTICE OF EXEMPTION BEEN FILED BY THE PUBLIC AGENCY APPROVING THE PROJECT?
   ( ) YES ( ) NO

IT IS HEREBY CERTIFIED THAT THE CITY OF SAN DIEGO HAS DETERMINED THE ABOVE ACTIVITY TO BE EXEMPT FROM CEQA

MARK BRUNETTE, SENIOR PLANNER

AUGUST 3, 2015
DATE

CHECK ONE: (X) SIGNED BY LEAD AGENCY
CLERK OR OPR:

DATE RECEIVED FOR FILING WITH COUNTY

NOTICE OF EXEMPTION

(Check one or both)

TO: __X__ RECORDER/COUNTY CLERK
P.O. BOX 1750, MS A-33
1600 PACIFIC HWY, ROOM 260
SAN DIEGO, CA 92101-2422

_____ OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET, ROOM 121
SACRAMENTO, CA 95814

FROM: CITY OF SAN DIEGO
DEVELOPMENT SERVICES DEPARTMENT
1222 FIRST AVENUE, MS 501
SAN DIEGO, CA 92101

PROJECT NO.: WBS # B-00501.02.06

PROJECT TITLE: Sewer Pump Stations (SPSs) 14 and 16 Dual Force Main Improvements

PROJECT LOCATION-SPECIFIC: SPS 14: 3214 Bayside Walk and SPS 16: 3599 Bayside Walk, San Diego, CA 92109 within the Mission Bay Park and Mission Beach Community Planning Areas (Council District 2).

PROJECT LOCATION-CITY/COUNTY: San Diego City/San Diego County

DESCRIPTION OF NATURE AND PURPOSE OF THE PROJECT: This project proposes the installation of approximately 662 ft. of 10 inch diameter redundant PVC force main pipe at SPS 14 and approximately 40 ft. of 8 inch diameter redundant PVC force main pipe at SPS 16 within the Mission Bay Park and Mission Beach Communities. Both projects will include the abandonment of a portion of existing pipe, installation of manholes at the termini of the force mains, replacement of valves and pipes inside the existing SPSs and a tie-in to the pump manifolds. Directional drilling will occur under West Mission Bay Drive to avoid disruption to the street. Any trenched areas that contained ornamental vegetation will be replaced in-kind.

NAME OF PUBLIC AGENCY APPROVING PROJECT: City of San Diego

NAME OF PERSON OR AGENCY CARRYING OUT PROJECT: City of San Diego, Public Works Dept/Rolf Lee
525 B Street, Suite 750 (MS 908A)
San Diego, CA 92101
619-533-4660

EXEMPT STATUS: (CHECK ONE)

( ) MINISTERIAL (SEC. 21080(b)(1); 15268);
( ) DECLARED EMERGENCY (SEC. 21080(b)(3); 15269(a));
( ) EMERGENCY PROJECT (SEC. 21080(b)(4); 15269 (b)(c)
(X) CATEGORICAL EXEMPTIONS: 15301 EXISTING FACILITIES, 15302 REPLACEMENT OR RECONSTRUCTION, AND 15303 NEW CONSTRUCTION OR CONVERSION OF SMALL STRUCTURES

REASONS WHY PROJECT IS EXEMPT: The City of San Diego conducted an environmental review and determined that this project meets the criteria set forth in CEQA State Guidelines, Section 15301, which allows for the operation, repair, maintenance, or minor alteration of existing public or private structures, and facilities. The project also meets the criteria set forth in CEQA State Guidelines, Section 15302, which allows for the replacement of existing structures or facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced; and Section 15303, which allows for minor alteration of facilities involving a negligible expansion of use, and construction and location of limited numbers of new small facilities or structures. The installation of the redundant PVC force main pipe and manholes will occur within previously disturbed areas or existing rights-of-way and underground directional drilling will be utilized to avoid busy streets. Any trenching that occurs in vegetated areas will be re-vegetated. Therefore, no significant environmental impacts would occur. In addition the project does not trigger any of the exceptions to categorical exemptions listed in CEQA State Guidelines, Section 15300.2.

LEAD AGENCY CONTACT PERSON:, MARK BRUNETTE, SENIOR PLANNER

TELEPHONE: 619-446-5379

IF FILED BY APPLICANT:

1. ATTACH CERTIFIED DOCUMENT OF EXEMPTION FINDING.
2. HAS A NOTICE OF EXEMPTION BEEN FILED BY THE PUBLIC AGENCY APPROVING THE PROJECT?
   (X) YES ( ) NO

IT IS HEREBY CERTIFIED THAT THE CITY OF SAN DIEGO HAS DETERMINED THE ABOVE ACTIVITY TO BE EXEMPT FROM CEQA

Mark Brunette — 10/12/13

MARK BRUNETTE, SENIOR PLANNER — DATE

CHECK ONE: (X) SIGNED BY LEAD AGENCY — DATE RECEIVED FOR FILING WITH COUNTY

CLERK OR OPR:

APPENDIX B

FIRE HYDRANT METER PROGRAM

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER **DI** 55.27	DEPARTMENT Water Department
SUBJECT **FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)**	**PAGE** 1**OF** 10	**EFFECTIVE DATE** October 15, 2002
	SUPERSEDES **DI** 55.27	**DATED** April 21, 2000

1. **PURPOSE**

1.1 To establish a Departmental policy and procedure for issuance, proper usage and charges for fire hydrant meters.

2. **AUTHORITY**

2.1 All authorities and references shall be current versions and revisions.

2.2 San Diego Municipal Code (NC) Chapter VI, Article 7, Sections 67.14 and 67.15

2.3 Code of Federal Regulations, Safe Drinking Water Act of 1986

2.4 California Code of Regulations, Titles 17 and 22

2.5 California State Penal Code, Section 498B.0

2.6 State of California Water Code, Section 110, 500-6, and 520-23

2.7 Water Department Director

Reference

2.8 State of California Guidance Manual for Cross Connection Programs

2.9 American Water Works Association Manual M-14, Recommended Practice for Backflow Prevention

2.10 American Water Works Association Standards for Water Meters

2.11 U.S.C. Foundation for Cross Connection Control and Hydraulic Research Manual

3. **DEFINITIONS**

3.1 **Fire Hydrant Meter:** A portable water meter which is connected to a fire hydrant for the purpose of temporary use. (These meters are sometimes referred to as Construction Meters.)

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.

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.

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.

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

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

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

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.

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. Theses 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.

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)

City of San Diego PUBLIC UTILITIES Water & Wastewater

(For Office Use Only)

NS REQ	FAC#
DATE	BY

METER SHOP (619) 527-7449

Application Date	Requested Install Date:

Meter Information

Fire Hydrant Location: (Attach Detailed Map//Thomas Bros. Map Location or Construction drawing.) Zip:	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, If so , explain:		
Estimated Duration of Meter Use:	☐	Check Box if Reclaimed Water

Company Information

Company Name:			
Mailing Address:			
City:	State:	Zip:	Phone: ( )
*Business license#	*Contractor license#		
A Copy of the Contractor's license OR Business License is required at the time of meter issuance.			
Name and Title of Billing Agent: (PERSON IN ACCOUNTS PAYABLE)			Phone: ( )
Site Contact Name and Title:			Phone: ( )
Responsible Party Name:			Title:
Cal ID#			Phone: ( )
Signature:		Date:	

Guarantees Payment of all Charges Resulting from the use of this Meter. Insures that employees of this Organization understand the proper use of Fire Hydrant Meter

☐ Fire Hydrant Meter Removal Request		Requested Removal Date:
Provide Current Meter Location if Different from Above:		
Signature:	Title:	Date:
Phone: ( )	Pager: ( )	

☐ City Meter	☐ Private Meter	
Contract Acct #:	Deposit Amount: $ 936.00	Fees Amount: $ 62.00
Meter Serial #	Meter Size: 05	Meter Make and Style: 6-7
Backflow #	Backflow Size:	Backflow Make and Style:
Name:	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

City of San Diego, CM&FS Div., 9753 Chesapeake Drive, SD CA 92123

Project Name:

Work Order No or Job Order No.

City Purchase Order No.

Resident Engineer (RE):

RE Phone#: Fax#:

Contractor's Name:

Contractor's Address:

Contractor's Phone #:

Contractor's fax #:

Contact Name:

Invoice No.

Invoice Date:

Billing Period: (To)

Item #	Item Description	Contract Authorization				Previous Totals To Date		This Estimate		Totals to Date	
		Unit	Price	Qty	Extension	%/QTY	Amount	% / QTY	Amount	% / QTY	Amount
1					$ -		$ -		$ -	0.00	$ -
2					$ -		$ -		$ -	0.00%	$ -
3					$ -		$ -		$ -	0.00%	$ -
4					$ -		$ -		$ -	0.00%	$ -
5					$ -		$ -		$ -	0.00%	$ -
6					$ -		$ -		$ -	0.00%	$ -
7					$ -		$ -		$ -	0.00%	$ -
8					$ -		$ -		$ -	0.00%	$ -
5					$ -		$ -		$ -	0.00%	$ -
6					$ -		$ -		$ -	0.00%	$ -
7					$ -		$ -		$ -	0.00%	$ -
8					$ -		$ -		$ -	0.00%	$ -
9					$ -		$ -		$ -	0.00%	$ -
10					$ -		$ -		$ -	0.00%	$ -
11					$ -		$ -		$ -	0.00%	$ -
12					$ -		$ -		$ -	0.00%	$ -
13					$ -		$ -		$ -	0.00%	$ -
14					$ -		$ -		$ -	0.00%	$ -
15					$ -		$ -		$ -	0.00%	$ -
16					$ -		$ -		$ -	0.00%	$ -
17	**Field Orders**				$ -		$ -		$ -	0.00%	$ -
					$ -		$ -		$ -	0.00%	$ -
	CHANGE ORDER No.				$ -		$ -		$ -	0.00%	$ -
					$ -		$ -		$ -	0.00%	$ -
	Total Authorized Amount (including approved Change Order)				**$ -**		**$ -**		$ -	**Total Billed**	$ -

SUMMARY

A. Original Contract Amount	$ -
B. Approved Change Order #00 Thru #00	$ -
C. Total Authorized Amount (A+B)	$ -
D. Total Billed to Date	$ -
E. Less Total Retention (5% of D)	$ -
F. Less Total Previous Payments	$ -
G. Payment Due Less Retention	**$0.00**
H. Remaining Authorized Amount	$0.00

I certify that the materials have been received by me in the quality and quantity specified

_____

Resident Engineer

_____

Construction Engineer

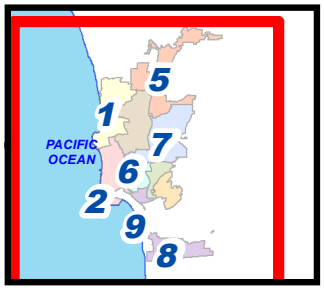
Retention and/or Escrow Payment Schedule

Total Retention Required as of this billing (Item E)	$0.00
Previous Retention Withheld in PO or in Escrow	$0.00
Add'l Amt to Withhold in PO/Transfer in Escrow:	***$0.00***
Amt to Release to Contractor from PO/Escrow:	

Contractor Signature and Date: _____

APPENDIX E

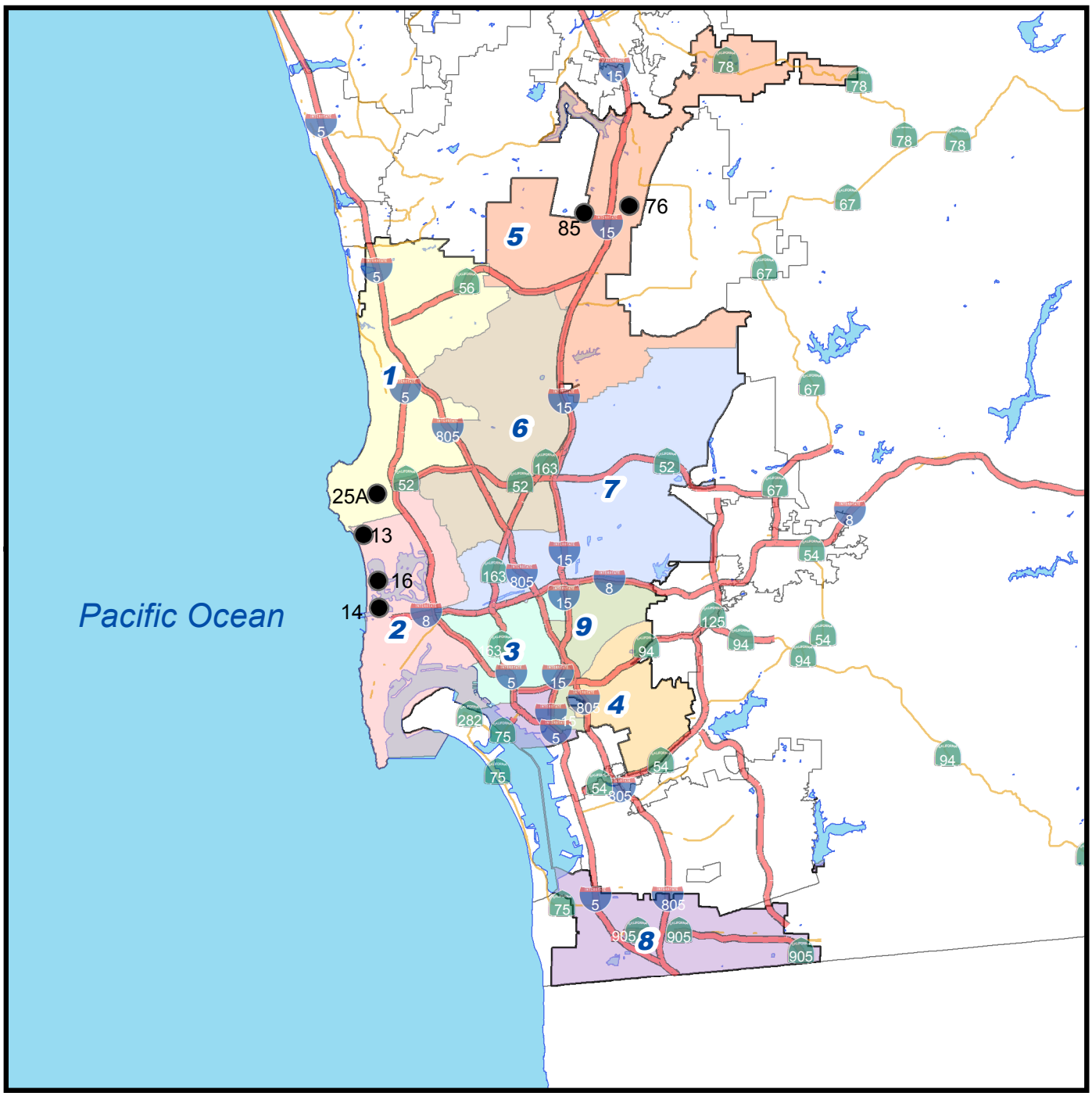
LOCATION MAP



The City of SAN DIEGO Public Works

SPS 13, 14, 16, 25A & 85 Dual Forcemains

SENIOR ENGINEER	PROJECT MANAGER	PROJECT ENGINEER	FOR QUESTIONS ABOUT THIS PROJECT
Alex Garcia	Ryan Greek	Luis Chavez	Call: 619-533-4207
619-533-3634	619-533-3667	619-533-4188	Email: engineering@sandiego.gov



Legend ● **Forcemains**

0 3.5 7 14 Miles

N W E S

COMMUNITY NAME: City Wide

COUNCIL DISTRICT: City Wide

SAP ID: B00501 (S)

Date: March 13, 2017

SanGIS

APPENDIX F

ADJACENT PROJECTS

The City of SAN DIEGO Public Works

PACIFIC BEACH PIPELINE SOUTH

SENIOR ENGINEER	PROJECT MANAGER	PROJECT ENGINEER	FOR QUESTIONS ABOUT THIS PROJECT
NABIL BATTA	ROBERTO VEJAR-PARRA	JING DEBELISO	Call: (619) 533-4207
(619)533-4145	(619)533-5402	(619)533-5285	Email: engineering@sandiego.gov

Legend

- PBPL_SEWER REPLACEMENT
- PBPL_WATER REPLACEMENT

LOCATION MAP 1-3

N W E S

COMMUNITY NAME: Midway/Pacific Highway, Pacific Beach, Mission Bay Park & Peninsula
Date: JULY 8, 2016

COUNCIL DISTRICT: 2

SanGIS

SAP ID: B12117 (S) \ S12015 (W)

The City of SAN DIEGO Public Works

PACIFIC BEACH PIPELINE SOUTH

SENIOR ENGINEER
NABIL BATTA
(619)533-4145

PROJECT MANAGER
ROBERTO VEJAR-PARRA
(619)533-5402

PROJECT ENGINEER
JING DEBELISO
(619)533-5285

FOR QUESTIONS ABOUT THIS PROJECT
Call: (619) 533-4207
Email: engineering@sandiego.gov

Legend

- PBPL_SEWER REPLACEMENT
- PBPL_WATER REPLACEMENT

LOCATION MAP 2-3

N
W E
S

COMMUNITY NAME: Midway/Pacific Highway, Pacific Beach, Mission Bay Park & Peninsula
Date: JULY 8, 2016

COUNCIL DISTRICT: 2

SanGIS

SAP ID: B12117 (S) \ S12015 (W)

The City of SAN DIEGO Public Works

PACIFIC BEACH PIPELINE SOUTH

SENIOR ENGINEER	PROJECT MANAGER	PROJECT ENGINEER	FOR QUESTIONS ABOUT THIS PROJECT
NABIL BATTA	ROBERTO VEJAR-PARRA	JING DEBELISO	Call: (619) 533-4207
(619)533-4145	(619)533-5402	(619)533-5285	Email: engineering@sandiego.gov

LOCATION MAP 3-3

Legend

PACIFIC BEACH RESERVOIR ABANDONMENT

N
W E
S

COMMUNITY NAME: Midway/Pacific Highway, Pacific Beach, Mission Bay Park & Peninsula
Date: JULY 8, 2016

COUNCIL DISTRICT: 2

SanGIS

SAP ID: B12117 (S) \ S12015 (W)

APPENDIX G

SAMPLE OF PUBLIC NOTICE

The City of SAN DIEGO

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

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.

The City of SAN DIEGO

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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- Temporary water service disruptions are planned. If planned disruptions impact your property, you will receive advance notice.
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Hours and Days of Operation:
Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:
Company Name, XXX-XXX-XXXX

To contact the City of San Diego: SD Public Works
619-533-4207 | engineering@sandiego.gov | sandiego.gov/CIP

This information is available in alternative formats upon request.

APPENDIX H

ADVANCED METERING INFRASTRUCTURE (AMI) DEVICE PROTECTION

Protecting AMI Devices in Meter Boxes and on Street Lights

The Public Utilities Department (PUD) has begun the installation of the Advanced Metering Infrastructure (AMI) technology as a new tool to enhance water meter reading accuracy and efficiency, customer service and billing, and to be used by individual accounts to better manage the efficient use of water. **All AMI devices shall be protected per Section 5-2, "Protection", of the 2015 Whitebook.**

AMI technology allows water meters to be read electronically rather than through direct visual inspection by PUD field staff. This will assist PUD staff and customers in managing unusual consumption patterns which could indicate leaks or meter tampering on a customer's property.

Three of the main components of an AMI system are the:

A. Endpoints, see Photo 1:

Photo 1

B. AMI Antenna attached to Endpoint (antenna not always required), see Photo 2:

Photo 2

Network Devices, see Photo 3:

Photo 3

AMI endpoints transmit meter information to the AMI system and will soon be on the vast majority of meters in San Diego. These AMI devices provide interval consumption data to the PUD's Customer Support Division. If these devices are damaged or communication is interrupted, this Division will be alerted of the situation. The endpoints are installed in water meter boxes, coffins, and vaults adjacent to the meter. A separate flat round antenna may also be installed through the meter box lid. This antenna is connected to the endpoint via cable. The following proper installation shall be implemented when removing the lid to avoid damaging the antenna, cable, and/or endpoint. Photo 4 below demonstrates a diagram of the connection:

Photo 4

The AMI device ERT/Endpoint/Transmitter shall be positioned and installed as discussed in this Appendix. If the ERT/Endpoint/Transmitter is disturbed, it shall be re-installed and returned to its original installation with the end points pointed upwards as shown below in Photo 5.

The PUD's code compliance staff will issue citations and invoices to you for any damaged AMI devices that are not re-installed as discussed in the Contract Document

Photo 5 below shows a typical installation of an AMI endpoint on a water meter.

Photo 5

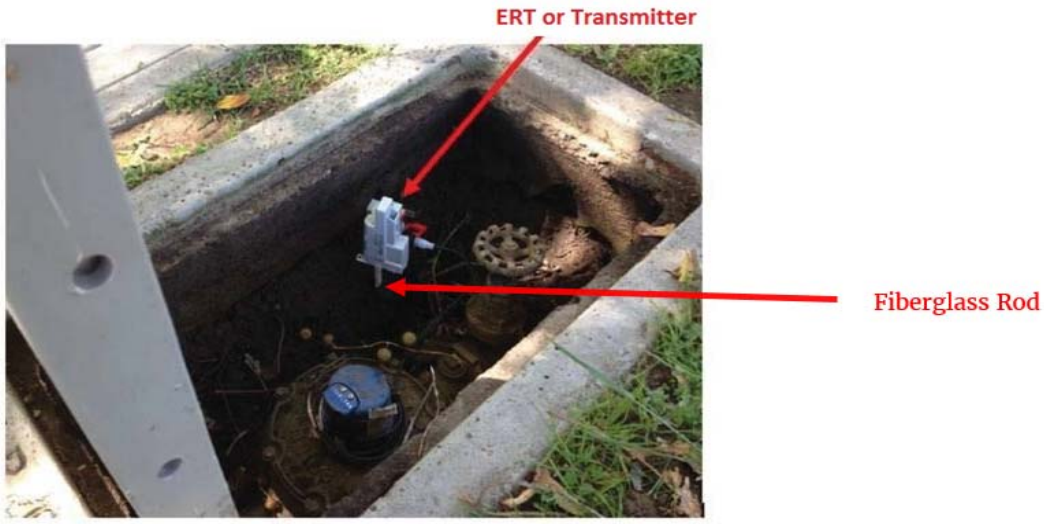

Photo 6 below is an example of disturbance that shall be avoided:

Photo 6

You are responsible when working in and around meter boxes. If you encounter these endpoints, use proper care and do not disconnect them from the registers on top of the water meter. If the lid has an antenna drilled through, do not change or tamper with the lid and inform the Resident Engineer immediately about the location of that lid. Refer to Photo 7 below:

Photo 7

Another component of the AMI system are the Network Devices. The Network Devices are strategically placed units (mainly on street light poles) that collect interval meter reading data from multiple meters for transmission to the Department Control Computer. **If you come across any of these devices on street lights that will be removed or replaced (refer to Photos 8 and 9 below), notify AMI Project Manager Arwa Sayed at (619) 362-0121 immediately.**

Photo 8 shows an installed network device on a street light. On the back of each Network Device is a sticker with contact information. See Photo 9. **Call PUD Water Emergency Repairs at 619-515-3525 if your work will impact these street lights.** These are assets that belong to the City of San Diego and you shall be responsible for any costs of disruption of this network.

Photo 8

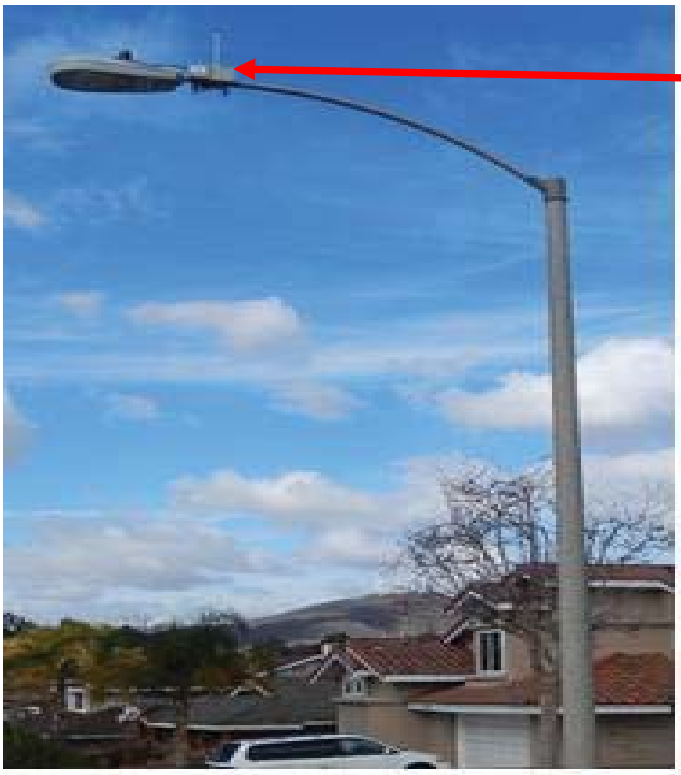

Photo 9

If you encounter any bad installations, disconnected/broken/buried endpoints, or inadvertently damage any AMI devices or cables, notify the Resident Engineer immediately. The Resident Engineer will then immediately contact the AMI Project Manager, Arwa Sayed, at (619) 362-0121.

APPENDIX I

GEOTECHNICAL REPORT

FINAL REPORT OF GEOTECHNICAL INVESTIGATION
SEWER PUMP STATIONS 13, 14, 16, 25A &
85 DUAL FORCEMAINS
CITY OF SAN DIEGO

Submitted to:

PSOMAS
3111 Camino Del Rio North, Suite 702
San Diego, CA 92108

Prepared By:

ALLIED GEOTECHNICAL ENGINEERS, INC.
9500 Cuyamaca Street, Suite 102
Santee, California 92071-2685

November 23, 2015

November 23, 2015

Ms. Sandy Russell, P.E.
Project Manager
PSOMAS
3111 Camino Del Rio North, Suite 702
San Diego, CA 92108

Subject: **FINAL REPORT OF GEOTECHNICAL INVESTIGATION**
SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCEMAINS
CITY OF SAN DIEGO
AGE Project No. 160 GS-14-C

Dear Ms. Russell:

Allied Geotechnical Engineers, Inc. is pleased to submit the accompanying report to present the findings, opinions, and recommendations of a geotechnical investigation that was performed to assist PSOMAS with their design of the subject project.

We appreciate the opportunity to be of service on this project. If you have any questions regarding the contents of this report or need further assistance, please feel free to contact our office.

Sincerely,

ALLIED GEOTECHNICAL ENGINEERS, INC.

REGISTERED GEOLOGIST
Nicholas E. Barnes
No. 1693
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANI SUTANTO
No. 51873
CIVIL
STATE OF CALIFORNIA

Nicholas E. Barnes, P.G., C.E.G.
Senior Geologist

Sani Sutanto, P.E.
Senior Engineer

NEB/SS/TJL:cal
Distr. (1 electronic copy) Addressee

FINAL REPORT OF GEOTECHNICAL INVESTIGATION
SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCEMAINS
CITY OF SAN DIEGO

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Tables

Appendices

1.0 INTRODUCTION

Allied Geotechnical Engineers, Inc. (AGE) is pleased to submit this report to present the findings, opinions, and recommendations of a geotechnical investigation conducted to assist PSOMAS with their design of Sewer Pump Stations 13, 14, 16, 25A & 85 Dual Forcemains projects for the City of San Diego (City). The investigation was performed in conformance with AGE's proposal dated May 16, 2014 (revised May 20, 2014), and the subconsultant agreement executed between PSOMAS and AGE dated December 9, 2014.

This report has been prepared for the exclusive use of PSOMAS and its design team subconsultants and the City in their design of the project as described herein. The information presented in this report is not sufficient for any other uses or the purposes of other parties.

2.0 SITE AND PROJECT DESCRIPTION

It is our understanding that the City of San Diego (City) plans to install replacement forcemains and associated appurtenant facilities work for the purpose of improving the redundancy and reliability of five existing sewer pump stations in the Pacific Beach, Mission Bay Park, La Jolla, and Rancho Bernardo areas of San Diego, California. At the request of PSOMAS, AGE's scope of services only covers four (SPS 13, 14, 25A and 85) of the five sewer pump stations. The proposed forcemain alignments are shown on the Site Plans (Figures 1 through 4). The locations and a brief description of the proposed improvements at these four sewer pump station sites are presented in the following sections.

Sewer Pump Station 13 (SPS 13)

The pump station is located at 655 Tourmaline Street. The proposed scope of work at this site consists of the installation of approximately 460 feet of 4-inch diameter dual forcemains, 25 feet of 8-inch diameter sewer main, and an emergency storage tank. The new sewer mains will be located within the existing right-of-way of Tourmaline Street. The project also includes the abandonment of an existing forcemain which traverses the hillside on the north side of Tourmaline Street.

It is our understanding that the dual forcemains will be installed using conventional cut and cover construction methods. The soil cover is anticipated to vary from 4 feet along the majority of the alignment to a maximum of 24 feet where the forcemains connect to a manhole on La Jolla Boulevard.

Sewer Pump Station 14 (SPS 14)

Pump Station 14 is located at 850 West Mission Bay Drive. The proposed improvements at this project site involve the design and construction of approximately 550 lineal feet forcemain ranging from 10 to 12 inches in diameter. From the pump station, the forcemain crosses West Mission Bay Drive at Bayside Lane, and crosses parkland on the south side of West Mission Bay Drive to connect to an existing 12-inch diameter forcemain. We understand that the forcemain will be installed using horizontal directional drilling (HDD) method beneath West Mission Bay Drive. Conventional cut and cover construction methods will be used to install the pipeline along the remainder of the project alignment with soil cover ranging from 5 to 9 feet in thickness.

Sewer Pump Station 25 A (SPS 25A)

This pump station is located at 2223 Via Tabara in La Jolla. The proposed scope of work includes the design and construction of approximately 600 lineal feet of new 4-inch forcemain between the pump station and a new manhole (shown as Manhole 1 on the plans) on Cardeno Drive. The work will also include the installation of an 8-inch diameter sewer main between the new manhole and an existing manhole. We understand that the sewer main between approximate station 3+50 (Via Tabara) and 6+90 (Cardeno Drive) will be installed using HDD method. Conventional cut and cover construction methods will be used to install the pipeline along the remainder of the project alignment.

Sewer Pump Station 85 (SPS 85)

Pump Station 85 is located at 11572 Alborada Drive off the southern end of Lake Hodges. The proposed improvements at this site involve the design and construction of approximately 870 feet of new 4-inch diameter forcemain between the pump station and an existing manhole at the intersection with Aguacate Way. The work will also include the construction of an 8-inch diameter sewer main between two existing manholes on Aguacate Way. The sewer mains will be installed using conventional cut and cover construction methods with soil cover ranging from 5 to 7 feet in thickness.

3.0 OBJECTIVE AND SCOPE OF INVESTIGATION

The objectives of this investigation were to characterize the subsurface conditions along the project alignments and to develop geotechnical recommendations for use in the design of the currently proposed project. The scope of our investigation included several tasks which are described in more detail in the following sections.

3.1 Information Review

This task involved a review of readily available information pertaining to the project site, including the preliminary project plans, as-built utility maps, topographic maps, published geologic literature and maps, aerial photographs, and AGE's in-house references.

3.2 Geotechnical Field Exploration

The field exploration program for this project was performed on March 21 and 22, 2015. A total of six (6) soil borings were performed at the approximate locations shown on Figures 1 through 4. The borings were advanced using conventional hollow-stem auger drilling methods to depths ranging from 6 to19 feet below the existing ground surface (bgs). Detailed descriptions of the drilling and sampling activities, and logs of the borings are presented in Appendix A.

Prior to commencement of the field exploration activities, a site reconnaissance visit was performed to observe existing conditions and to select suitable locations for the borings. Subsequently, Underground Service Alert (USA) was contacted to coordinate clearance of the proposed boring locations with respect to existing buried utilities. Existing buried utilities in the vicinity of the project alignments include potable water and sanitary sewer pipelines; storm drains; natural gas and electrical transmission lines; cable, telephone and fiber optic lines.

Traffic control permits were obtained from the City to perform borings B-1, B4, B-5 and B-6. Borings B-2 and B-3 were performed in Mission Bay Park at locations that received prior approval from the City's Park & Recreation Department.

3.3 Laboratory Testing

Selected soil samples obtained from the borings were tested in the laboratory to verify field classifications and evaluate certain engineering characteristics. The geotechnical laboratory tests were performed in general conformance with the American Society for Testing and Materials (ASTM) or other generally accepted testing procedures.

The laboratory tests included in-place density and moisture content, maximum density and optimum moisture content, sieve (wash) analysis, expansion index, and direct shear. In addition, representative samples of the onsite soil materials were collected and delivered to Clarkson Laboratories and Supply, Inc. for chemical (analytical) testing to determine soil pH and resistivity, soluble sulfate and chloride concentrations, and bicarbonate content. A brief description of the tests that were performed and the final test results are presented in Appendix B.

4.0 GEOLOGIC CONDITIONS

4.1 Geologic Setting and Site Physiography

SPS 13, 14, and 25A are located in the western portion of the San Diego Embayment, a deep sedimentary-filled basin which is underlain at depth by a basement rock complex of Cretaceous age batholithic and metavolcanic and metasedimentary rocks of Jurassic age. The sedimentary formations consist of nearly flat-lying to gently southwest dipping, marine and non-marine sediments which range from Cretaceous to Holocene in age. Man-made fills occur in various locations along the project alignments. SPS 85 is located outside the northeast boundary of the San Diego Embayment on a hill that is underlain by granitic rocks of the Peninsular Ranges Batholith of Cretaceous age.

4.2 Tectonic Setting

Tectonically, the San Diego region is situated in a broad zone of northwest-trending, predominantly right-slip faults that span the width of the Peninsular Ranges and extend offshore into the California Continental Borderland Province west of California and northern Baja California. At the latitude of San Diego, this zone extends from the San Clemente fault zone, located approximately 60 miles to the west, and the San Andreas fault located about 95 miles to the east.

Major active regional faults of tectonic significance include the Coronado Bank, San Diego Trough, San Clemente, and Newport Inglewood/Rose Canyon fault zones which are located offshore; the faults in Baja California, including the San Miguel-Vallecitos and Agua Blanca fault zones; and the faults located further to the east in Imperial Valley which include the Elsinore, San Jacinto and San Andreas fault zones.

4.3 Geologic Units

Based on their origin and compositional characteristics, the soil types encountered in the exploratory borings can be categorized into five geologic units which include (in order of increasing age) fill materials, Holocene Beach Deposits, Old Paralic Deposits, Ardath Shale, and granitic rocks. A brief description of each unit is presented below.

4.3.1 Fill Materials (Qaf)

Fill materials were encountered in all six borings as discussed below:

Boring B-1 (SPS 13)

Fill materials were encountered to a depth of 5 feet bgs in this boring. The fill materials consist of a light brown to yellow brown, silty sand with rounded gravel up to 2 inches in maximum dimension. The published geologic map indicates the presence of fill materials below the parking lot of Tourmaline Surf Park (Kennedy, 1975a).

Borings B-2 and B-3 (SPS 14)

The fill materials encountered in Mission Bay Park include both hydraulic and mechanically placed fill materials. Available historic information and aerial photos indicate that much of present- day Mission Bay previously was a shallow tidal marsh with mud flats and sand bars that were occasionally covered by water during high tide. Dredging activities beginning in the mid 1940's and continuing through the early 1960's transformed the tidal marsh into the present-day Mission Bay Park. Approximately twenty-five million cubic yards of sand and silt was dredged to create the bay and surrounding landforms (www.Sandiego.gov).

Mechanically placed fills were observed to a depth of 5-feet bgs in both borings. These materials generally consist of fine to medium grained silty sand and poorly graded sand with silt. The mechanically placed fill also contained traces of rounded gravels up to 1-inch in maximum dimension. The fill soils in boring B-2 also contained angular clasts of volcanic rock up to 4 inches in maximum dimension.

Hydraulic fill was encountered below the mechanically placed fill to a maximum depth of 13 feet bgs. The hydraulic fill generally consists of a dark gray, fine-grained, micaceous, poorly graded sand with silt containing appreciable amounts of broken seashells.

Borings B-4 and B-5 (SPS 25A)

Fill materials were encountered to a depth of approximately 2 feet bgs in both borings. The fill soils generally consist of yellowish brown to yellowish orange silty sands. Angular and rounded gravel to 1-inch in size was observed in the fill materials in boring B-4.

Boring B-6 (SPS 85)

Fill materials consisting of yellow brown gravelly silty sand were encountered to a depth of 2 feet bgs. The fill materials appear to have been derived from the underlying granitic bedrock.

4.3.2 Beach Deposits (Qb)

Beach Deposits of Holocene age (Kennedy, 1975a) were encountered below the fill in borings B-2 and B-3 (SPS 14) in Mission Bay Park to the maximum depth of exploration. The materials consist primarily of gray, medium dense to dense, micaceous, poorly graded sand. The published geologic map (Kennedy, 1975a) indicates that Beach Deposits may also be encountered in the vicinity of the SPS13 pump station.

4.3.3 Old Paralic Deposits (Qop)

Old Paralic Deposits of late to middle Pleistocene age (Kennedy & Tan, 2005) were encountered below the fill in boring B-1 to the maximum depth of exploration of 19 feet bgs. These deposits were formerly referred to as the Bay Point Formation of late Pleistocene age (Kennedy, 1975a). This formation generally consists of marine and nonmarine strandline, beach, estuarine and colluvial deposits. These sedimentary deposits are comprised of poorly consolidated, moderately permeable, fine to medium grained, pale brown to reddish brown sandstone, siltstone and conglomerate that is locally fossiliferous. Based on fossil assemblages, the unit has been assigned a late Pleistocene age (Kennedy, 1975a). The Old Paralic Deposits encountered in boring B-1 generally consists of mottled light to yellow brown, damp, very dense silty sand and clayey sand.

4.3.4 Ardath Shale (Ta)

The Ardath Shale of lower to middle Eocene age (Kennedy, 1975a) was encountered below the fill materials in borings B-4 and B-5 (SPS 25A) to the maximum depths of exploration. The Ardath Shale is generally described as a thinly bedded to massive, yellowish brown sandy siltstone and claystone (Kennedy, 1975a). The claystone facies of the unit is generally considered susceptible to landslide/slope stability hazards. The Ardath Shale formation encountered in our borings consists of olive yellow to olive brown, fine grained sandy siltstone and silty sandstone with local lenses of sandy claystone.

4.3.5 Mount Soledad Formation (Tmsc)

The early to middle Eocene Mount Soledad Formation consists predominantly of cobble conglomerate which is interbedded with medium-grained sandstone in the upper part of unit. Boring B-1 at SPS 13 encountered refusal at 19 feet bgs on large cobbles which are interpreted as the Mount Soledad Formation. This formation is exposed on nearby slopes at the approximate elevation of our drilling refusal depth in boring B-1. Additionally, Haley & Aldrich (2000) encountered gravels and cobbles of the Mt. Soledad Formation at a depth of 28 feet bgs in a soil boring performed on La Jolla Boulevard, at a location approximately 175 feet northwest of boring B-1.

4.3.6 Granitic Rock (Kwm)

Granitic bedrock was encountered below the fill materials in boring B-6 at SPS 85. Drilling refusal was encountered at an approximate depth of 6 feet bgs on relatively unweathered bedrock. Tan and Kennedy (1999) mapped this unit as the Woodson Mountain Granodiorite of Cretaceous age. The weathered rock materials encountered in the boring consists of a pale yellow brown, very dense, gravelly silty sand.

4.4 Groundwater

Groundwater was encountered in borings B-2 and B-3 (SPS 14) at depths of 6 and 10 feet bgs, respectively (which correspond to the approximate sea level elevation at this site). No groundwater or active seepage was encountered in the other four borings at the time of our field exploration.

The elevation of the groundwater in boring B-1 (SPS 13) is unknown but assumed to be at sea level elevation. The depth (elevation) of the regional groundwater table beneath SPS 25A and SPS 85 is unknown and is estimated to be in excess of 50 feet in depth.

It must be noted that, depending on location, variations in the elevation of the groundwater table should be expected in response to seasonal and/or tidal fluctuations. Localized perched water conditions can also be expected to occur, particularly during the wet (rainy) season.

5.0 DISCUSSIONS, OPINIONS AND RECOMMENDATIONS

5.1 Potential Geologic Hazards

5.1.1 Faulting

None of the project sites are located within an Alquist-Priolo Earthquake Study Zone. A review of the published geologic maps indicates that none of the proposed project alignments cross a known (mapped) fault (Kennedy, 1975a; Tan and Kennedy, 1999; Kennedy and Tan, 2005).

For the purpose of this project, we consider the Rose Canyon fault zone (RCFZ) to represent the most significant seismic hazard. The RCFZ is a complex set of anastomosing and en-echelon, predominantly strike slip faults that extend from off the coast near Carlsbad to offshore south of downtown San Diego (Treiman, 1993). Previous geologic investigations on the RCFZ in the Rose Creek area (Rockwell et. al., 1991) and in downtown San Diego (Patterson et. al., 1986) found evidence of multiple Holocene earthquakes. Based on these studies, several fault strands within the RCFZ have been classified as active faults, and are included in Alquist-Priolo Special Studies Zones. In San Diego Bay, this fault zone is believed to splay into multiple, subparallel strands; the most pronounced of which are the Silver Strand, Spanish Bight and Coronado Bank faults.

5.1.2 California Building Code Seismic Design Parameters

The parameters presented herein were calculated using the 2010 ASCE 7 - Minimum Design Loads for Buildings and Other Structures procedures which has been adopted for the California Building Codes 2013.

For structural design in accordance with the 2010 ASCE 7 procedures, the United States Geological Survey Design Maps (USGS, 2013) were used to calculate ground motion parameters for the project alignment. The Risk-Targeted Maximum Considered Earthquake (MCE_R) ground motion response acceleration is calculated based on the most severe earthquake effects considered by ASCE 7-10 determined for the orientation that resulted in the largest maximum response to the horizontal ground motions and with adjustment to the targeted risk. The Maximum Considered Earthquake Geometric Mean (MCE_G) is determined for the geometric peak ground acceleration and without adjustment for the targeted risk. The MCE_G Peak Ground Acceleration (PGA) adjusted for site effects (PGA_M) should be used for design and evaluation of liquefaction, lateral spreading, seismic settlements, and other soil related issues.

In the event that a seismic analysis is required for this project, we recommend that the seismic design parameters presented in Table 1 on the next page be used. These criteria are based on the soil profile type as determined by existing subsurface geologic conditions, on the proximity of the site to a nearby fault and on the maximum moment magnitude and slip rate of the nearby fault.

Table 1

Summary of Seismic Design Parameters

PARAMETER	SPS 13	SPS 14	SPS 25A	SPS 85
Site Class	D	D	D	C
Ss (g)	1.189	1.159	1.269	0.959
Fa	1.024	1.036	1.000	1.017
S_1 (g)	0.454	0.441	0.490	0.372
Fv	1.546	1.559	1.510	1.428
S_{MS} (g)	1.218	1.201	1.269	0.974
S_{M1} (g)	0.702	0.687	0.740	0.532
S_{DS} (g)	0.812	0.801	0.846	0.650
S_{D1} (g)	0.468	0.468	0.493	0.345
T_L (second)	8	8	8	8
PGA (g)	0.519	0.501	0.571	0.356
PGA_M (g)	0.519	0.501	0.571	0.371
C_{RS}	0.863	0.868	0.841	1.040
C_{R1}	0.894	0.900	0.873	1.086

5.1.3 Fault Ground Rupture & Ground Lurching

The project alignments do not cross any known (mapped) active or potentially active faults (Kennedy, 1975a and 1975b; Kennedy and Tan, 2005; City of San Diego, 1995; Caltrans State Hazard Map). Therefore, the potential for fault ground rupture and ground lurching along the project alignments is considered.

5.1.4 Soil Liquefaction

Seismically-induced soil liquefaction is a phenomenon in which loose to medium dense, saturated granular materials undergo matrix rearrangement, develop high pore water pressure, and lose shear strength due to cyclic ground vibrations induced by earthquakes.

A very high potential for liquefaction exists along the West Mission Bay Drive alignment (SPS 14). This alignment is underlain by poorly consolidated hydraulic fills and shallow groundwater (within 10 feet or less bgs). Furthermore, the City of San Diego Seismic Safety Study (1995) identifies this area as having a high liquefaction potential.

The other project sites (SPS 13, SPS 25A and SPS 85) are underlain by competent geologic units which are considered to have a very low to negligible liquefaction potential.

5.1.5 Landslides

A review of the published geologic maps indicate that the project alignments are not located on or below any known (mapped) ancient landslides (Kennedy, 1975a; Kennedy and Tan, 2005; City of San Diego, 1995).

5.1.6 Lateral Spread Displacement

The West Mission Bay Drive alignment (SPS 14) is underlain by poorly consolidated soil materials, and therefore there is a potential for lateral spread in the event of strong seismic shaking. The other project alignments (SPS 13, SPS 25A and SPS 85) are underlain by competent geologic units which are not considered susceptible to seismic-induced lateral spreading.

5.1.7 Differential Seismic-Induced Settlement

Differential seismic settlement occurs when seismic shaking causes one type of soil to settle more than another type. It may also occur within a soil deposit with largely homogeneous properties if the seismic shaking is uneven due to variable geometry or thickness of the soil deposit. Based on the results of our investigation, it is our opinion that there is a high potential of differential settlement in areas where the alignment is underlain by mechanically or hydraulically placed man-made fills.

5.1.8 Secondary Hazards

A review of the published maps indicates that there is a low potential for damage resulting from seismic-induced tsunamis or seiches at SPS 13, 25A and 85. However, SPS 14 is located within the tsunami inundation zone (California Geological Survey, 2009).

5.2 Soil Corrosivity

In accordance with the City of San Diego Water Facility Design Guidelines, Book 2, Chapter 7, soil is generally considered aggressive to concrete if its chloride concentration is greater than 300 parts per million (ppm) or sulfate concentration is greater than 1,000 ppm, or if the pH is 5.5 or less.

Analytical testing was performed on a representative sample of the onsite soil materials to determine pH, resistivity, soluble sulfate, chlorides and bicarbonates content. The tests were performed in accordance with California Test Method Nos. 643, 417 and 422. A summary of the test results is presented below. Copies of the analytical laboratory test data reports are included in Appendix B. The results indicate that the onsite soil is not considered corrosive against concrete and/or steel. The slightly elevated Chloride concentration at SPS 13 is not considered a threat to concrete and/or steel because, based on the pH test results, the soil is considered neutral.

TABLE 2

SUMMARY OF CORROSIVITY TEST RESULTS

	pH	Resistivity (ohm-cm)	Sulfate Conc. (ppm)	Chloride Conc. (ppm)	Bicarbonates Conc. (ppm)
SPS 13	7.3	590	210	490	250
SPS 14	8.6	2,000	140	96	92
SPS 25A	9.4	960	86	53	120
SPS 85	8.5	4,900	28	53	40

AGE does not practice in the field of corrosion engineering. In the event that corrosion sensitive facilities are planned, we recommend that a corrosion engineer be retained to perform the necessary corrosion protection evaluation and design.

5.3 Expansive Soil

Laboratory tests (Expansion Index) were performed on representative samples of the Ardath Shale encountered in borings B-4and B-5. The test results indicate that these soils possess moderate expansion potential. The soils encountered at SPS 13, SPS 14 and SPS 85 are considered non-expansive.

5.4 Cut-and-Cover Construction

Since no changes to the existing ground surface along the cut-and-cover segment of the proposed pipeline alignments are planned, the net stress change in the underlying soils is considered negligible. Furthermore, the native soils at the proposed invert level along the pipeline alignments are expected to provide a stable trench bottom. In the event that loose or disturbed soils are encountered at the trench bottoms, it is recommended that they be over-excavated and replaced with pipe bedding or other approved materials.

5.4.1 Soil and Excavation Characteristics

Soil materials within the anticipated depths of the excavation at SPS 13, 14 and 25A consist of man-made fill and formational soils which can generally be readily excavated with conventional heavy-duty construction equipment. The majority of soil materials encountered in the borings performed at these three sites are considered suitable for use as compacted backfill materials provided that they are free of biodegradable materials, trash, rocks or hard lumps greater than 4 inches in maximum dimension, hazardous substance contamination, or other deleterious debris. If the fill materials contain rocks or hard lumps, at least 70 percent (by weight) of its particles shall pass a U.S. Standard $^{3}/_{4}$-inch sieve.

Excavations at the SPS 13 site may encounter the Mount Soledad Formation which was encountered in boring B-1 at a depth of 19 feet bgs (approximate elevation of 63 feet msl). Difficult excavation conditions may be experienced in this formation due to its high cobble content and localized cementation. The soil materials generated from excavations in the Mount Soledad Formation are not considered suitable for use as compacted trench backfill, and we recommend that granular import fill materials be used for trench backfilling purposes.

Excavations at SPS 85 will encounter granitic bedrock with varying degrees of weathering. Very difficult rock excavation conditions which may need to utilize rock breaking and/or drill and blasting methods will likely be required.

Materials generated from the rock blasting or jackhammering operations are not considered suitable for use as backfill materials due to their high rock content and lack of fine-grained materials. It is therefore recommended that the contractor use granular import fill materials for trench backfilling purposes.

5.4.2 Pipe Loads and Settlement

Pipes should be designed for all loads applied by surrounding soils including dead load from soils, loads applied at the ground surface, uplift loads, and earthquake loads. Soil loading above the groundwater level may be estimated assuming a density of 130 pcf for the backfill materials.

Where a pipe changes direction abruptly, resistance to thrust forces can be provided by means of thrust blocks. For design purposes, for the passive resistance against thrust blocks embedded in dense soil materials, an equivalent fluid density of 300 pcf may be used. Thrust blocks should be embedded a minimum of 3 feet beneath the ground surface.

Buried flexible pipes are generally designed to limit deflections caused by applied loads. The deflections can be estimated using the Modified Spangler equation. A modulus of soil reaction, E', equal to 2,000 and 3,000 psi may be used to represent a minimum of 6 inches of compacted pipe bedding materials of low plasticity (LL < 50) with less than 12 percent fines passing the #200 standard sieve and crushed rock materials, respectively.

5.4.3 Trench Backfill

Pipe Bedding Zone and Pipe Zone

"Pipe Bedding Zone" is defined as the area below the bottom of the pipe and extending over the full trench width, and should be at least 6 inches thick in order to provide a uniform firm foundation material directly beneath the pipe.

The "Pipe Zone" is defined as the full width of a trench from the bottom of the pipe to a horizontal level about 6 inches above the top (crown) of the pipe. In order to provide uniform support and to minimize external loads, trench widths should be selected such that a minimum clear space of 6 inches is provided on each side of the pipe. During backfilling, it is recommended that the backfill materials be placed on each side of the pipe simultaneously to avoid unbalanced loads on the pipe.

Backfill materials placed in the "Pipe Bedding Zone" and "Pipe Zone" should consist of clean, free draining sand with a minimum Sand Equivalent value of 50 or crushed rock. Sand should be free of clay, organic matter, and other deleterious materials and conform to the gradation shown in the following table.

Sieve Size	Percent Passing by Weight (percent)
½ inch	100
#4	75-100
#16	35-75
#50	10-40
#200	0-10

Crushed rock should conform to Section 200-1.2 and 200-1.3 of the Standard Specifications for Public Works Construction (SSPWC) for 3/4-inch crushed rock gradation. It must be noted that, since the native soil materials do not meet these specifications, import backfill materials will be required for the "Pipe Bedding Zone" and "Pipe Zone". If crushed rock is to be used for pipe zone and bedding backfill materials, we recommend that the rock materials be wrapped in geotextile filter fabric such as Mirafi 140N or equivalent. The purpose of the filter fabric is to prevent migration of fine grained materials from the backfill materials, and the sides and bottom of the trench into the rock bedding materials.

Above Pipe Zone

The "Above Pipe Zone" is defined as the full width of the trench from the top of the "Pipe Zone" to the finish grade or bottom of the pavement section. Backfill placed in this zone should have less than 40 percent passing the standard #200 sieve and not less than 70 percent passing the U.S. standard $^{3}/_{4}$-inch sieve, and should not contain any organic debris, rocks or hard lumps greater than 6 inches, or other deleterious materials.

5.4.4 Placement and Compaction of Backfill

Prior to placement, all backfill materials should be moisture-conditioned, spread and placed in lifts (layers) not-to-exceed 6 inches in loose (uncompacted) thickness, and uniformly compacted to at least 90 percent relative compaction. During backfilling, the soil moisture content should be maintained at or within 2 to 3 percent above the optimum moisture content of the backfill materials.

It is recommended that the upper 24 inches directly beneath the roadway pavement and the base materials be compacted to at least 95 percent relative compaction. The maximum dry density and optimum moisture content of the backfill materials should be determined in the laboratory in accordance with the ASTM D1557 testing procedures.

Small hand-operated compacting equipment should be used for compaction of the backfill materials to an elevation of at least 4 feet above the top (crown) of the pipes. Flooding or jetting should not be used to densify the backfill.

5.5 Horizontal Directional Drilling (HDD)

It is anticipated that HDD operations for SPS 14 and 25A will encounter hydraulic fill and Ardath Shale, respectively. It is further anticipated that HDD operation for SPS 14 will encounter groundwater during test pit excavations and drilling operations. Based on our previous experience with similar subsurface conditions, it is our opinion that HDD application is considered suitable for both SPS 14 and 25A. The hydraulic fill below groundwater and Ardath Shale can be classified as running and firm, respectively (Tunnelman's Ground Classification System).

The selection of bore radius, drill bit, reamer type and drilling fluids, and monitoring and protection of existing utilities/improvements are the sole responsibility of the HDD contractor. Special care should be taken during the performance of HDD operation within the hydraulic fill at SPS 14. The hydraulic fill material is subject to collapse and increase settlement through volume loss. Furthermore, groundwater seepage toward the bore will also increase the potential for volume loss. Ground surface settlement due to HDD operation within the Ardath Shale with a minimum of 10-foot cover is anticipated to be less than 1 inch.

5.6 Buried Structures

It is recommended that any proposed buried structures be founded on firm native soils or approved compacted materials. In areas where loose or soft soils are encountered at the bottom of the box structure excavations, it is recommended that the loose/soft materials be removed and replaced with 3/4-inch crushed rock materials wrapped in geotextile fabric which meets or exceeds the specifications shown below.

Fabric Property	Min. Certified Values	Test Method
Grab Tensile Strength	300 lb	ASTM D 4632
Grab Tensile Elongation	35% (MAX)	ASTM D 4632
Burst Strength	600 psi	ASTM D 3786
Trapezoid Tear Strength	120 lb	ASTM D 4533
Puncture Strength	130 lb	ASTM D 4833

The actual extent of over-excavation of any loose/soft soil materials should be evaluated and determined in the field by the City's Resident Engineer.

5.6.1 Placement and Compaction of Backfill

Placement and compaction of backfill materials around the buried structures should be performed in accordance with the recommendations presented in Section 5.4.4 of this report.

5.6.2 Foundations

5.6.2.1 Bearing Capacity

For design of the buried structures which are founded on firm native soils or uniformly compacted fill materials an allowable soil bearing capacity of 3,500 and 2,000 psf may be used, respectively. This allowable soil bearing value is for total dead and live loads, and may be increased by one third when considering seismic loads.

5.6.2.2 Anticipated Settlement

Under static condition, total settlement of the slab foundation is estimated to be less than 0.25 inch. Differential settlement between the center and the edge of the slab foundation is expected not to exceed 0.25 inch. No permanent deformation and/or post-construction settlement is anticipated, provided that backfill around the structures is properly compacted in accordance with the project specifications.

5.6.2.3 Resistance to Lateral Loads

Resistance to lateral loads may be developed by a combination of friction acting at the base of the slab foundation and passive earth pressure developed against the sides of the foundations below grade. Passive pressure and friction may be used in combination, without reduction, in determining the total resistance to lateral loads.

An allowable passive earth pressure of 250 psf per foot of foundation embedment below grade may be used for the sides of foundations placed against competent native soils or properly compacted fill materials. The maximum recommended allowable passive pressure is 2,500 psf. A coefficient of friction of 0.45 may be used for foundation cast directly on competent native soils or approved compacted materials.

5.6.3 Walls Below Grade

Lateral earth pressures for walls below grade for structures less than 48 inches in horizontal dimensions may be treated as a shaft structure. Walls below grade for structures larger than 48 inches in horizontal dimensions should be designed to resist the lateral earth pressures presented in Figures 5 and 6 provided that the wall backfill materials are properly placed and compacted in conformance with the recommendations presented in this report. Surcharge and foundation loads occurring within a horizontal distance equal to the wall height should be added to the lateral pressures as presented in Figures 7 and 8.

5.7 Summary

Based on the findings of this investigation, we have prepared a summary of the relevant geotechnical criteria which should be considered in the design and construction of the proposed project as shown in Table 3 on the next page.

TABLE 3

SUMMARY OF GEOTECHNICAL DESIGN CRITERIA

	SPS 13 (Tourmaline Street)	SPS 14 (West Mission Bay Drive)	SPS 25A (Via Tabara and Cardeno Drive)	SPS 85 (Alborada Drive)
Subsurface Materials (below fill)	Old Paralic Deposits. May also encounter Beach Deposits at southwest end of alignment near SPS 13, and Mount Soledad Formation on lower portions of Tourmaline Street (below approximate elevation of 63 feet MSL).	Beach Deposits.	Ardath Shale	Granitic bedrock
Approximate Pipe Invert Elevation (feet, msl)	+11 to +78	-6 to +7	+570 to +643	+373 to + 457
Approximate Ground Surface Elevation (feet, msl)	+24 to +85	+6 to +13	+577 to +649	+378 to +461
Estimated Groundwater Elevation (feet, msl)	0 msl (sea level)	0 msl (sea level)	Unknown, but the depth is anticipated to be more than 50 feet bgs.	Unknown, but the depth is anticipated to be more than 50 feet bgs.
Fault Crossing	None	None	None	None
Liquefaction Susceptibility	Low to very low.	High to very high.	None	None
Landslides	None	None	None	None
Expansive Soil	None	None	May be locally present	Absent based on available data
Compressible Soil	None	Potentially loose fill and Beach Deposits.	None	None
Other Difficult Soil	Difficult excavation conditions in the Mount Soledad Formation	Running sand	None anticipated	Very difficult excavation condition. Blasting and the use of rock breaker may be required.
Use of Onsite Material for Backfill	Yes. Except for materials generated from excavations in the Mount Soledad Formation which contains abundant cobbles.	Yes	Yes	No. Requires import fill materials
Typical Construction Slope (horizontal : vertical)	Sloped excavations not recommended	Sloped excavations not recommended	Sloped excavations not recommended	Sloped excavations not recommended
Shoring Need	Yes	Yes	Yes	Yes
Need for Dewatering	No	Yes	No	No
Settlement	0.25" or less provided there is no change in the ground surface elevation.	0.25" or less provided there is no change in the ground surface elevation.	0.25" or less provided there is no change in the ground surface elevation.	0.25" or less provided there is no change in the ground surface elevation.
Horizontal Directional Drilling Considereations	Not applicable.	Potential for running soil, soil loss, and groundwater seepage. Need to monitor and protect existing utilities.	Soil classified as firm. Minimal settlement anticipated.	Not applicable.
Other Unusual Conditions with Cost Consequences	None anticipated, except where contaminated soil and/or groundwater conditions are encountered.	None anticipated, except where contaminated soil and/or groundwater conditions are encountered.	None anticipated, except where contaminated soil and/or groundwater conditions are encountered.	None anticipated, except where contaminated soil and/or groundwater conditions are encountered.

6.0 CONSTRUCTION-RELATED CONSIDERATIONS

6.1 Construction Dewatering

The plans indicate that, with the exception of the connection with the existing pump station, the trenched excavation for the SPS 14 pipeline does not extend below the ground water table. Considering that the underlying soil types are highly permeable, the use of cut-off walls may be required in the area where the pipeline connects to the existing pump station.

Groundwater is not anticipated to be encountered at SPS 13, SPS 25A and 85. The contractor should, however, anticipate the possible need for sump pumps in the event that localized perched water conditions are encountered during construction.

The design, installation, and operation of any construction dewatering measures necessary for the project shall be the sole responsibility of the contractor.

6.2 Temporary Shoring

Since the anticipated pipe invert depths will generally be greater than 4 feet below the ground surface, prevailing Federal and Cal OSHA safety regulations require that trenched excavations be either sloped (if sufficient construction space or easement is available), shored, braced, or protected with an approved sliding trench shield. Limited construction space, the presence of other buried utilities, and the need to avoid excessive community disruption dictate that shored excavations will likely be needed along all four of the project pipeline alignments. Design and construction of temporary shoring should be the sole responsibility of the contractor.

6.2.1 Settlement

Settlement of existing street improvements and/or utilties adjacent to the shoring may occur in proportion to both the distance between shoring system and adjacent structures or utilities and the amount of horizontal deflection of the shoring system. Vertical settlement will be maximum directly adjacent to the shoring system, and decreases as the distance from the shoring increases. At a distance equal to the height of the shoring, settlement is expected to be negligible. Maximum vertical settlement is estimated to be on the order of 75 percent of the horizontal deflection of the shoring system. It is recommended that shoring be designed to limit the maximum horizontal deflection to 1-inch or less where structures or utilities are to be supported.

It is recommended that pre- and post-construction surveys be conducted to document existing site conditions. Documentation should include photographic and video surveys of existing facilities and site improvements, as well as field surveys of building floors and pavement structures. We further recommend that a weekly survey of all existing utilities be performed during the construction phase.

6.2.2 Lateral Earth Pressures

Temporary shoring should be designed to resist the pressure exerted by the retained soils and any additional lateral forces due to loads placed near the top of the excavation. For design of braced shorings supporting fill materials and beach deposits, the recommended lateral earth pressure should be 32H psf, where H is equal to the height of the retained earth in feet. For braced shoring supporting Ardath Shale and granitic bedrock, the recommended lateral earth pressures may be reduced to 20H psf. Any surcharge loads would impose uniform lateral pressure of 0.3q, where "q"

equals the uniform surcharge pressure. The surcharge pressure should be applied starting at a depth equal to the distance of the surcharge load from the top of the excavation. In the event that the bottom of the excavation is located below the groundwater level, hydrostatic pressure should be added to the lateral loads.

The recommended lateral earth pressures have been prepared based on the assumptions that the shored earth is level at the surface and that the shoring system is temporary in nature.

6.2.3 Lateral Bearing Capacity

Resistance to lateral loads will be provided by passive soil resistance. The allowable passive pressure for the fill materials and beach deposits may be assumed to be equivalent to a fluid weighing 200 pcf. Allowable lateral bearing pressure in these material should not exceed 2,000 psf. Allowable passive pressure for the Ardath Shale and granitic bedrock materials may be assumed to be equivalent to a fluid weighing 350 pcf, with maximum allowable lateral bearing pressure of 3,500 psf.

6.4 Environmental Considerations

The scope of AGE's investigation did not include the performance of a Phase I Environmental Site Assessment (Phase I ESA) to evaluate the possible presence of soil and/or groundwater contamination beneath the project alignments. Field screening of the soil samples collected from the borings with an organic vapor meter (OVM) did not reveal elevated levels of volatile organics.

In the event that hazardous or toxic materials are encountered during the construction phase, the contractor should immediately notify the City and be prepared to handle and dispose of such materials in accordance with current industry practices and applicable Local, State and Federal regulations.

7.0 GENERAL CONDITIONS

7.1 Post-Investigation Services

Post-investigation geotechnical services are an important continuation of this investigation, and we recommend that the City retains our firm or utilizes staff personnel from the City's Construction Inspection Division to perform the necessary geotechnical observation and testing services during construction.

Sufficient and timely observation and testing should be performed during excavation, pipeline installation, backfilling and other related earthwork operations. The purpose of the geotechnical observation and testing is to correlate findings of this investigation with the actual subsurface conditions encountered during construction and to provide supplemental recommendations, if necessary.

7.2 Uncertainties and Limitations

The information presented in this report is intended for the sole use of PSOMAS and other members of the design team and the City for project design purposes only and may not provide sufficient data to prepare an accurate bid. The contractor should be required to perform an independent evaluation of the subsurface conditions at the project site prior to submitting his/her bid.

AGE has observed and investigated the subsurface conditions only at selected locations along the project alignments. The findings and recommendations presented in this report are based on the assumption that the subsurface conditions beneath all project alignments do not deviate substantially from those encountered in the exploratory soil borings. Consequently, modifications or changes to the recommendations presented herein may be necessary based on the actual subsurface conditions encountered during construction.

California, including San Diego County, is in an area of high seismic risk. It is generally considered economically unfeasible to build a totally earthquake-resistant project and it is, therefore, possible that a nearby large magnitude earthquake could cause damage at the project site.

Geotechnical engineering and geologic sciences are characterized by uncertainty. Professional judgments and opinions presented in this report are based partly on our evaluation and analysis of the technical data gathered during our present study, partly on our understanding of the scope of the proposed project, and partly on our general experience in geotechnical engineering.

In the performance of our professional services, we have complied with that level of care and skill ordinarily exercised by other members of the geotechnical engineering profession currently practicing under similar circumstances in southern California. Our services consist of professional consultation only, and no warranty of any kind whatsoever, expressed or implied, is made or intended in connection with the work performed. Furthermore, our firm does not guarantee the performance of the project in any respect.

AGE does not practice or consult in the field of safety engineering. The contractor will be responsible for the health and safety of his/her personnel and all subcontractors at the construction site. The contractor should notify the City if he or she considers any of the recommendations presented in this report to be unsafe.

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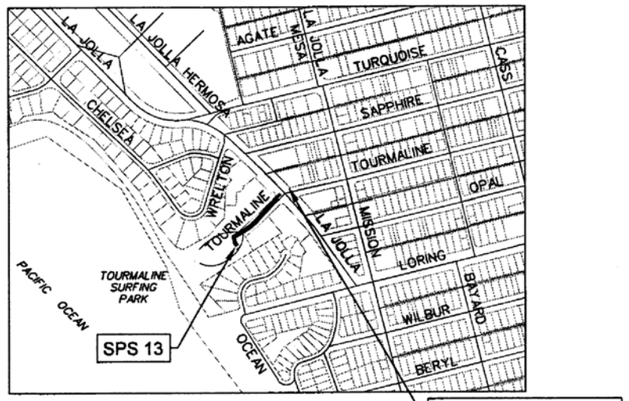
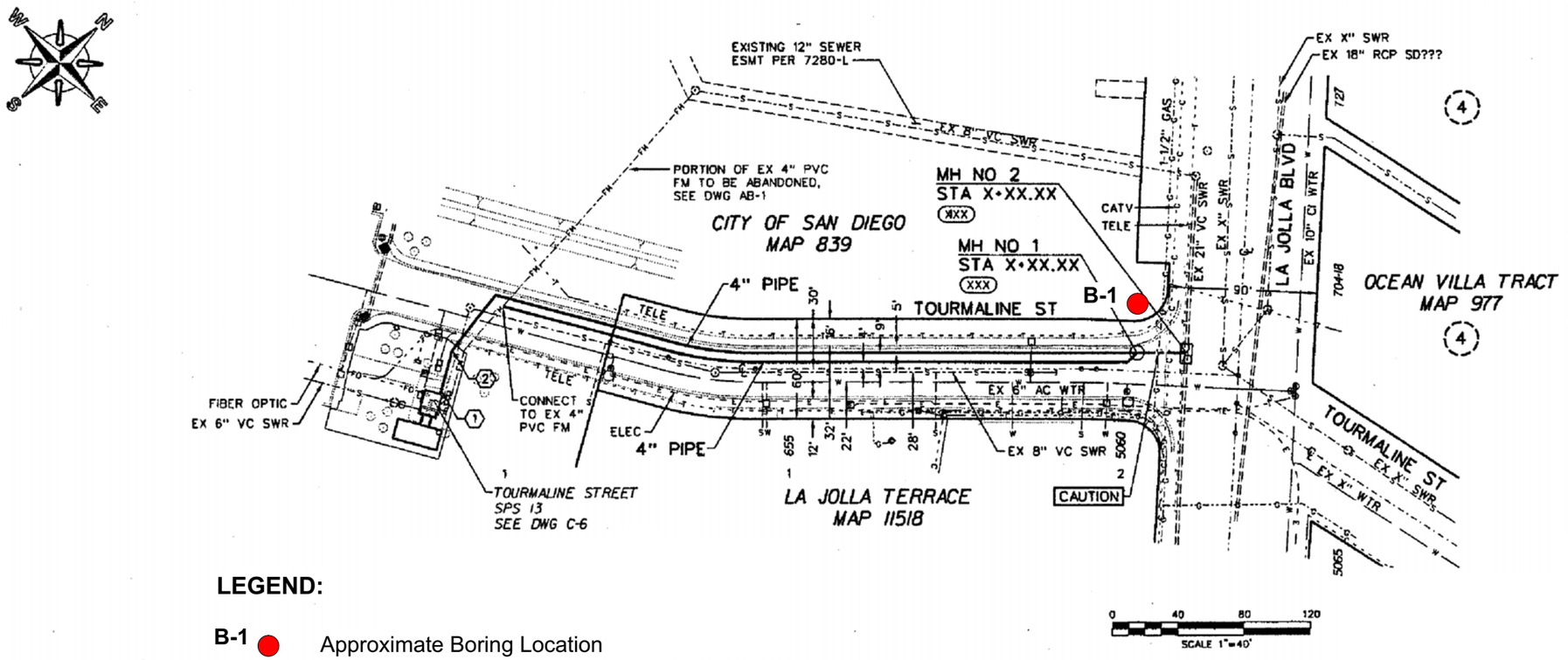
U.S. Department of Agriculture black and white aerial photograph Nos. AXN-7M- 184, 185, 187 and 188 (dated 1953)

FIGURES



SPS 13 VICINITY MAP

NOT TO SCALE

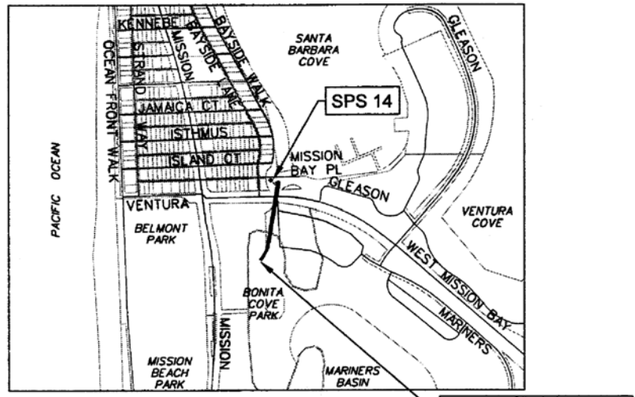


LEGEND:

B-1 ● Approximate Boring Location

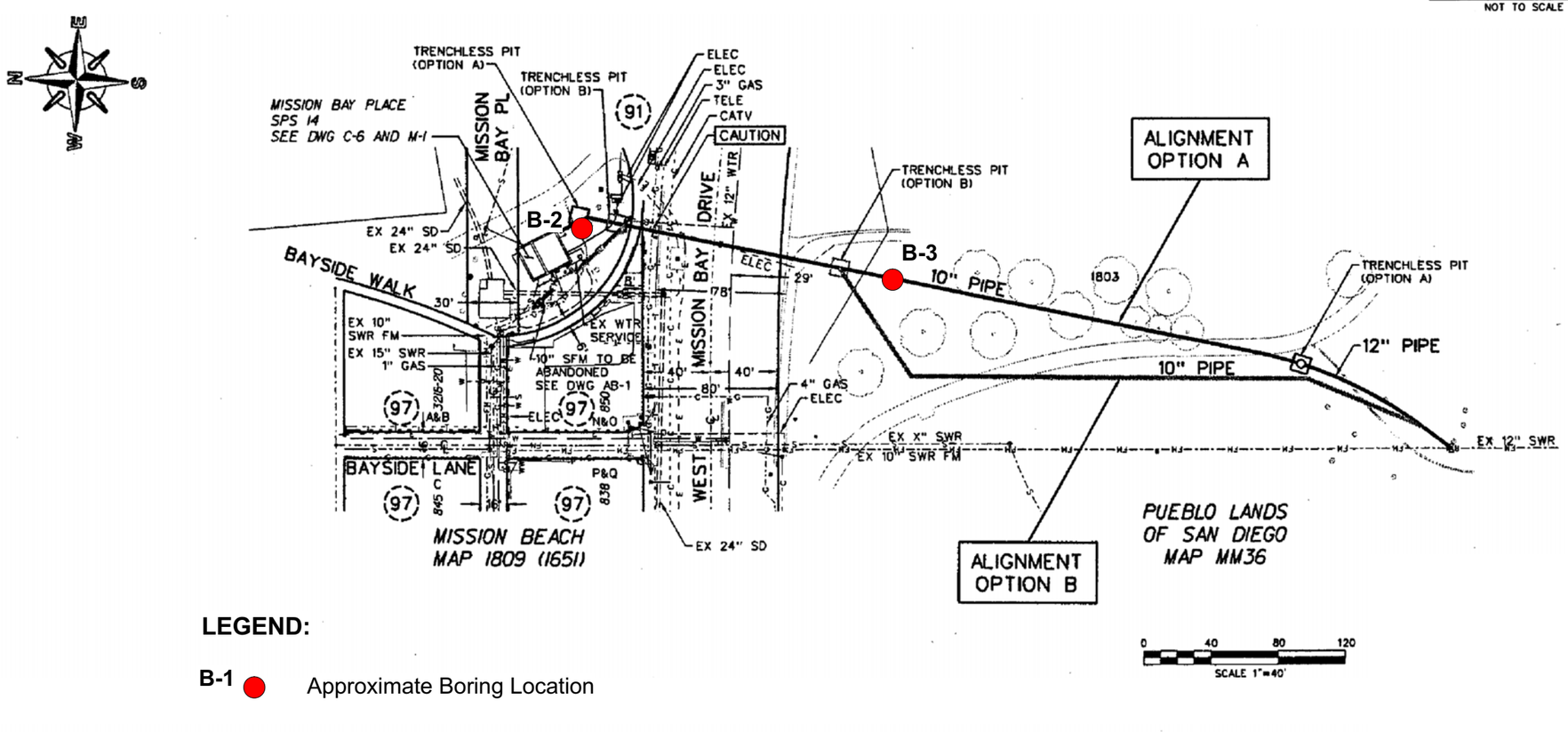
Source: 50% Construction Plans prepared by PSOMAS dated February, 2015.

SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS	**SPS 13 SITE AND VICINITY MAP**
PROJECT NO. 160 GS-14-C	**ALLIED GEOTECHNICAL ENGINEERS, INC.** — **FIGURE 1**



SPS 14 VICINITY MAP

NOT TO SCALE

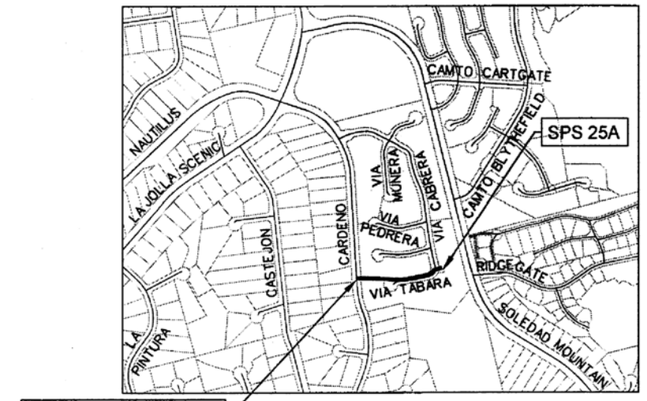


LEGEND:

B-1 ● Approximate Boring Location

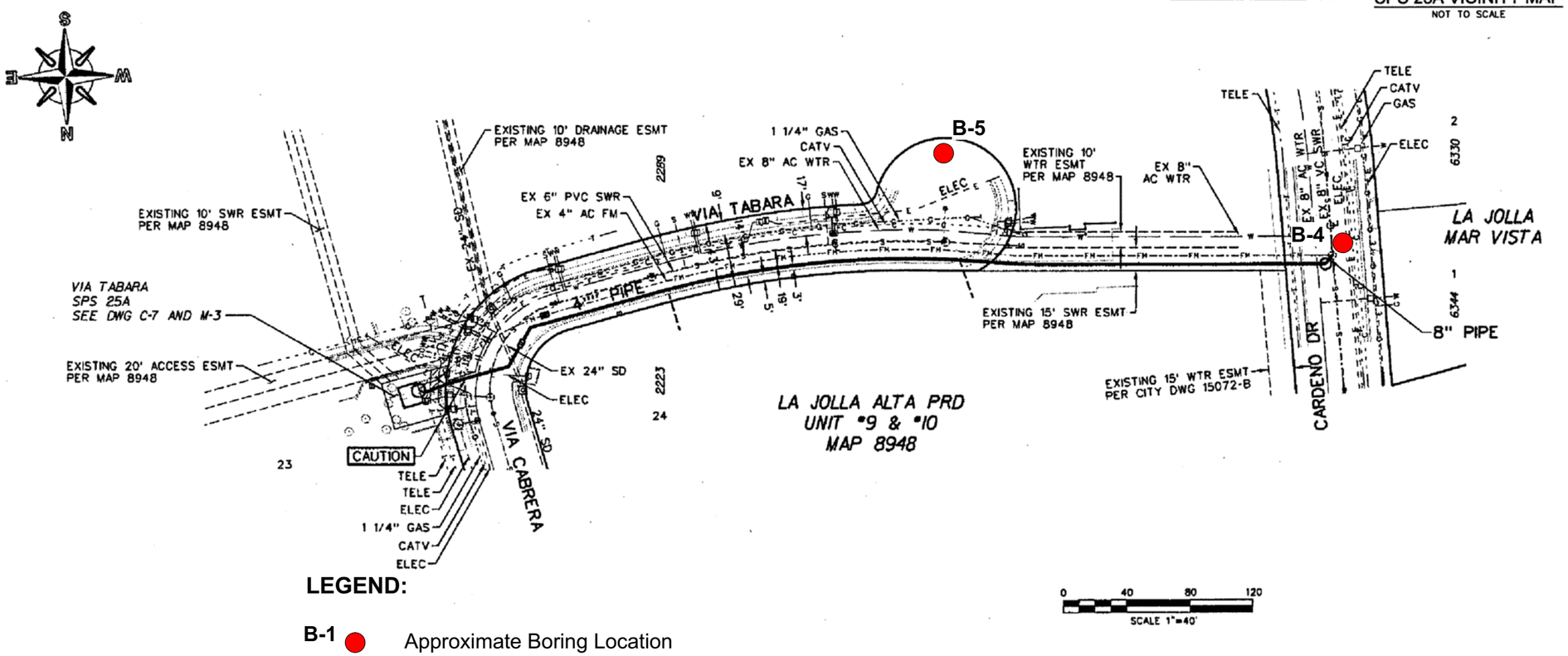
Source: 50% Construction Plans prepared by PSOMAS dated February, 2015.

SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS	**SPS 14 SITE AND VICINITY MAP**
PROJECT NO. 160 GS-14-C	**ALLIED GEOTECHNICAL ENGINEERS, INC.** — **FIGURE 2**



SPS 25A VICINITY MAP

NOT TO SCALE

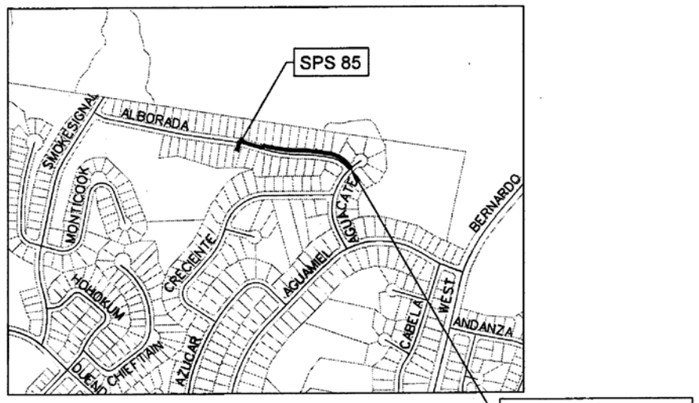


LEGEND:

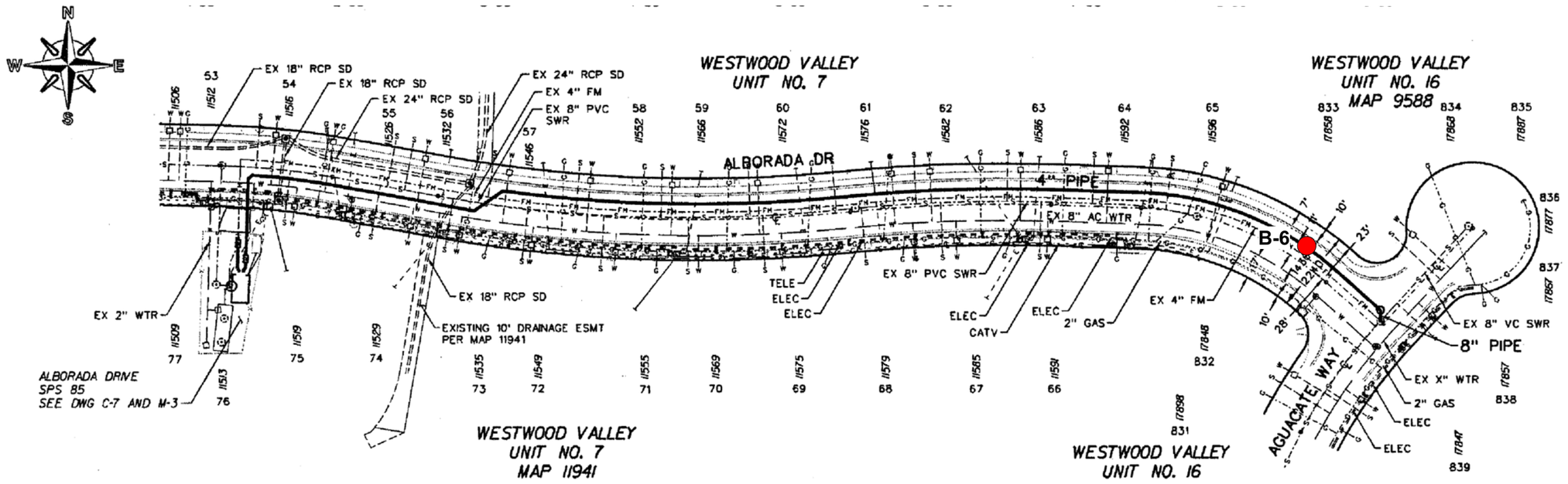
B-1 ● Approximate Boring Location

Source: 50% Construction Plans prepared by PSOMAS dated February, 2015.

SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS	SPS 25A SITE AND VICINITY MAP
PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 3



SPS 85 VICINITY MAP
NOT TO SCALE

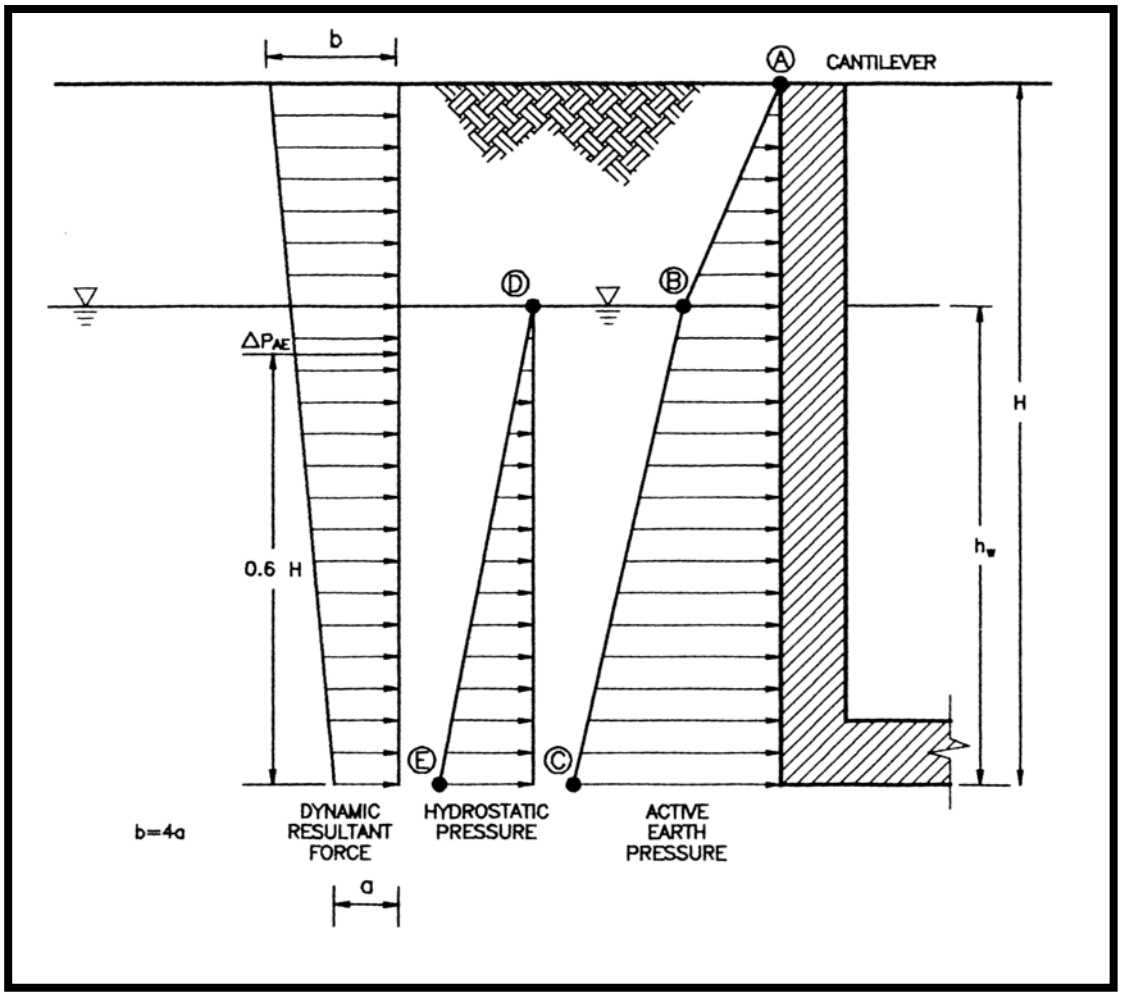


LEGEND:

B-1 ● Approximate Boring Location

Source: 50% Construction Plans prepared by PSOMAS dated February, 2015.

SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS	SPS 85 SITE AND VICINITY MAP
PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 4



NOTES

H = wall height in feet

h_w = water height above bottom of structure in feet

Lateral pressure values presented herein are based on the assumption that non-expansive backfill materials will be used to backfill behind walls

LATERAL PRESSURES

Earth Pressure

Ⓐ = 0

Ⓑ = 32 ($H-h_w$), psf

Ⓒ = 32 ($H-h_w$) + $20h_w$, psf

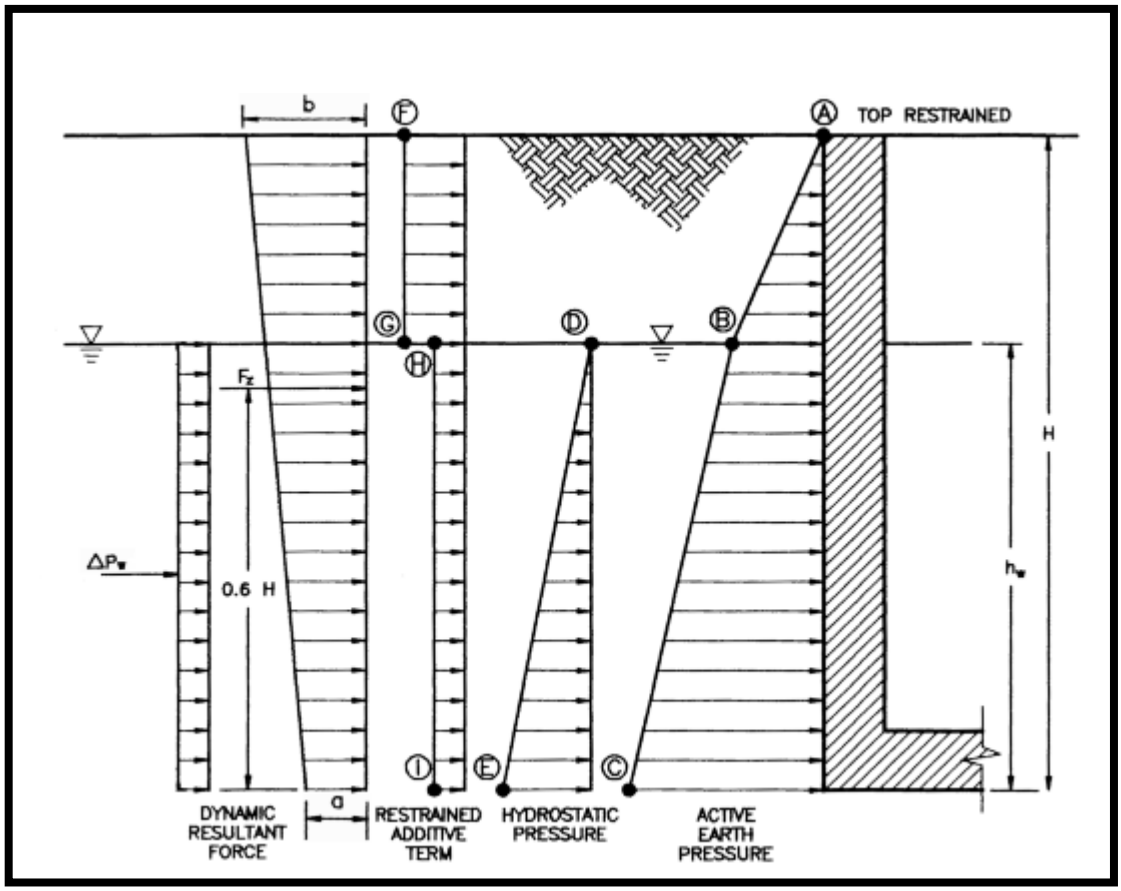
Hydrostatic Pressure

Ⓓ = 0

Ⓔ = $62.4h_w$

LATERAL PRESSURES FOR CANTILEVER WALLS
SPS 13, 14, 16, 25A & 85 DUAL FM FORCEMAINS

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 5



NOTES

H = wall height in feet

h_w = water height above bottom of structure in feet

Lateral pressure values presented herein are based on the assumption that non-expansive backfill materials will be used to backfill behind walls

LATERAL PRESSURES

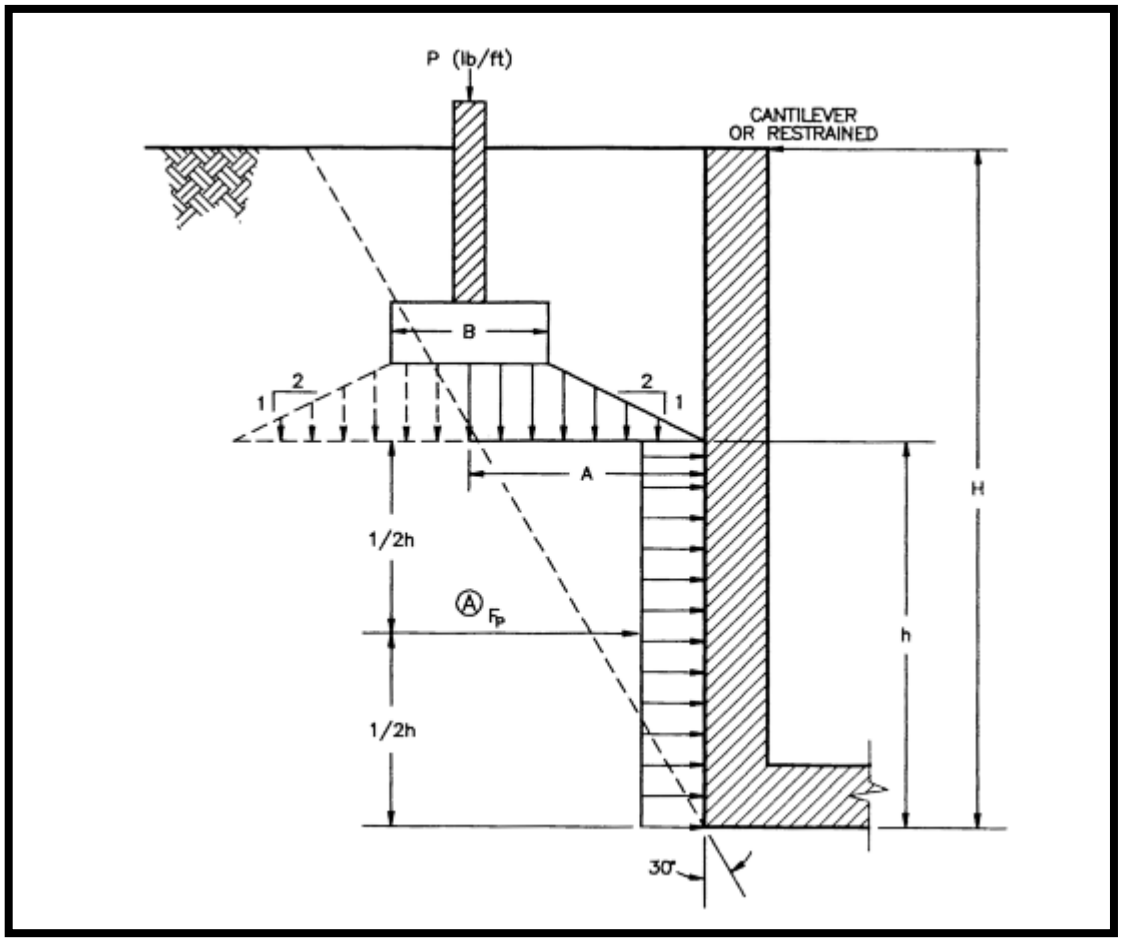
Earth Pressure
Ⓐ = 0
Ⓑ = 32 (H-h_w), psf
Ⓒ = 32 (H-h_w) + 20h_w, psf

Hydrostatic Pressure
Ⓓ = 0
Ⓔ = 62.4h_w

Restrained Additive Term
Ⓕ = Ⓖ = 10H, psf
Ⓗ = Ⓘ = 5H, psf

LATERAL PRESSURES FOR RESTRAINED WALLS SPS 13, 14, 16, 25A & 85 DUAL FM FORCEMAINS

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 6



NON-EXPANSIVE BACKFILL

$F_p = M (A/B) P$, lb/ft

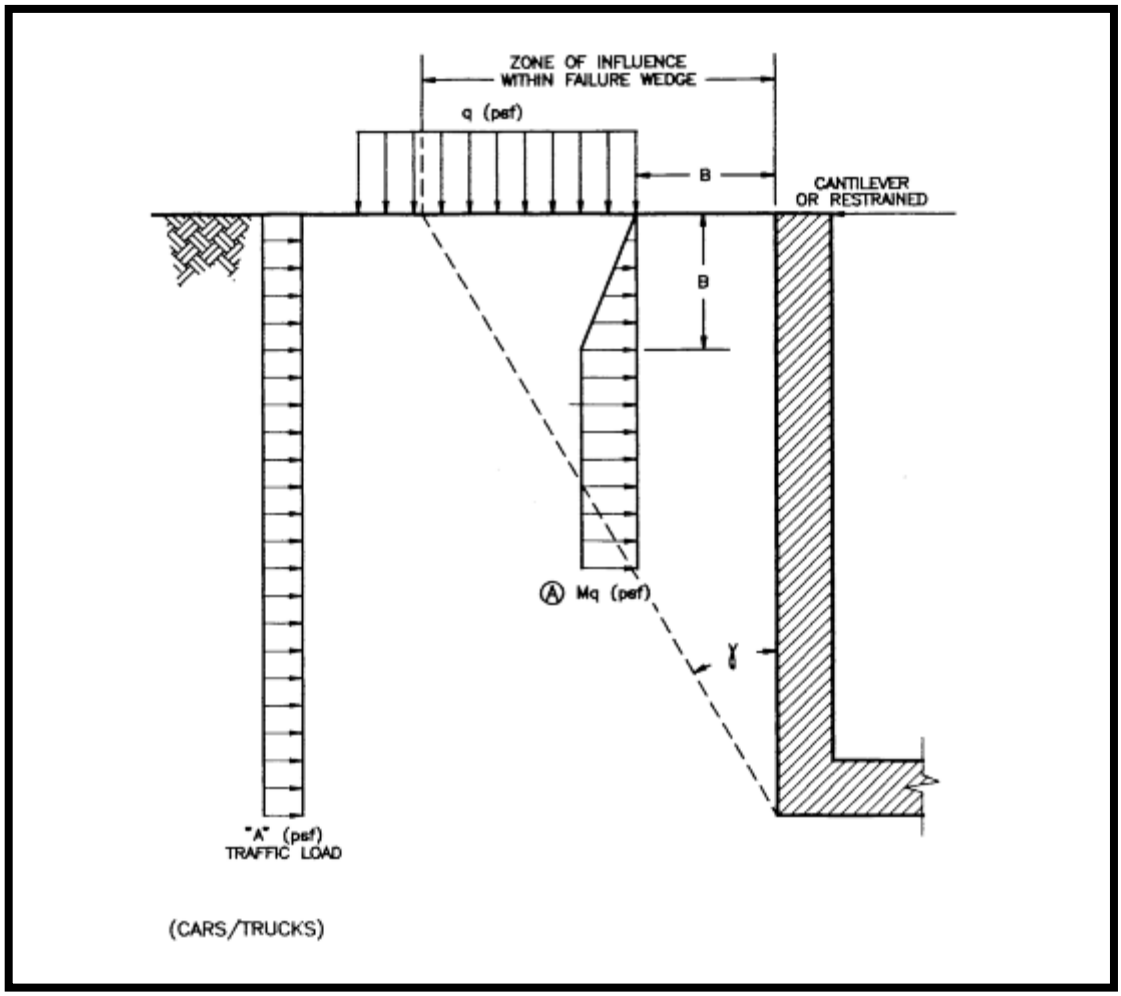
$A = h \tan 30^o$, ft
M = 0.3 for cantilever wall
M = 0.4 for restrained wall

NOTES:

1. Surcharge pressure acting on wall is not affected by groundwater elevation.

2. Surcharge pressures shown are applicable for continuous footing only. Spread footings need to be evaluated individually.

FOUNDATION INDUCED WALL PRESSURES SPS 13, 14, 16, 25A & 85 DUAL FM FORCEMAINS		
PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 7



NON-EXPANSIVE BACKFILL

q = surcharge load (psf)
B = distance between wall and surcharge load, ft
M = 0.3 for cantilever wall
M = 0.4 for restrained wall
Ⓐ = Mq, psf
"A" = 75 psf
$\gamma = 30^{o}$

NOTE: Surcharge pressure acting on wall is not affected by groundwater elevation.

TRAFFIC AND SURCHARGE PRESSURES
SPS 13, 14, 16, 25A & 85 DUAL FM FORCEMAINS

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE 8

APPENDIX A

FIELD EXPLORATION PROGRAM

APPENDIX A

FIELD EXPLORATION PROGRAM

The field exploration program for this project was performed on March 21 and 22, 2015, and included the performance of a total of six (6) soil borings. The borings were advanced to depths ranging between 6 feet and 19 feet below the existing ground surface (bgs) using conventional hollow-stem auger drilling methods. The borings were performed by Tri-County Drilling using a CME 85 truck-mounted drill rig. A Key to Logs is presented on Figures A-1 and A-2, and the boring logs are presented on Figures A-3 thru A-8.

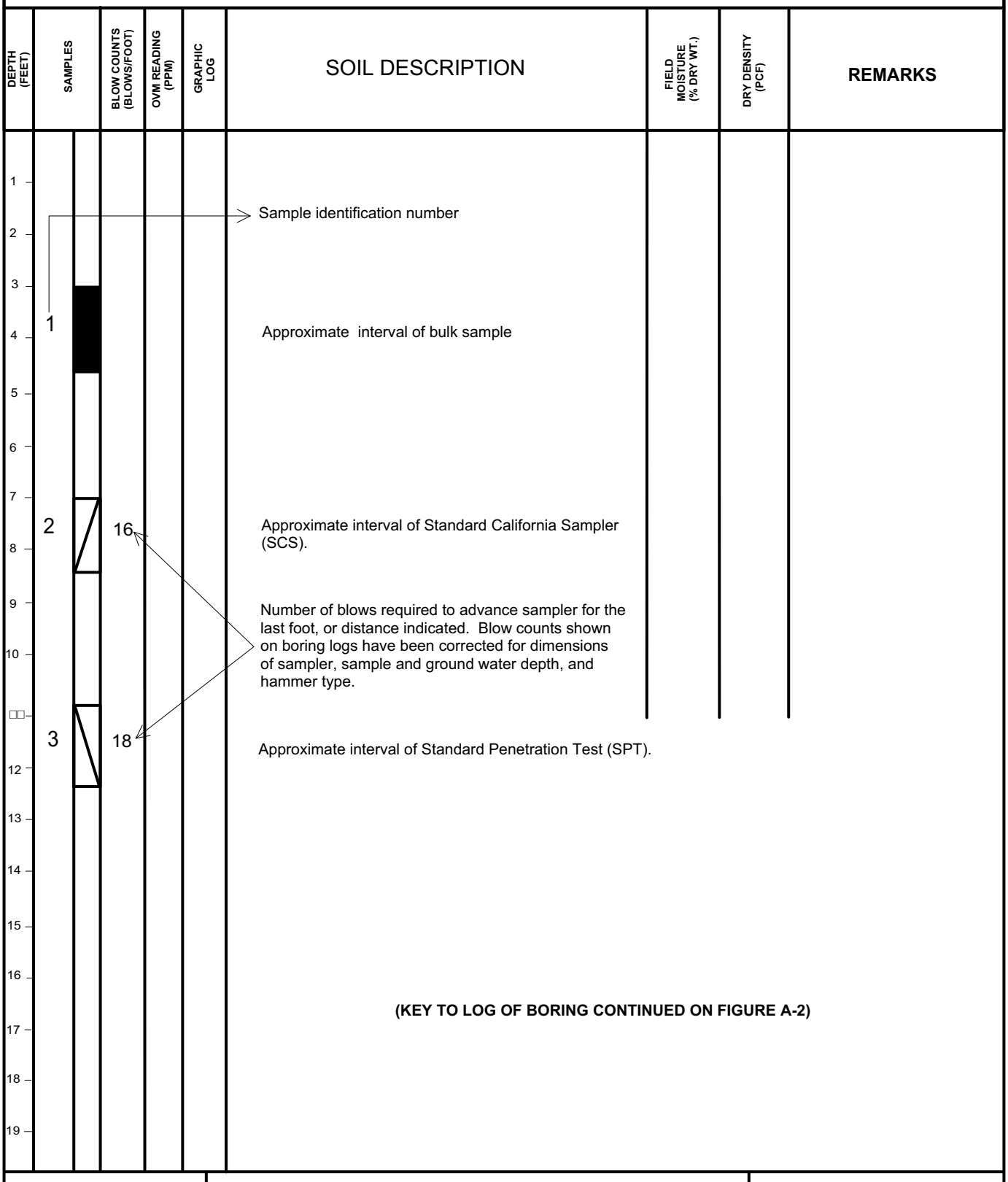
Prior to commencement of the field exploration activities, several site visits were performed to observe existing conditions and to select suitable locations for the borings. Subsequently, Underground Service Alert (USA) was contacted to coordinate clearance of the proposed boring locations with respect to existing buried utilities. Traffic control permits were obtained from the City of San Diego to perform the borings B-1, B4, B-5 and B-6. Borings B-2 and B-3 are located in Mission Bay Park, and were performed at locations that received prior approval from the City of San Diego Park & Recreation Department.

During drilling, Standard Penetration Tests (SPT) were performed at selected depth intervals. The SPT tests involve the use of a specially manufactured "split spoon" sampler which is driven into the soil at the bottom of the borehole by dropping a 140-pound weight from a height of 30 inches. The number of blows required to penetrate each 6-inch increment was counted and recorded on the field logs, and have been used to evaluate the relative density and consistency of the materials. The blow counts were subsequently corrected for sample type, hammer model, groundwater and surcharge. The corrected blow counts are shown on the boring logs.

Relatively undisturbed samples were obtained by driving a 3-inch (OD) diameter standard California sampler with a special cutting tip and inside lining of thin brass rings into the soil at the bottom of the borehole. The sampler is driven a distance of 12 inches into the soil at the bottom of the borehole by dropping a 140-pound weight from a height of 30 inches. A 6-inch long section of soil sample that was retained in the brass rings was extracted from the sampling tube and transported to our laboratory in close-fitting, waterproof containers. The samples were field screened for the presence of volatile organics using a RAE Systems MiniRAE 3000 organic vapor meter (OVM). The OVM readings are indicated on the boring logs.

Following completion of the drilling and sampling activities, the borings were grouted from the bottom of the boring to approximately 12 inches below the ground surface. Borings B-1, B-2, and B-3 are located in lawn or dirt areas, and were capped with excess soil cuttings and lawn cut out. The remainder of the borings are located in paved roadways, and were backfilled with 6 inches of bentonite chips and capped with 6 inches of rapid-set concrete or asphalt patch to match the adjacent pavement surface.

KEY TO LOG OF BORING



(KEY TO LOG OF BORING CONTINUED ON FIGURE A-2)

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-1

KEY TO LOG OF BORING (CONTINUED)

DEPTH (FEET)	SAMPLES	BLOW COUNTS (BLOWS/FOOT)	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE (% DRY WT.)	DRY DENSITY (PCF)	REMARKS
1					—?— —?— APPROXIMATE GEOLOGIC CONTACT			
2					FILL			
3					SAND			
4					CLAY			
5					SILT			
6								
7								
8					▼ Groundwater level at the time of drilling			
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

GENERAL NOTES

1. Approximate elevation and location of borings is based on the 50% Submittal Plans for Construction prepared by Psomas, dated February 2015.
2. Soil descriptions are based on visual classification made during the field exploration and, where deemed appropriate, have been modified based on the results of laboratory tests.
3. Description on the boring logs apply only at the specific boring locations and at the time the borings were performed. They are not warranted to be representative of subsurface conditions at other locations or times.

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-2

BORING NO. B-1

DATE OF DRILLING: APRIL 21, 2015 | TOTAL BORING DEPTH: 19.0 FEET

GENERAL LOCATION: DIRT SHOULDER ON THE WEST CORNER OF TOURMALINE STREET AND LA JOLLA BOULEVARD (SPS 13)

APPROXIMATE SURFACE ELEV.: +80 FEET MSL | DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..

DRILLING METHOD: 8 INCH HSA | LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
1–4					**FILL** Light brown to yellow brown, dry to damp, fine silty sand (SM) with rounded gravel up to 2" in maximum dimension			
5				?	?			?
6–7	1 2	34 49 56/5"	0.3		**OLD PARALIC DEPOSITS** Mottled light brown to yellow brown, damp, dense to very dense fine to medium grained silty to clayey sand (SM-SC)	7.1	124.0	
10–11	3	14 18 14	0.2			6.6		
12–14	4							
15–16	5 6	16 32 39	0.3		Light brown to yellow brown, damp, very dense fine to medium grained silty sand (SM)	2.2	129.7	
18								Large cobbles encountered at the bottom of the borehole

NOTES:

Bottom of borehole at 19 feet

Refusal on large cobbles of the Mount Soledad Formation

No seepage or groundwater observed at time of drilling

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-3

BORING NO. B-2

DATE OF DRILLING: APRIL 22, 2015 | TOTAL BORING DEPTH: 16.5 FEET

GENERAL LOCATION: NORTH SIDE OF MISSION BAY DRIVE (SPS 14)

APPROXIMATE SURFACE ELEV.: +8 FEET MSL | DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..

DRILLING METHOD: 8 INCH HSA | LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
1–4					**FILL** Light gray, damp, fine grained sand with silt (SP-SM) with occasional angular volcanic rock fragments up to 4" in maximum dimension			
5				?	?			?
6–7	1 2	6 6 7			**HYDRAULIC FILL** Dark gray to dark greenish gray, wet, medium dense, fine grained poorly graded sand with silt (SP-SM) ▼			No sample recovery
10–11	3	1 3 3	0.3		Dark gray to dark greenish gray, wet, loose fine grained poorly graded sand (SP) with shell fragments	22.8		
12	4			?	?			?
13–15	5				**BEACH DEPOSIT** Dark gray to dark greenish gray, wet, dense fine grained poorly graded sand (SP) with shell fragments			
16	6	3 15 21	0.1			20.1	110.7	
17								

NOTES:

Bottom of borehole at 16.5 feet

No refusal

Depth to GW estimated at 8 feet based on moisture content of soil cuttings

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-4

BORING NO. B-3

DATE OF DRILLING: APRIL 22, 2015 | TOTAL BORING DEPTH: 16.5 FEET

GENERAL LOCATION: SOUTH SIDE OF MISSION BAY DRIVE (SPS 14)

APPROXIMATE SURFACE ELEV.: +10 FEET MSL | DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..

DRILLING METHOD: 8 INCH HSA | LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
1–2					**FILL** Light to medium brown, damp, fine to medium grained silty sand (SM) with traces of gravel up to 1" in maximum dimension			Upper 6" consist of lawn and top soil
3				?	?			?
4–6	1 2	7 10 9	0.2		**HYDRAULIC FILL** Light gray to greenish gray, damp, fine grained, micaceous, medium dense poorly graded sand with silt (SP-SM) with shell fragments	7.5	90.0	
10–11	3	1 2 4	0.3		▼ Soil becomes dark gray to dark greenish gray, and loose	30.6		
12	4			?	?			?
13–16	5 6	7 18 18	0.2		**BEACH DEPOSITS** Dark gray to greenish gray, damp, fine grained, micaceous, dense poorly graded sand with silt (SP-SM) with shell fragments	20.2	108.3	
17								

NOTES:

Bottom of borehole at 16.5 feet

No refusal

Depth to GW estimated at 10 feet based on moisture content of soil cuttings

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-5

BORING NO. B-4

DATE OF DRILLING: APRIL 21, 2015 | TOTAL BORING DEPTH: 16.5 FEET

GENERAL LOCATION: EAST SIDE OF CARDENO DRIVE (SPS 25A)

APPROXIMATE SURFACE ELEV.: +648 FEET MSL | DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..

DRILLING METHOD: 8 INCH HSA | LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
					Pavement Section: 6" A.C. over 3" misc. base			
1–2					**FILL** Yellow orange, damp, silty sand (SM) with abundant gravels up to 1" in maximum dimension			
2–3				?	?			?
3–5					**ARDATH SHALE** Olive yellow to light olive brown, moist, hard sandy silstone (ML) and claystone (CL)			
5–6	1 2	15 34 44	0.5			20.4	108.6	
6–10								
10–11	3 4	13 25 43	0.7		Olive yellow, moist, very dense silty sand (SM) with localized zones of very hard pale olive sandy siltstone (ML)	17.5		
11–13	5							
13–15								
15–16	6	14 38 50	0.5		Yellow to olive yellow, moist, very dense silty sandstone (SM) and very hard siltstone (ML)	17.4	113.8	
16–17								

NOTES:

Bottom of borehole at 16.5 feet

No refusal

No seepage was observed
at the time of drilling

PROJECT NO. 160 GS-14-C | **ALLIED GEOTECHNICAL ENGINEERS, INC.** | **FIGURE A-6**

BORING NO. B-5

DATE OF DRILLING: APRIL 21, 2015	TOTAL BORING DEPTH: 16.5 FEET
GENERAL LOCATION: VIA TABARA (SPS 25A)	
APPROXIMATE SURFACE ELEV.: +598 FEET MSL	DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..
DRILLING METHOD: 8 INCH HSA	LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
					Pavement Section: 2" A.C. over 4" misc. base			
1					**FILL**			
2				?	Yellow orange, damp, silty sand (SM) with abundant gravels up to 1" in maximum dimension			?
3	1				**ARDATH SHALE**			
4					Pale yellow to olive yellow, moist, very stiff fine sandy siltstone (ML) and claystone (CL)			
5		6						
6	2	12	0.2			22.8	103.1	
7		20						
8	3							
9								
10	4	50/5"	0.2		Light gray with yellowish orange oxide staining, damp, very dense fine grained silty sandstone (SM)	15.1		
11								
12	5							
13								
14								
15					Pale yellow to olive yellow, moist, very hard fine sandy siltstone (ML)			
16	6	17 50/5"	0.1			17.5	111.1	
17								

NOTES:

Bottom of borehole at 16.5 feet

No refusal

No seepage was observed
at the time of drilling

PROJECT NO. 160 GS-14-C	**ALLIED GEOTECHNICAL ENGINEERS, INC.**	**FIGURE A-7**

BORING NO. B-6

DATE OF DRILLING: APRIL 22, 2015	TOTAL BORING DEPTH: 6 FEET
GENERAL LOCATION: ALBORADA DRIVE (SPS 85)	
APPROXIMATE SURFACE ELEV.: +459 FEET MSL	DRILLING CONTRACTOR: TRI-COUNTY DRILLING. INC..
DRILLING METHOD: 8 INCH HSA	LOGGED BY: NICK BARNES

DEPTH (FEET)	SAMPLES	BLOW COUNTS BLOWS/FOOT	OVM READING (PPM)	GRAPHIC LOG	SOIL DESCRIPTION	FIELD MOISTURE % DRY WT.	DRY DENSITY LBS./CU. FT.	REMARKS
					Pavement Section: 4.5" A.C. over 4" misc. base			
1					**FILL** Yellow brown, damp, gravelly silty sand (SM)			
2				?				?
3	1				**MOUNT WOODSON GRANODIORITE** Pale yellow, dry to damp, very dense gravelly silty sand (SM)			
4								
5	2 3 4	50/2" 50/2"	0.1					Sample 2: No Recovery
6					Yellow brown, medium to coarse grained, slight to moderately weathered, granitic rock	2.6		
7								

NOTES:

Bottom of borehole at 6 feet

Refusal on slightly weathered bedrock

No seepage was observed
at the time of drilling

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE A-8

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Selected soil samples were tested in the laboratory to verify visual field classifications and to evaluate certain engineering characteristics. The testing was performed in accordance with the American Society for Testing and Materials (ASTM) or other generally accepted test methods, and included the following:

- Determination of in-place moisture content (ASTM D2216). The final test results are presented on the boring logs;
- Determination of in-place dry density and moisture content (ASTM D2937) based on relatively undisturbed drive samples. The final test results are presented on the boring logs;
- Maximum density and optimum moisture content (ASTM D1557). The final test results are presented on Figures B-1 through B-3;
- Sieve analyses (ASTM D422), and the final test results are plotted as gradation curves on Figure B-4;
- Direct shear test (ASTM D3080). The test results are presented on Figures B-5 through B-7; and
- Expansion index (ASTM D4829). The final test results are presented in Table B-1.

In addition, representative samples of the onsite soil materials were delivered to Clarkson Laboratory and Supply, Inc. for analytical (chemical) testing to determine soil pH and resistivity, soluble sulfate and chloride concentrations, and bicarbonate content. Copies of Clarkson's laboratory test data reports are included herein.

Figure B-1

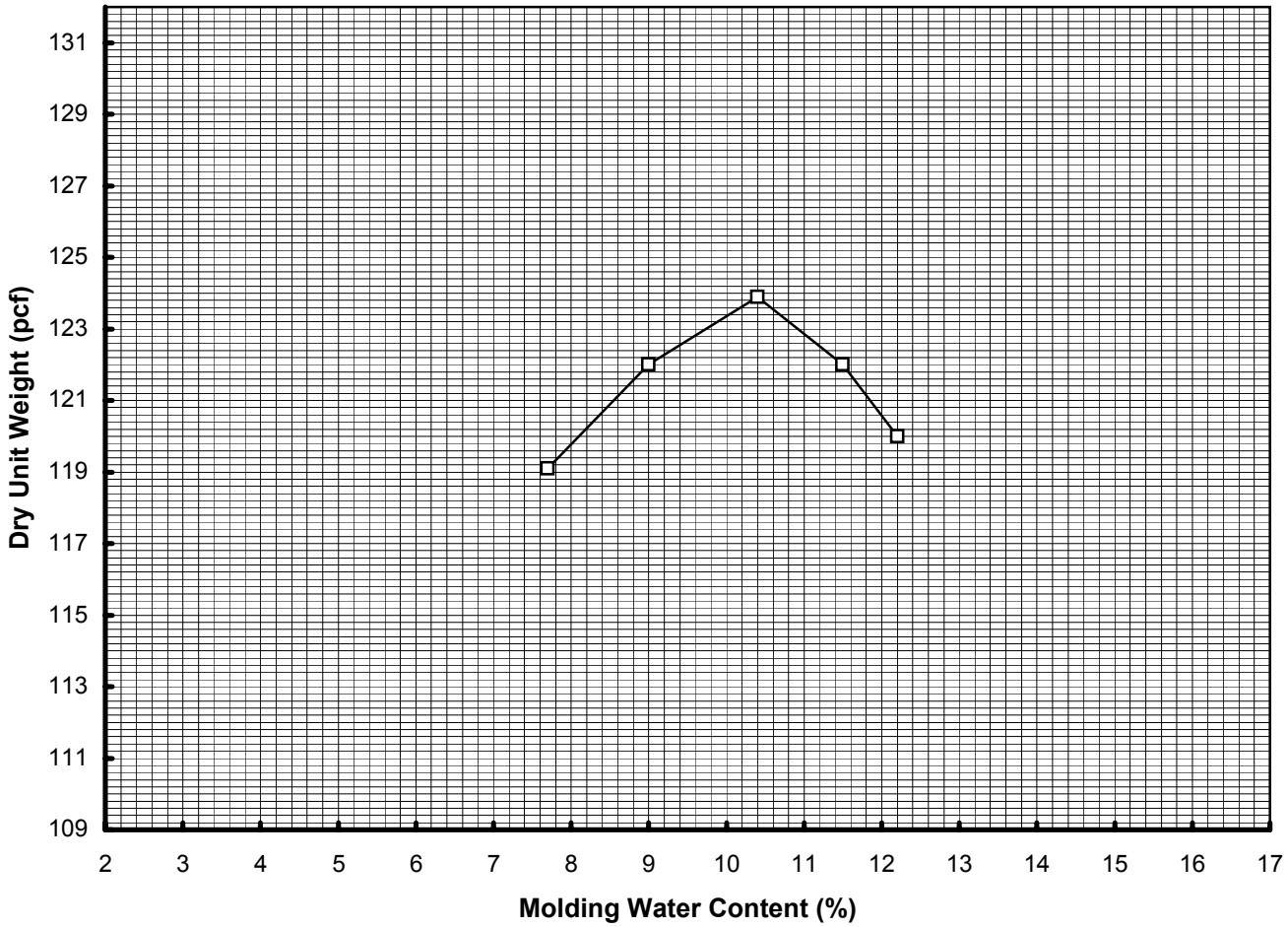
Summary of Expansion Index Test Results

Boring No.	Sample No.	Depth (ft.)	Expansion Index
4	1	5-8	66

COMPACTION CURVE

Test Method: ASTM D 1557

Compaction Procedure: [B] Specimen Preparation Method: [X] Moist or [ ] Dry



BORING NO. BrUCV-A-14-0[illegible] 5

Boring No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
B-1	2	5-8	10.4	123.9			Yellowish brown, silty fine sand (SM)

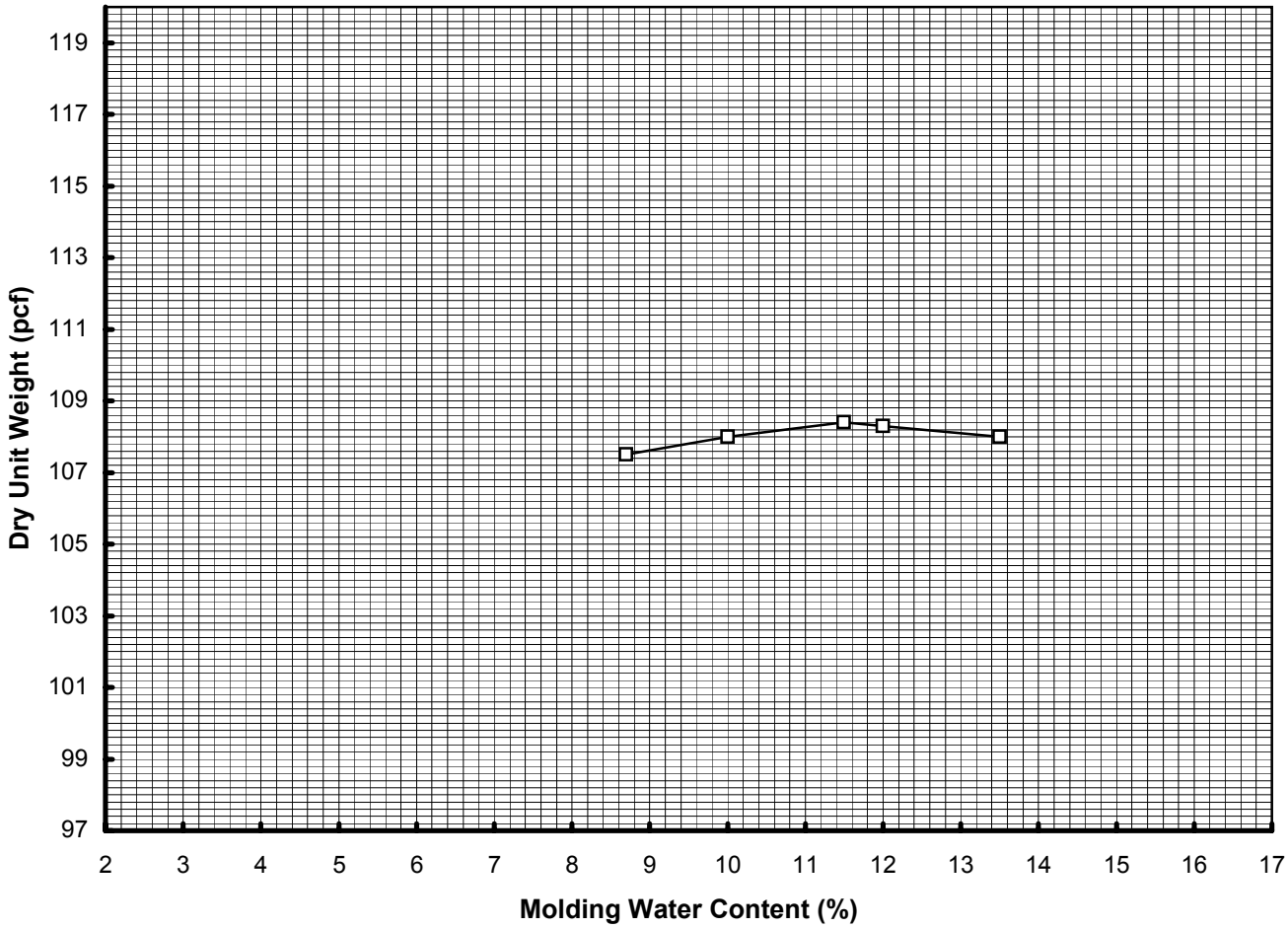
SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS
SAN DIEGO, CALIFORNIA

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE B-1

COMPACTION CURVE

Test Method: ASTM D 1557

Compaction Procedure: [B] Specimen Preparation Method: [X] Moist or [ ] Dry



BORING NO. BrUCV-A-14-0[illegible] 5

Boring No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
B-2	1	5-8	11.5	108.4			Light gray, silty fine to medium sand (SM)

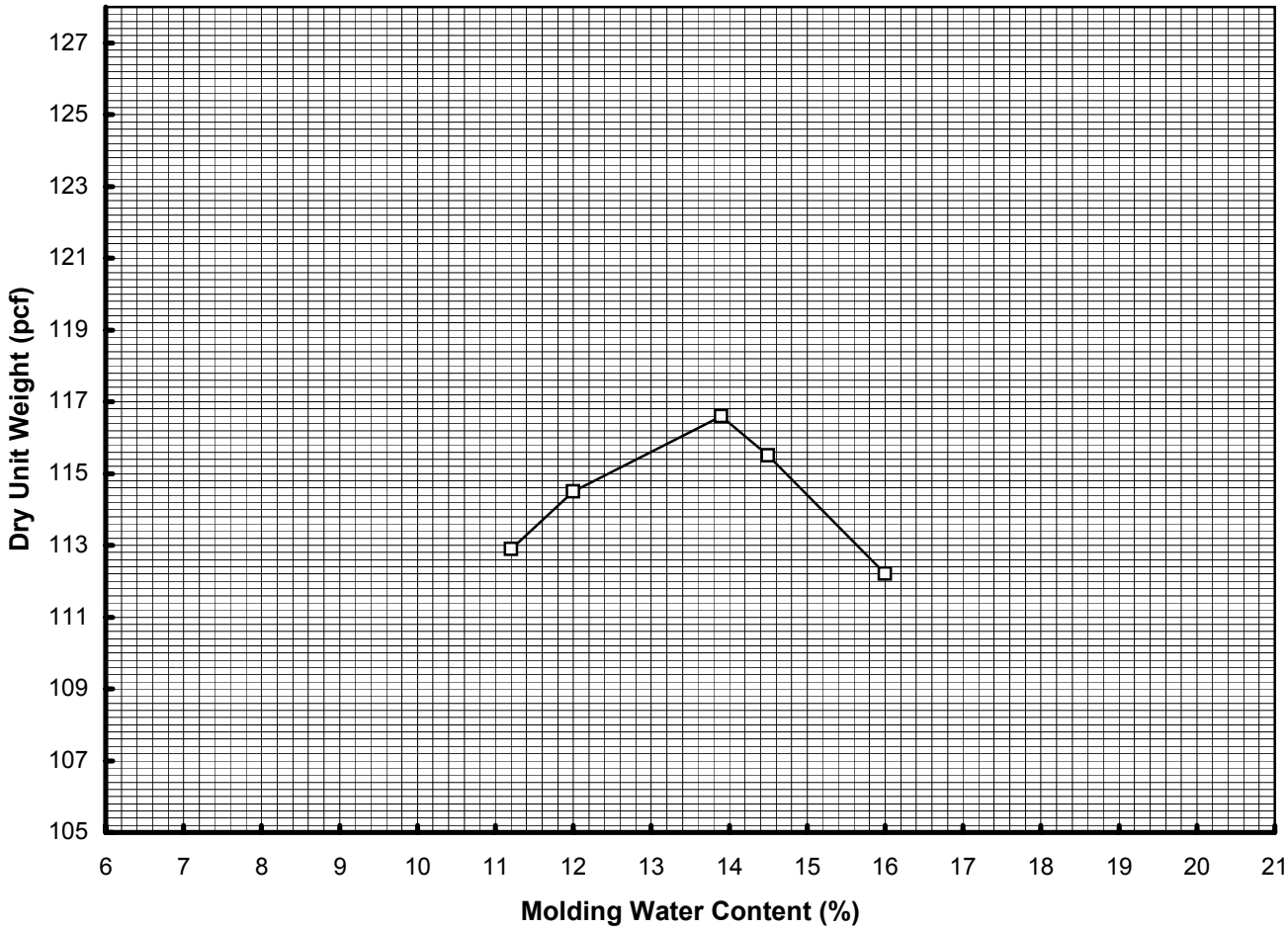
SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS
SAN DIEGO, CALIFORNIA

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE B-2

COMPACTION CURVE

Test Method: ASTM D 1557

Compaction Procedure: [B] Specimen Preparation Method: [X] Moist or [ ] Dry



BORING NO. BrUCV-A-14-0[illegible] 5

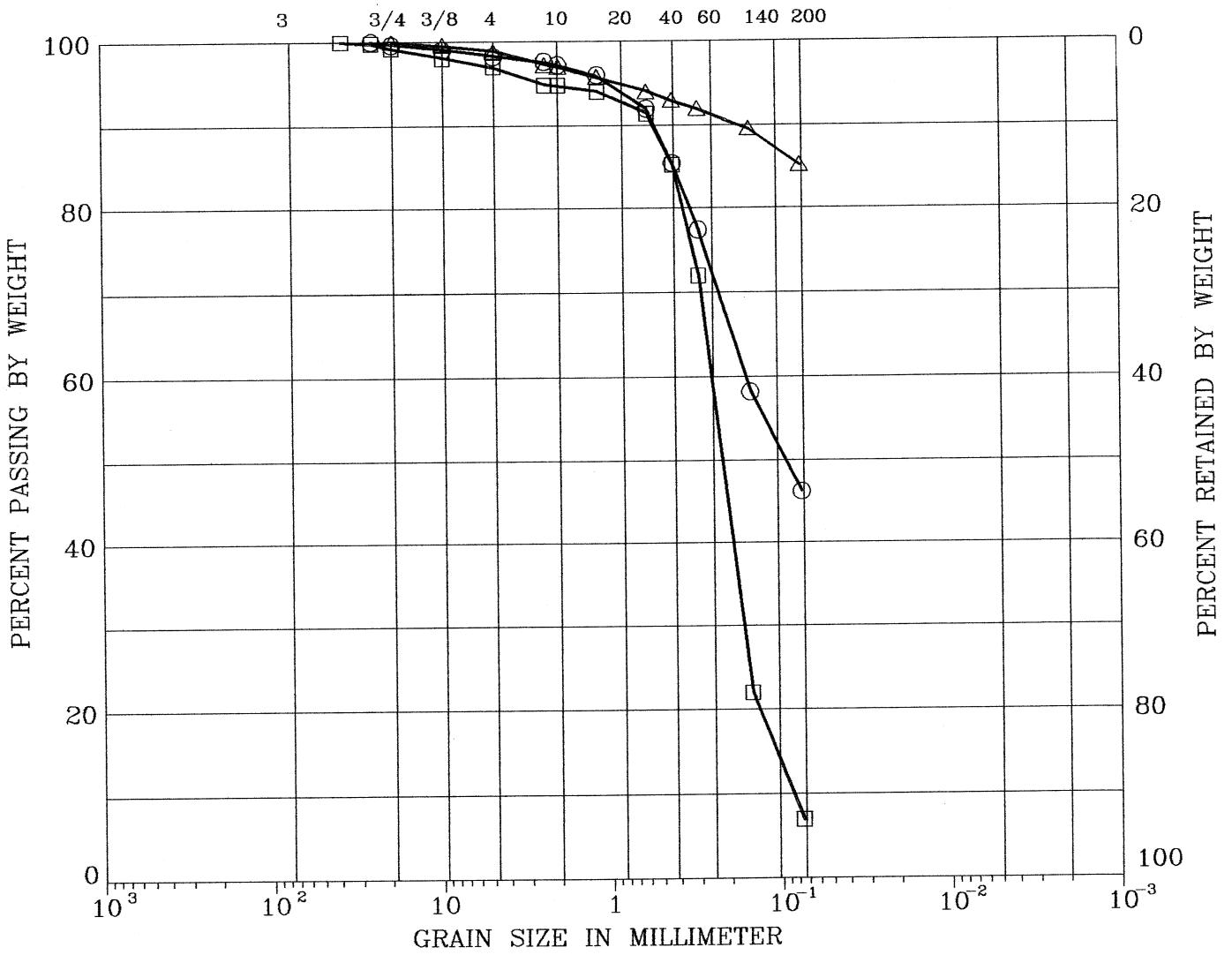
Boring No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
B-4	1	5-8	13.9	116.6			Brownish yellow silt (ML)

SPS 13, 14, 16, 25A & 85 DUAL FORCEMAINS
SAN DIEGO, CALIFORNIA

PROJECT NO. 160 GS-14-C	ALLIED GEOTECHNICAL ENGINEERS, INC.	FIGURE B-3

UNIFIED SOIL CLASSIFICATION

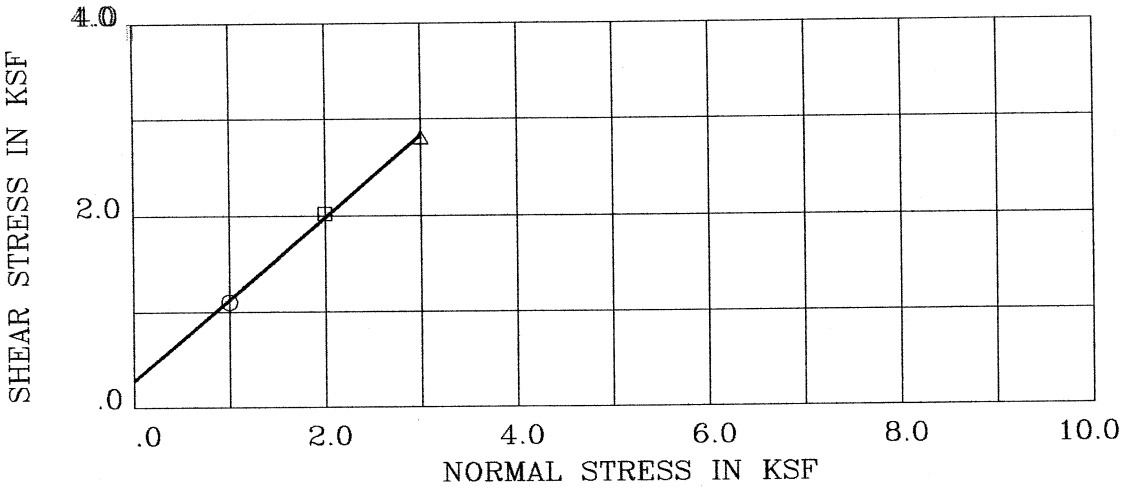
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN INCHES			U.S. STANDARD SIEVE No.			HYDROMETER

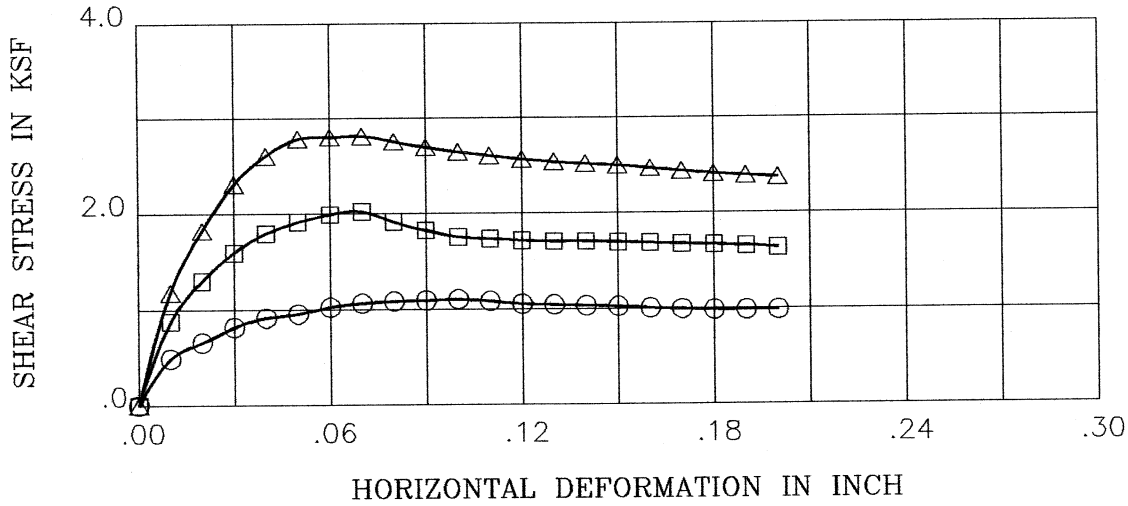


SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B1–2	5–8			SILTY SAND (SM)
□	B2–1	5–8			POORLY GRADED SAND (SP)
△	B4–1	5–8			SILTS (ML–MH)

Remark :

Project 160 GS–14C	SPS 13, 14, 16, 25A AND 85 DUAL FORCEMAINS
ALLIED GEOTECHNICAL ENGINEERS, INC.	GRAIN SIZE DISTRIBUTION Figure B–4





BORING/SAMPLE : B1-1 DEPTH (ft) : 6-6.5

DESCRIPTION :

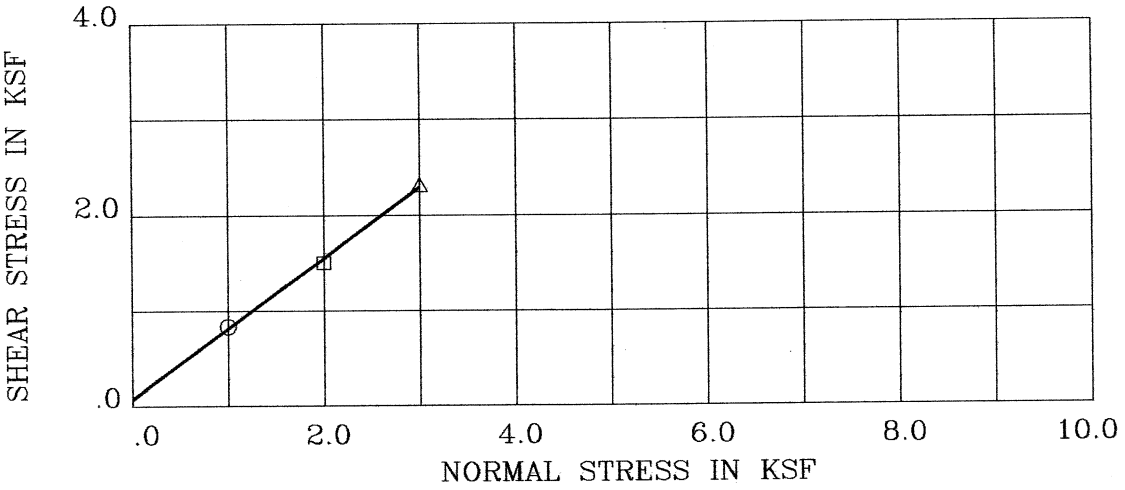
STRENGTH INTERCEPT (C) : .273 KSF (PEAK STRENGTH)

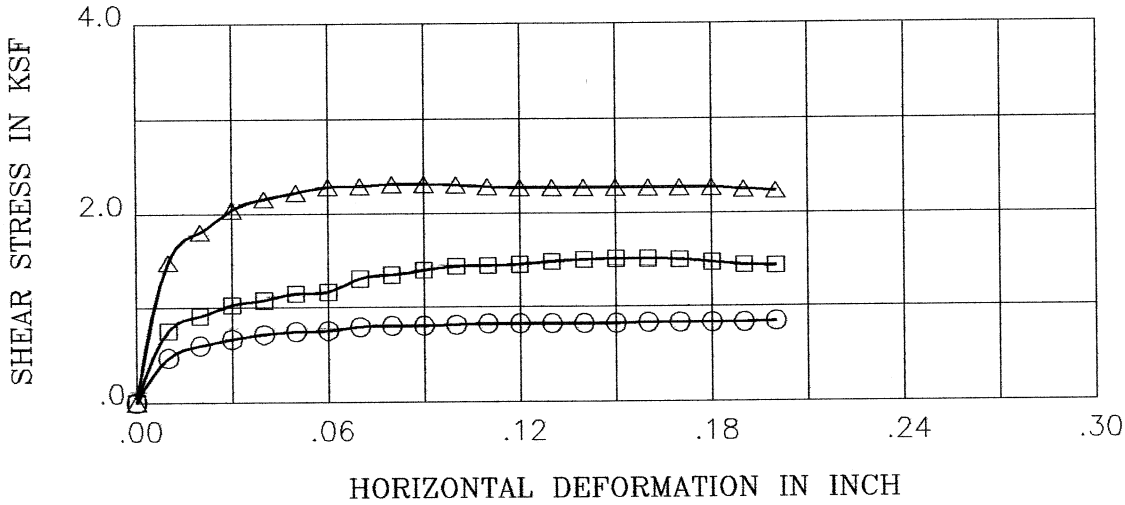
FRICTION ANGLE (PHI) : 40.5 DEG

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	9.4	116.3	.448	1.00	1.10	.98
□	8.9	121.2	.390	2.00	2.03	1.64
△	-5.4	142.7	.181	3.00	2.81	2.37

Remark :

Project 160 GS-14C	SPS 13, 14, 16, 25A AND 85 DUAL FORCEMAINS
ALLIED GEOTECHNICAL ENGINEERS, INC.	DIRECT SHEAR TEST Figure B-5





BORING/SAMPLE : B3-2 DEPTH (ft) : 6-6.5

DESCRIPTION :

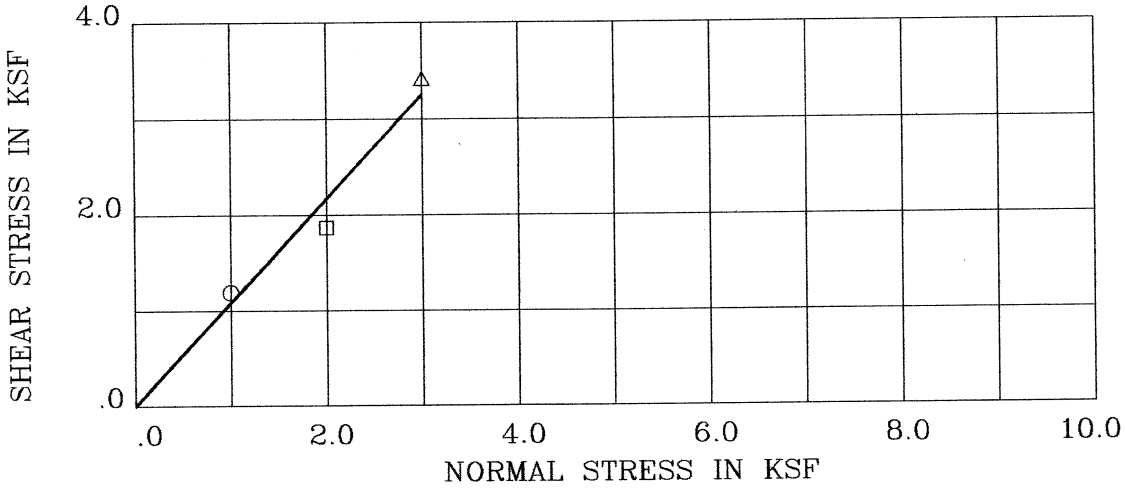
STRENGTH INTERCEPT (C) : .074 KSF (PEAK STRENGTH)

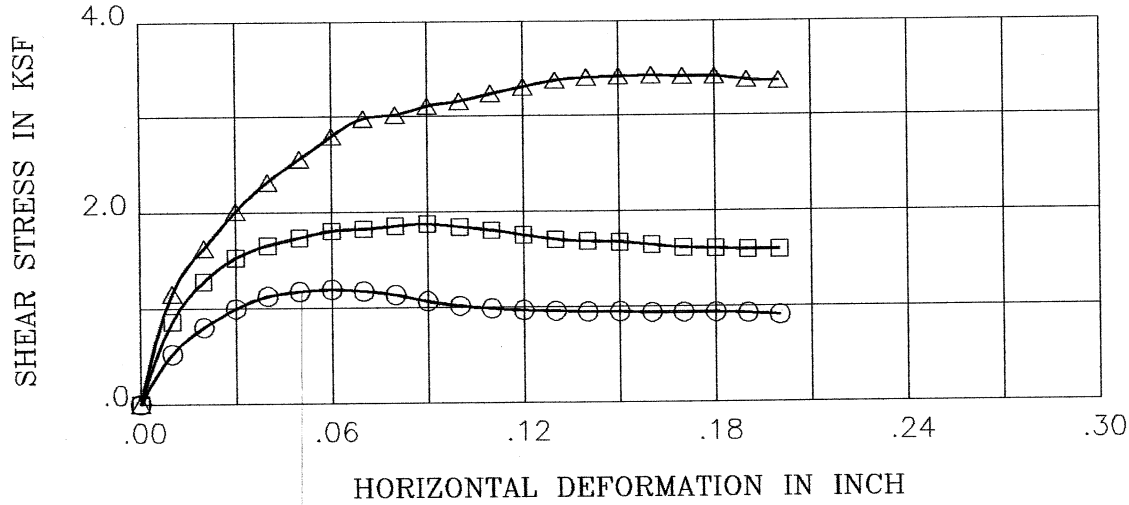
FRICTION ANGLE (PHI) : 36.5 DEG

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	12.1	83.4	1.020	1.00	.84	.84
□	12.6	83.6	1.016	2.00	1.51	1.43
△	16.5	78.6	1.144	3.00	2.32	2.24

Remark :

Project 160 GS-14C	SPS 13, 14, 16, 25A AND 85 DUAL FORCEMAINS
ALLIED GEOTECHNICAL ENGINEERS, INC.	DIRECT SHEAR TEST Figure B-6





BORING/SAMPLE : B5-2 DEPTH (ft) : 6-6.5

DESCRIPTION :

STRENGTH INTERCEPT (C) : .000 KSF (PEAK STRENGTH)

FRICTION ANGLE (PHI) : 47.3 DEG

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	22.7	99.1	.699	1.00	1.19	.91
□	23.0	100.5	.676	2.00	1.87	1.60
△	23.9	99.6	.692	3.00	3.42	3.36

Remark :

Project 160 GS-14C	SPS 13, 14, 16, 25A AND 85 DUAL FORCEMAINS
ALLIED GEOTECHNICAL ENGINEERS, INC.	DIRECT SHEAR TEST Figure B-7

LABORATORY REPORT

Telephone (619) 425-1993 Fax 425-7917 Established 1928

CLARKSON LABORATORY AND SUPPLY INC.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
ANALYTICAL AND CONSULTING CHEMISTS

Date: May 4, 2015
Purchase Order Number: PROJECT#160 GS-14-C
Sales Order Number: 26802
Account Number: ALLG

To:

Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO5661-1 Customers Phone: 449-5900
Fax: 449-5902
Sample Designation:

One soil sample received on 04/28/15 at 9:10am,
taken on 04/28/15 taken from Sewer Pump Station
13,14,16,25A and 85 Project# 160 GS-14-C
marked as B1-2 @ 5'-8'

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 7.3

Water Added (ml)	Resistivity (ohm-cm)
10	1800
5	1100
5	660
5	650
5	610
5	590
5	610
5	630

25 years to perforation for a 16 gauge metal culvert.
32 years to perforation for a 14 gauge metal culvert.
44 years to perforation for a 12 gauge metal culvert.
57 years to perforation for a 10 gauge metal culvert.
69 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate Calif. Test 417	0.021% (210ppm)
Water Soluble Chloride Calif. Test 422	0.049% (490ppm)
Bicarbonate (HCO_3)	250ppm

Laura Torres
LT/ilv

L A B O R A T O R Y R E P O R T

Telephone (619) 425-1993 Fax 425-7917 Established 1928

C L A R K S O N L A B O R A T O R Y A N D S U P P L Y I N C.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L A N D C O N S U L T I N G C H E M I S T S

Date: May 4, 2015
Purchase Order Number: PROJECT#160 GS-14-C
Sales Order Number: 26802
Account Number: ALLG

To:

Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO5661-2 Customers Phone: 449-5900
Fax: 449-5902
Sample Designation:

One soil sample received on 04/28/15 at 9:10am,
taken on 04/28/15 taken from Sewer Pump Station
13,14,16,25A and 85 Project# 160 GS-14-C
marked as B3-1 @ 3'-6'

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 8.6

Water Added (ml)	Resistivity (ohm-cm)
10	6000
5	4300
5	3300
5	2800
5	2200
5	2100
5	2000
5	2200
5	2400

41 years to perforation for a 16 gauge metal culvert.
53 years to perforation for a 14 gauge metal culvert.
73 years to perforation for a 12 gauge metal culvert.
93 years to perforation for a 10 gauge metal culvert.
114 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate Calif. Test 417 0.014% (140ppm)

Water Soluble Chloride Calif. Test 422 0.010% (96ppm)

Bicarbonate (HCO_3) 92ppm

Laura Torres
LT/ilv

L A B O R A T O R Y R E P O R T

Telephone (619) 425-1993 Fax 425-7917 Established 1928

C L A R K S O N L A B O R A T O R Y A N D S U P P L Y I N C.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L A N D C O N S U L T I N G C H E M I S T S

Date: May 4, 2015
Purchase Order Number: PROJECT#160 GS-14-C
Sales Order Number: 26802
Account Number: ALLG

To:

Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO5661-3 Customers Phone: 449-5900
Fax: 449-5902
Sample Designation:

One soil sample received on 04/28/15 at 9:10am,
taken on 04/28/15 taken from Sewer Pump Station
13,14,16,25A and 85 Project# 160 GS-14-C
marked as B5-1 @ 2'-5'

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 9.4

Water Added (ml)	Resistivity (ohm-cm)
10	1800
5	1200
5	990
5	960
5	980
5	990

30 years to perforation for a 16 gauge metal culvert.
39 years to perforation for a 14 gauge metal culvert.
54 years to perforation for a 12 gauge metal culvert.
69 years to perforation for a 10 gauge metal culvert.
84 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate Calif. Test 417 0.009% (86ppm)

Water Soluble Chloride Calif. Test 422 0.005% (53ppm)

Bicarbonate (HCO_3) 120ppm

Laura Torres
LT/ilv

L A B O R A T O R Y R E P O R T

Telephone (619) 425-1993 Fax 425-7917 Established 1928

C L A R K S O N L A B O R A T O R Y A N D S U P P L Y I N C.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L A N D C O N S U L T I N G C H E M I S T S

Date: May 4, 2015
Purchase Order Number: PROJECT#160 GS-14-C
Sales Order Number: 26802
Account Number: ALLG

To:

Allied Geotechnical Engineers
1810 Gillespie Way Ste 104
El Cajon, CA 92020
Attention: Sani Sutanto

Laboratory Number: SO5661-4 Customers Phone: 449-5900
Fax: 449-5902
Sample Designation:

One soil sample received on 04/28/15 at 9:10am,
taken on 04/28/15 taken from Sewer Pump Station
13,14,16,25A and 85 Project# 160 GS-14-C
marked as B6-1 @ 2'-4'

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 8.5

Water Added (ml)	Resistivity (ohm-cm)
10	18000
5	15000
5	8000
5	5300
5	5200
5	4900
5	5200
5	5800

59 years to perforation for a 16 gauge metal culvert.
76 years to perforation for a 14 gauge metal culvert.
106 years to perforation for a 12 gauge metal culvert.
135 years to perforation for a 10 gauge metal culvert.
164 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate Calif. Test 417 0.003% (28ppm)

Water Soluble Chloride Calif. Test 422 0.005% (53ppm)

Bicarbonate (HCO_3) 40ppm

Laura Torres
LT/ilv

ATTACHMENT F

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ATTACHMENT G

CONTRACT AGREEMENT

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and **Orion Construction Corporation**, herein called "Contractor" for construction of **Sewer Pump Stations 13, 14, 16, 25A, & 85 Dual Force Mains & SPS 76 Generator**; Bid No. **K-18-1433-DBB-3**; in the amount of **Three Million Three Hundred Seventy Four Thousand Dollars and Zero Cents ($3,374,000.00)**, which is comprised of the Base Bid.

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

1. The following are incorporated into this contract as though fully set forth herein:

   (a) The attached Faithful Performance and Payment Bonds.

   (b) The attached Proposal included in the Bid documents by the Contractor.

   (c) Reference Standards listed in the Instruction to Bidders and the Supplementary Special Provisions (SSP).

   (d) That certain documents entitled **Sewer Pump Stations 13, 14, 16, 25A, & 85 Dual Force Mains & SPS 76 Generator**, on file in the office of the Public Works Department as Document No. **B-00501, B-14168**, as well as all matters referenced therein.

2. The Contractor shall perform and be bound by all the terms and conditions of this contract and in strict conformity therewith shall perform and complete in a good and workmanlike manner **Sewer Pump Stations 13, 14, 16, 25A, & 85 Dual Force Mains & SPS 76 Generator**, Bid Number **K-18-1433-DBB-3,** San Diego, California.

3. For such performances, the City shall pay to Contractor the amounts set forth at the times and in the manner and with such additions or deductions as are provided for in this contract, and the Contractor shall accept such payment in full satisfaction of all claims incident to such performances.

4. No claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.

5. This contract is effective as of the date that the Mayor or designee signs the agreement.

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

THE CITY OF SAN DIEGO

By Stephen Samara

Print Name: Stephen Samara
Principal Contract Specialist
Public Works Department

Date: 2/16/2018

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By Pedro De Lava, Jr.

Print Name: Pedro De Lava, Jr.
Deputy City Attorney

Date: 2/27/18

CONTRACTOR

By R Downing

Print Name: Richard Downing

Title: President

Date: Oct. 25th 2017

City of San Diego License No.: B19920029 70

State Contractor's License No.: 549309

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000010760

CERTIFICATIONS AND FORMS

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

Bidder's General Information

To the City of San Diego:

Pursuant to "Notice Inviting Bids", specifications, and requirements on file with the City Clerk, and subject to all provisions of the Charter and Ordinances of the City of San Diego and applicable laws and regulations of the United States and the State of California, the undersigned hereby proposes to furnish to the City of San Diego, complete at the prices stated herein, the items or services hereinafter mentioned. The undersigned further warrants that this bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

The undersigned bidder(s) further warrants that bidder(s) has thoroughly examined and understands the entire Contract Documents (plans and specifications) and the Bidding Documents therefore, and that by submitting said Bidding Documents as its bid proposal, bidder(s) acknowledges and is bound by the entire Contract Documents, including any addenda issued thereto, as such Contract Documents incorporated by reference in the Bidding Documents.

NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID UNDER 23 UNITED STATES CODE 112 AND PUBLIC CONTRACT CODE 7106

State of California

County of San Diego

The bidder, being first duly sworn, deposes and says that he or she is authorized by the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-17 regarding Drug-Free Workplace as outlined in the WHITEBOOK, Section 7-13.3, "Drug-Free Workplace", of the project specifications, and that;

This company has in place a drug-free workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of subdivisions a) through c) of the policy as outlined.

CONTRACTOR CERTIFICATION

AMERICAN WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-4 regarding the American With Disabilities Act (ADA) outlined in the WHITEBOOK, Section 7-13.2, "American With Disabilities Act", of the project specifications, and that:

This company has in place workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of the policy as outlined.

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

I declare under penalty of perjury that I am authorized to make this certification on behalf of the company submitting this bid/proposal, that as Contractor, I am familiar with the requirements of City of San Diego Municipal Code § 22.3004 regarding Contractor Standards as outlined in the WHITEBOOK, Section 7-13.4, ("Contractor Standards"), of the project specifications, and that Contractor has complied with those requirements.

I further certify that each of the Contractor's subcontractors whose subcontracts are greater than $50,000 in value has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

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.

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:

_____

(Name of Project or Task)

as particularly described in said contract and identified as Bid No. **K-18-1433-DBB-3**; SAP No. (WBS/IO/CC) **B-00501, B-14168**; 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

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

A. **BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**

B. **CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS**

Bids will not be accepted until ALL forms are submitted as part of the bid submittal

BID BOND

See Instructions to Bidders, Bidder Guarantee of Good Faith (Bid Security)

KNOW ALL MEN BY THESE PRESENTS,

That Orion Construction Corporation as Principal, and

Western Surety 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

Sewer Pump Stations 13, 14, 16, 25A & 85 Dual Force Mains & SPS 76 Generator

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 7th day of August, 2017

Orion Construction Corporation (SEAL)

(Principal)

By: _____
Richard Dowsing, President
(Signature)

Western Surety Company (SEAL)

(Surety)

By: _____
Maria Guise, Attorney-in-Fact
(Signature)

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT CIVIL CODE § 1189

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

State of California)
County of Orange)

On AUG 0 7 2017 before me, Rhonda C. Abel, Notary Public
Date *Here Insert Name and Title of the Officer*

personally appeared Maria Guise
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/~~xxx~~ subscribed to the within instrument and acknowledged to me that ~~xx~~/she/~~xxxx~~ executed the same in ~~xxx~~/her/~~xxxx~~ authorized capacity(~~xxx~~), and that by ~~xx~~/her/~~xxxx~~ 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.

RHONDA C. ABEL
COMM. # 2051838
NOTARY PUBLIC - CALIFORNIA
ORANGE COUNTY
COMM. EXPIRES DEC. 14, 2017

Signature _____
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is 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 x 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: _____

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Michael D Parizino, Rhonda C Abel, James A Schaller, Jeri Apodaca, Maria Guise, Rachelle Rheault, Kim Luu, Individually

of Newport Beach, CA, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 7th day of January, 2016.

WESTERN SURETY COMPANY

Paul T. Bruflat, Vice President

State of South Dakota
County of Minnehaha } ss

On this 7th day of January, 2016, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires
June 23, 2021

J. MOHR
NOTARY PUBLIC
SOUTH DAKOTA

J. Mohr, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this _____ day of AUG 0 7 2017

WESTERN SURETY COMPANY

L. Nelson, Assistant Secretary

Form F4280-7-2012

Authorizing By-Law

ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.

CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS

As part of its bid or proposal (Non-Price Proposal in the case of Design-Build contracts), the Bidder shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against the Bidder in a legal or administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.

CHECK ONE BOX ONLY.

☑ The undersigned certifies that within the past 10 years the Bidder has NOT been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers.

☐ The undersigned certifies that within the past 10 years the Bidder has been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers. A description of the status or resolution of that complaint, including any remedial action taken and the applicable dates is as follows:

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN

Contractor Name: ORION CONSTRUCTION CORPORATION

Certified By RICHARD DOWSING Title PRESIDENT

Name

Signature Date 03/22/2017

USE ADDITIONAL FORMS AS NECESSARY

City of San Diego

CITY CONTACT: Rosa Riego, **Contract Specialist**, **Email:** RRiego@sandiego.gov
Phone No. (619) 533-3426, **Fax No**. (619) 533-3633

ADDENDUM B

e - Bidding **FOR**

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

BID NO.: **K-18-1433-DBB-3**
SAP NO. (WBS/IO/CC).: **B-00501, B-14168**
CLIENT DEPARTMENT: **2000**
COUNCIL DISTRICT: **1, 2, 5**
PROJECT TYPE: **BP**

BID DUE DATE:

2:00 PM
AUGUST 22, 2017
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

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

Sandra Russell — 8/4/17

1) Registered Engineer — Date — Seal:

Debbie Van Martin — 8/07/17

2) For City Engineer — Date — Seal:

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER's QUESTIONS

Q1. If HDPE meets the same pressure ratings, as the required C900 in some section, can HDPE be used?

A1. Any changes in the Plans and Specifications would need to follow Section 3 of the 2015 Greenbook and 2015 Whitebook.

Q2. HDD is already listed as an approved instillation method, can HDD be used in other sections.

A2. Any changes in the Plans and Specifications would need to follow Section 3 of the 2015 Greenbook and 2015 Whitebook.

Q3. Note No. 4 on sheet C-7 calls for the existing irrigation controller to be relocated outside the existing fence. The controller is already outside the fence as shown on the drawing. Please clarify this note.

A3. The existing irrigation controller is currently inside the fence. It is to be relocated and reinstalled outside the fence to the location shown on the plans per the installation requirements in note 4.

Q4. Can you please forward the plans or re-upload the plans to planet bids. We are able to download and view them but it appear there is an issue with the files that do not allow you to print them.

A4. Please see Section C. - Plans as part of this Addendum.

Q5. Page C-3 call for DR-11 HDPE pipe, section 02620 call for DR11. The plans or the specifications do not specify if IPS or DIPS O.D. pipe is required. 10" IPS is 8.679" I.D., 10" DIPS is 8.96" I.D., 12" DR-11 IPS is 10.20" I.D. Please clarify if IPS or DIPS and size to be installed.

A5. For SPS 14 use 10" HDPE DR11 DIPS. For SPS 25A use 4" HDPE DR11 DIPS.

C. PLANS

1. To drawings numbered 38545-01-D through 38545-49-D, **DELETE** in their entirety and **REPLACE** with pages 05 through 53 of this addendum.

2. To drawings numbered 38545-01-D through 38545-49-D **ADD** 38545-50-D, with page 54 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *August 8, 2017*
San Diego, California

JN / RWB / cc

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

CONTRACTOR'S RESPONSIBILITIES

1. PURSUANT TO SECTION 4216 OF THE CALIFORNIA GOVERNMENT CODE, AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION, YOU MUST CONTACT THE REGIONAL NOTIFICATION CENTER (E.G., UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA) AND OBTAIN AN INQUIRY IDENTIFICATION NUMBER.
2. NOTIFY SDG&E AT LEAST 10 WORKING DAYS PRIOR TO EXCAVATING WITHIN 10' OF SDG&E UNDERGROUND HIGH VOLTAGE TRANSMISSION POWER LINES. (I.E., 69 KV & HIGHER)
3. LOCATE AND RECONNECT ALL SEWER LATERALS. LOCATIONS AS SHOWN ON THE PLANS ARE APPROXIMATE ONLY. LATERAL RECORDS ARE AVAILABLE TO THE CONTRACTOR AT THE WATER DEPARTMENT, 2797 CAMINITO CHOLLAS. LOCATE THE IMPROVEMENTS THAT WILL BE AFFECTED BY LATERAL REPLACEMENTS.
4. EXCAVATE AROUND WATER METER BOX (CITY PROPERTY SIDE) TO DETERMINE IN ADVANCE. THE SIZE OF EACH SERVICE BEFORE TAPPING MAIN.
5. CITY FORCES, WHEN SPECIFIED OR SHOWN ON THE PLANS, WILL MAKE PERMANENT CUTS & PLUGS AND CONNECTIONS.
6. KEEP EXISTING MAINS IN SERVICE IN LIEU OF HIGH-LINING, UNLESS OTHERWISE SPECIFIED SHOWN ON PLANS.
7. THE LOCATIONS OF EXISTING BUILDINGS AS SHOWN ON THE PLAN ARE APPROXIMATE.
8. STORM DRAIN INLETS SHALL REMAIN FUNCTIONAL AT ALL TIMES DURING CONSTRUCTION.
9. 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 ALL EXISTING UTILITIES EITHER SHOWN ON THE PLANS OR MARKED IN THE FIELD IN ACCORDANCE WITH THE SPECIFICATIONS SECTION 5-UTILITIES.
10. 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.
11. ALL ADVANCE METERING INFRASTRUCTURE (AMI) 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.
12. NO CONSTRUCTION ACTIVITIES ARE ALLOWED WITHIN MISSION BAY PARK (SPS 14 AND SPS 16) BETWEEN THE FRIDAY BEFORE MEMORIAL DAY AND LABOR DAY, INCLUSIVE.
13. ALL STAINLESS STEEL MATERIALS SHALL BE TYPE 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
14. REPAIR LININGS OF EXISTING PIPING AT POINTS OF CONNECTION.
15. GRAVITY PIPE SLOPE SHOWN ON PLANS IS FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.

CONSTRUCTION STORM WATER PROTECTION NOTES

	1. TOTAL SITE DISTURBANCE AREA (ACRES)	HYDROLOGIC UNIT/WATERSHED	HYDROLOGIC SUBAREA NAME/NO.
	SPS 13 0.30 AC	SPS 13 PENASQUITOS	SPS 13 SCRIPPS/906.30
A	SPS 14 0.25 AC	SPS 14 PENASQUITOS	SPS 14 SCRIPPS/906.30
	SPS 16 0.01 AC	SPS 16 PENASQUITOS	SPS 16 SCRIPPS/906.30
	SPS 25A 0.13 AC	SPS 25A PENASQUITOS	SPS 25A SCRIPPS/906.30
A	SPS 85 0.06 AC	SPS 85 SAN DIEGUITO	SPS 85 DEL DIOS/905.21
	SPS 76 N/A	SPS 76 SAN DIEGUITO	SPS 76 DEL DIOS/905.21 (A)

2. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE

☒ WPCP

THE PROJECT SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100

☐ SWPPP

THE PROJECT IS SUBJECT TO MUNICIPAL STORM WATER PERMIT NO. R9-2013-0001 AS AMENDED BY R9-2015-0001 AND R9-2015-0100 AND CONSTRUCTION GENERAL PERMIT ORDER 2009-0009-DWQ AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ
TRADITIONAL: RISK LEVEL ☐ 1 ☐ 2 ☐ 3
LUP: RISK TYPE ☐ 1 ☐ 2 ☐ 3

3. CONSTRUCTION SITE PRIORITY

☐ ASBS ☐ HIGH ☐ MEDIUM ☒ LOW

MONUMENTATION/SURVEY NOTES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LICENSED LAND SURVEYOR OR LICENSED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING IN THE STATE OF CALIFORNIA SHALL FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR ANY EARTHWORK, DEMOLITION OR SURFACE IMPROVEMENTS. IF DESTROYED, A LICENSED LAND SURVEYOR SHALL REPLACE SUCH MONUMENT(S) WITH APPROPRIATE MONUMENTS. WHEN SETTING SURVEY MONUMENTS USED FOR RE-ESTABLISHMENT OF THE DISTURBED CONTROLLING SURVEY MONUMENTS AS REQUIRED BY SECTIONS 6730.2 AND 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILLED WITH THE COUNTY SURVEYOR. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION SHALL BE NOTIFIED IN WRITING AT LEAST 7 DAYS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.

ABBREVIATIONS

ABAND	ABANDON	FH	FIRE HYDRANT
ABAND'D	ABANDONED	FS	FINISHED SURFACE
AC	ASBESTOS CEMENT (PIPE)	GV	GATE VALVE
		HDPE	HIGH DENSITY POLYETHYLENE
AHD	AHEAD	HP	HIGH PRESSURE
AWTP	ALVARADO WATER TREATMENT PLANT	IE	INVERT ELEVATION
		IRR	IRRIGATION
ASSY	ASSEMBLY	LT	LEFT
AV	AIR VALVE	MJ	MECHANICAL JOINT
BFV	BUTTERFLY VALVE	MTD	MULTIPLE TELEPHONE DUCT
BK	BACK	N/O	NORTH OF
BO	BLOWOFF	OVHD	OVERHEAD
BTWN	BETWEEN	PVC	POLYVINYL CHLORIDE (PIPE)
CATV	CABLE TV	PROP	PROPOSED
℄	CENTER LINE	RCB	REINFORCED CONCRETE BOX
CI	CAST IRON	RCP	REINFORCED CONCRETE PIPE
CICL	CAST IRON CEMENT LINED	RED	REDUCER
		RT	RIGHT
CML&C	CEMENT LINED & COATED STEEL PIPE	℄	SURVEY LINE
		SD	STORM DRAIN
CML&TC	CEMENT LINED & TAPE COATED STEEL PIPE	SO	STUB OUT
		S/O	SOUTH OF
COND	CONDUIT	STL	STEEL
CONT	CONTINUED	SWR	SEWER
CONTR	CONTRACTOR	TEL	TELEPHONE
DB	DIRECT BURIED	UNK	UNKNOWN
EB	ENCASED BURIED	VC	VITRIFIED CLAY (PIPE)
EL, ELEV	ELEVATION	WM	WATER METER
ELEC	ELECTRIC	WTR	WATER
EX, EXIST	EXISTING	W/O	WEST OF
E/O	EAST OF		
F	FLANGE		

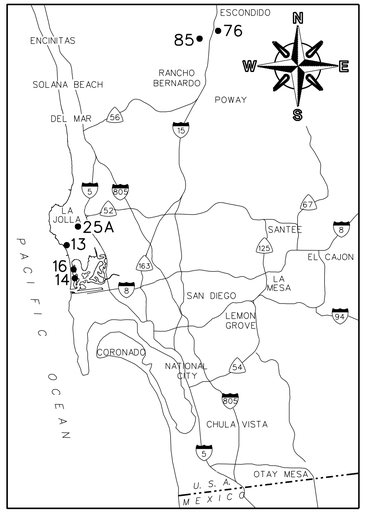
WORK TO BE DONE

WORK SHALL INCLUDE THE INSTALLATION OF A DIESEL EMERGENCY GENERATOR SET, AN EMERGENCY STORAGE TANK, SECONDARY FORCE MAINS AND APPURTENANCES WORK FOR THE PURPOSE OF IMPROVED REDUNDANCY AND RELIABILITY OF SIX EXISTING SEWER PUMP STATIONS (SPS) 13, 14, 16, 25A, 76 & 85.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

Sandra Russell 5/4/17
SANDRA RUSSELL R.C.E 44078 DATE



VICINITY MAP
NOT TO SCALE

SITE ADDRESSES

SPS 13
633 TOURMALINE STREET

SPS 14
3214 BAYSIDE WALK

SPS 16
3599 BAYSIDE WALK

SPS 25A
6301 VIA CABRERA

SPS 85
11513 ALBORADA DRIVE

SPS 76
18695 POMERADO ROAD

FIELD DATA

BENCHMARK:
SEE DWG G-3

DATUM:
MEAN SEA LEVEL, NGVD 29 (FT)

BASIS OF BEARINGS:
SEE DWG G-3

STREETS REQUIRING 12" TRENCH CAP:
NONE

LEGEND

IMPROVEMENTS	REFERENCE	SYMBOL
TRENCH RESURFACING	SDG-107, SDG-108 AND 1/C-12	
SEWER FORCE MAIN		
SEWER MAIN	SDS-101, SDS-110 (TYPE C)	
SEWER MANHOLE/PVC LINED	SDS-106, SDS-107, SDS-108, SDS-120, SDM-113, M-3, SM-07	
ABANDON EX MANHOLE	SM-08	
SLURRY FILL ABANDONED SEWER MAIN		
SURVEY WELL MONUMENT	M-10, M-10A, M-10B	
SURVEY MONUMENT		
CONCRETE THRUST BLOCK	SDW-151	
BLOWOFF	SDM-105, SDW-106, SDW-143, SDW-144, SDW-145, SDW-146	
AVV	SDM-105, SDW-117, SDW-158, SDW-159, SDW-160, WB-05	
CONCRETE SIDEWALK	SDG-155, SDG-156	
SEWER FORCE MAIN HDPE CASING		

FOR ADDITIONAL SYMBOLS, SEE RESURFACING AND CURB RAMP SHEETS

EXISTING STRUCTURES

WATER MAIN & VALVES
WATER METER/SERVICE LINE
FIRE HYDRANT
SEWER MAIN & MANHOLES
STORM DRAINS
AC PAVEMENT (PROFILE)
GROUND LINE (PROFILE)
CONCRETE SURFACE (PROFILE)
TRAFFIC SIGNAL (TS)
STREET LIGHT (SL)
GAS MAIN
ELEC, TEL, OR CATV CONDUIT (E T C)
SEWER FORCE MAIN (FM FM)
RAILROAD, TROLLEY TRACKS
FENCE (X)
RIGHT-OF-WAY
ELECTRIC VAULT/PEDESTAL (E)
LIGHT FIXTURE
IRRIGATION CONTROL BOX
WATER VAULT/MANHOLE
POWER POLE
GAS VALVE (G)
MONITORING WELL
TRAFFIC SIGNAL PULLBOX (TR)
TELEPHONE VAULT/PEDESTAL (C)
BACKFLOW DEVICE (BF)

G-1

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

PLANS FOR THE CONSTRUCTION OF
SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

COVER SHEET

SPEC NO. 1433

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 1 OF 50 SHEETS (A)

APPROVED: 6/23/2017
FOR CITY ENGINEER DATE
DEBBIE VAN MARTIN C62882
PRINT DCE NAME RCE #

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			
(A) ADDENDUM A	PSO		7/18/2017	

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WATER WBS N/A
SEWER WBS B-00501

SUBMITTED BY
RYAN GREEK
PROJECT MANAGER

CHECKED BY
LUIS CHAVEZ
PROJECT ENGINEER

SEE SHEETS
CCS27 COORDINATE

SEE SHEETS
CCS83 COORDINATE

38545-01-D

REGISTERED PROFESSIONAL ENGINEER
SANDRA RUSSELL
No. 44078
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA
Sandra Russell
5/4/17

AS-BUILT INFORMATION

MATERIALS	MANUFACTURER
PIPE CL 235 (WATER)	-
PIPE SDR 35 (SEWER)	-
GATE VALVES	-
FIRE HYDRANTS	-
SEWER MANHOLES	-
REHABILITATE SEWER MANHOLES	-
REHABILITATE SEWER MAIN	-

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
A	7/18/17	01, 02, 50	

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

The City of SAN DIEGO Public Works

(A) REVISE STORM WATER PROTECTION NOTES

ADDENDUM B

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

SHEET INDEX

SHEET NO.	DISCIPLINE CODE	TITLE	LIMITS	PIPE SIZE (IN)	PIPE MATERIAL	LENGTH (FT)
1	G-1	COVER SHEET				
2	G-2	SHEET INDEX				
3	G-3	VICINITY MAPS, BASIS OF BEARINGS AND BENCH MARKS				
4	G-4	SPS 13, 14 AND SPS 16 CONSTRUCTION STAGING PLANS				
5	G-5	SPS 25A AND SPS 85 CONSTRUCTION STAGING PLANS				
6	AB-1	SEWER ABANDONMENT				
7	D-1	SPS 14 DEMOLITION PLAN AND SECTION				
8	D-2	SPS 16 DEMOLITION PLAN AND SECTION				
9	D-3	SPS 25A DEMOLITION PLAN AND SECTION				
10	D-4	SPS 85 DEMOLITION PLAN AND SECTION				
11	C-1	SPS 13 - TOURMALINE STREET (LINE A)	STA. 1+00.00 TO 5+90.0±	4"/8"	PVC	490
12	C-2	SPS 13 - TOURMALINE STREET (LINE B)	STA. 10+00.00 TO 14+17.0±	4"/8"	PVC	388
13	C-3	SPS 14 - MISSION BAY PLACE (LINE C)	STA. 0+66.57 TO 6+44.5±	10"/12"	DI/HDPE/PVC	579.24
14	C-4	SPS 16 - SAN JUAN PLACE (LINES E AND F)	STA. 1+00.00 TO 1+32.4±	8"/10"	PVC	32.4
			STA 10+00.00 TO 10+29.9±	8"/10"	PVC	29.9
15	C-5	SPS 25A - VIA TABARA	STA. 1+00.00 TO 6+97.0±	4"/8"	DI/PVC	597.5
16	C-6	SPS 85 - ALBORADA DRIVE (LINES G AND H)	STA 1+00.00 TO 9+67.2±	4"/8"	PVC	869
			STA 10+00.00 TO 10+41.8±	4"/8"	PVC	41.8
17	C-7	SPS 13 SITE PLAN			TOTAL:	3027.84
18	C-8	SPS 14 SITE PLAN AND LINE D FM PROFILE				
19	C-9	SPS 25A SITE PLAN				
20	C-10	SPS 85 SITE PLAN AND LINE H FM PROFILE				
21	C-11	MANHOLE CONNECTION DETAILS				
22	C-12	DETAILS				
23	C-13	DETAILS				
24	C-14	CURB RAMP LOCATIONS				
25	C-15	CURB RAMP IMPROVEMENTS				
26	C-16	CURB RAMP IMPROVEMENTS				
27	C-17	CURB RAMP AND DRIVEWAY IMPROVEMENTS				
28	C-18	STREET RESURFACING				
29	C-19	HORIZONTAL ALIGNMENT COORDINATE INDEX REPORT				
30	C-20	HORIZONTAL ALIGNMENT COORDINATE INDEX REPORT				
31	M-1	SPS 13 AND EMERGENCY OVERFLOW STORAGE TANK MECHANICAL PLAN				
32	M-2	SPS 13 AND EMERGENCY OVERFLOW STORAGE TANK MECHANICAL SECTION				
33	M-3	SPS 13 VALVE VAULT MECHANICAL PLAN AND SECTION				
34	M-4	SPS 14 MECHANICAL PLAN				
35	M-5	SPS 14 MECHANICAL SECTIONS				
36	M-6	SPS 16 MECHANICAL PLANS				
37	M-7	SPS 16 MECHANICAL SECTION				
38	M-8	SPS 25A MECHANICAL PLANS AND SECTION				
39	M-9	SPS 85 MECHANICAL PLAN AND SECTIONS				
40	M-10	MECHANICAL DETAILS				
41	E-1	ELECTRICAL LEGENDS, GENERAL NOTES				
42	E-2	SPS 13 AND 14 ELECTRICAL PLANS				
43	E-3	SPS 16 ELECTRICAL PLAN				
44	E-4	SPS 25A AND 85 ELECTRICAL PLANS				
45	E-5	SPS 76 SINGLE LINE DIAGRAM - DEMOLITION				
46	E-6	SPS 76 SINGLE LINE DIAGRAM - NEW WORK				
47	E-7	SPS 76 ENLARGED ELECTRICAL PLAN - DEMOLITION				
48	E-8	SPS 76 ENLARGED ELECTRICAL PLAN - NEW WORK				
49	E-9	ELECTRICAL DETAILS				
A 50	G-6	SPS 76 ENLARGED SITE PLAN				

DISCIPLINE CODE

G	GENERAL
AB	ABANDONMENT
C	CIVIL
D	DEMOLITION
L	LANDSCAPE
A	ARCHITECTURAL
S	STRUCTURAL
M	MECHANICAL
E	ELECTRICAL
I	INSTRUMENTATION
T	TRAFFIC CONTROL

SHEET INDEX

G-2

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SHEET INDEX

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 2 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: [signature] FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — 6/23/2017 DATE — C62882 RCE #

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			
A ADDENDUM A	PSO	[signature]	7/18/2017	

SEE SHEETS CCS27 COORDINATE
SEE SHEETS CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-02-D

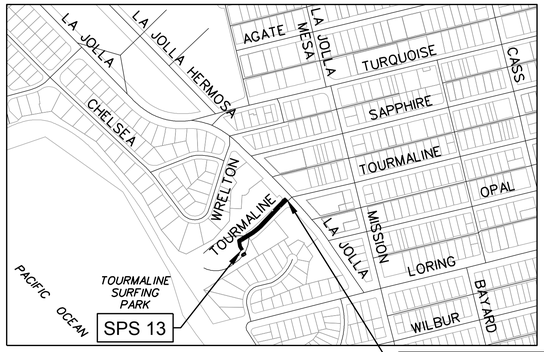
CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
[signature] 5/4/17

A ADD NEW SHEET TO SHEET INDEX

ADDENDUM A



SPS 13 VICINITY MAP
NOT TO SCALE

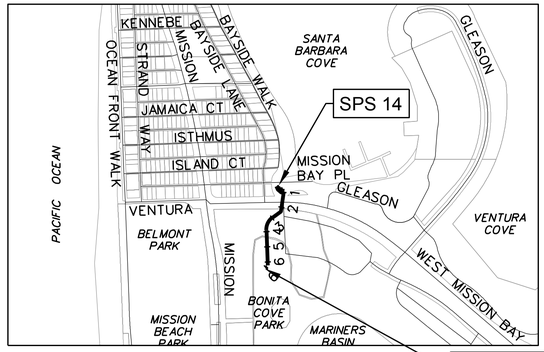
BASIS OF BEARINGS/COORDINATES:

STATIC GPS SURVEY, USING ROS 14492 NAD 83 FEET, ZONE 6 (EPOCH 91.35), UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BASE STATION BROADCAST 2014 AND CONSTRAINING TO GPS 203, GPS 17 AND CHECKING GPS 157, I.E. S 85°19'56" E.

BENCH:

NEBP OPAL ST AND MISSION BLVD
ELEV. 86.436 MSL, BASED ON NGVD 29 FEET AS SHOWN IN THE CITY OF SAN DIEGO BENCH BOOK.

NAD 27: 230-1689 & 234-1689
NAD 83: 1870444, 6250407 & 1874444, 6250407



SPS 14 VICINITY MAP
NOT TO SCALE

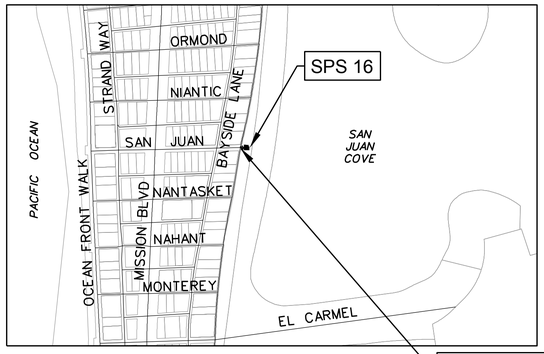
BASIS OF BEARINGS/COORDINATES:

STATIC GPS SURVEY, USING ROS 14492 NAD 83 FEET, ZONE 6 (EPOCH 1991.35), UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BROADCAST OF 2014 AND CONSTRAINING TO GPS PT 2903 AND GPS PT 17, I.E. N 64°34'13" E.

BENCH:

NWBP OPAL ST AND MISSION BLVD
ELEV. 86.439, BASED ON NGVD 29 FEET AS SHOWN IN CITY OF SAN DIEGO BENCH BOOK.

NAD 27: 218-1689
NAD 83: 1858444, 6250407



SPS 16 VICINITY MAP
NOT TO SCALE

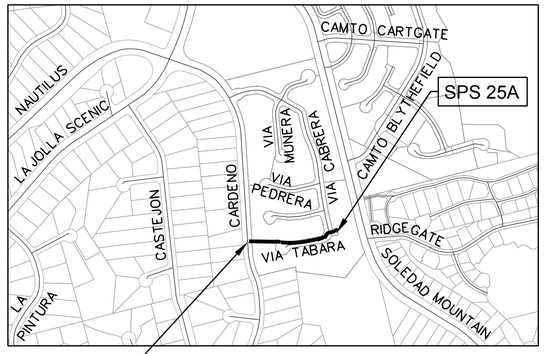
BASIS OF BEARINGS/COORDINATES:

STATIC GPS SURVEY, USING ROS 14492 NAD 83 FEET, ZONE 6 (EPOCH 1991.35). UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BROADCAST OF 2014 AND CONSTRAINING TO GPS 906 AND GPS 17 (PT•20017), I.E. N 65°31'04" E.

BENCH:

CL MON BAYSIDE LN AND NIANTIC CT
ELEV. 3.168, BASED ON NGVD 29 FEET AS SHOWN IN CITY OF SAN DIEGO BENCH BOOK.

NAD 27: 222-1689
NAD 83: 1862444, 6250407



SPS 25A VICINITY MAP
NOT TO SCALE

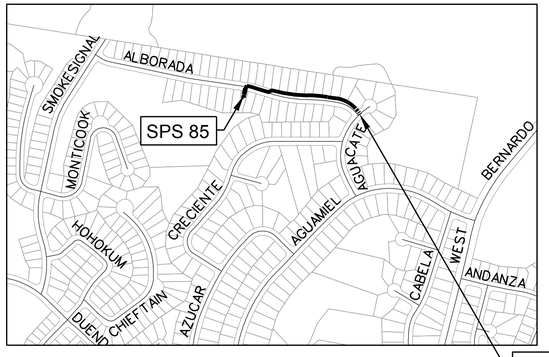
BASIS OF BEARINGS/COORDINATES:

STATIC GPS SURVEY, USING ROS 14492 NAD 83 FEET, ZONE 6 (EPOCH 1991.35), UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BROADCAST OF 2014 AND CONSTRAINING TO GPS 749 AND GPS 17, I.E. S 80°00'59" E.

BENCH:

NWBP CASTEJON DR AND MERIDA CT
ELEV. 604.397 MSL, BASED ON NGVD 29 FEET AS SHOWN IN THE CITY OF SAN DIEGO BENCH BOOK.

NAD 27: 242-1689
NAD 83: 1882444, 6250407



SPS 85 VICINITY MAP
NOT TO SCALE

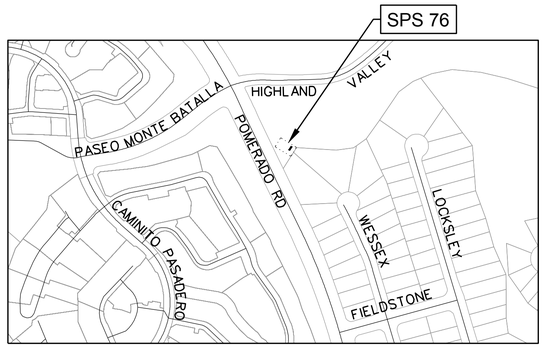
BASIS OF BEARINGS/COORDINATES:

STATIC GPS SURVEY, USING ROS 14492 NAD 83 FEET, ZONE 6 (EPOCH 91.35), UTILIZING RTK/GPS FIELD PROCEDURES WITH A CALVRS BASE STATION BROADCAST 2014 AND CONSTRAINING TO GPS 355 AND GPS 17, I.E. S 15°14'21" W.

BENCH:

EBP TOP INLET AGUACATE WAY AND AQUAMIEL RD
ELEV. 379.441 MSL, BASED ON NGVD 29 FEET AS SHOWN IN THE CITY OF SAN DIEGO BENCH BOOK.

NAD 27: 318-1743
NAD 83: 1958444, 6304407



SPS 76 VICINITY MAP
NOT TO SCALE

NAD 27: 322-1749
NAD 83: 1962444, 6310407

N
W E
S

VICINITY MAPS, BASIS OF BEARINGS AND BENCH MARKS

G-3

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

VICINITY MAPS, BASIS OF BEARINGS AND BENCH MARKS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 3 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — RCE # C62882
PRINT DCE NAME

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

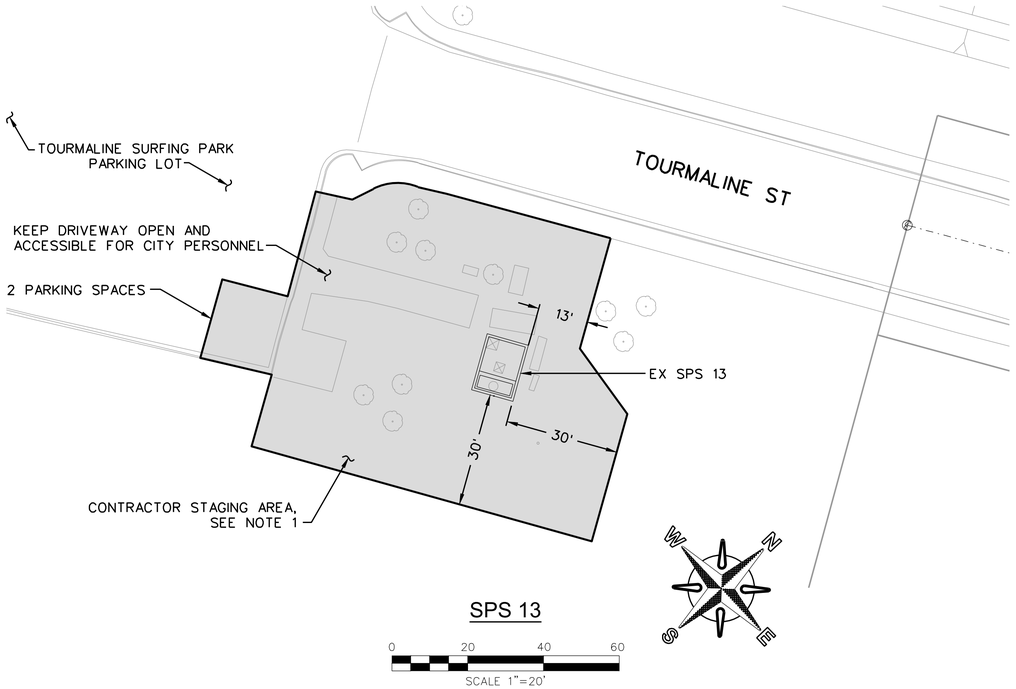
CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

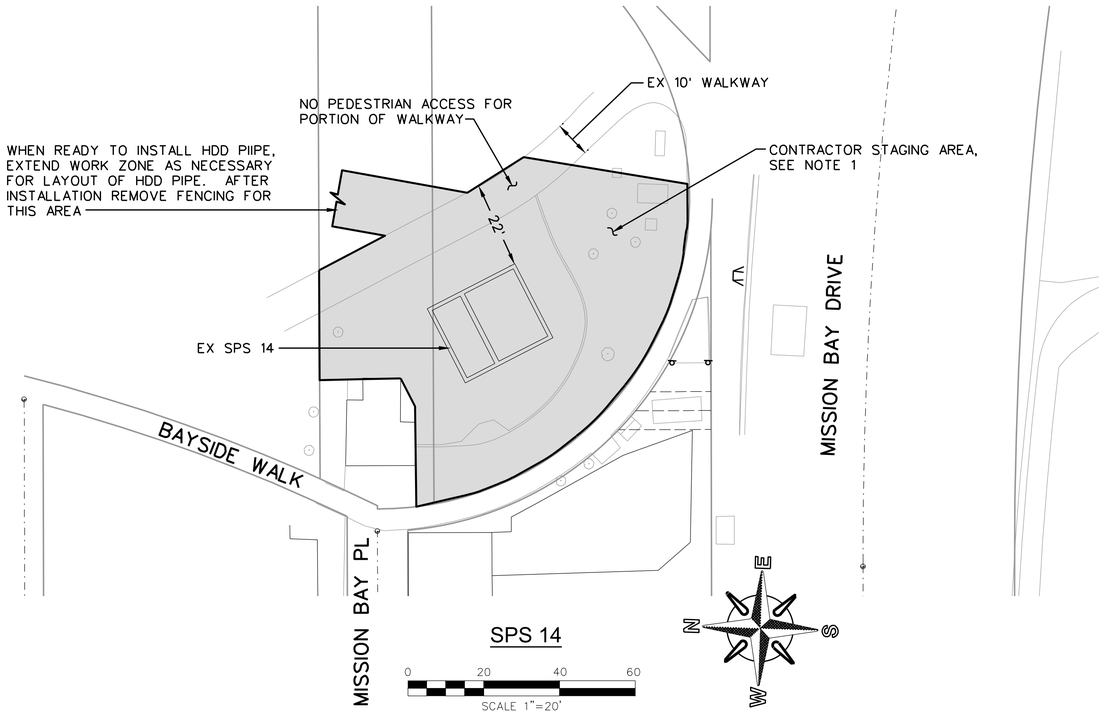
38545-03-D

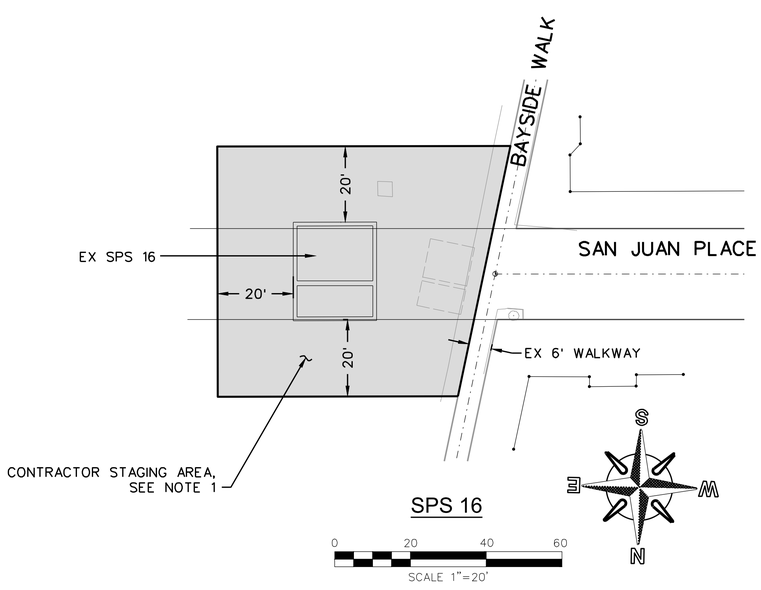
CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17







NOTES:

1. A TEMPORARY CONTINUOUS FENCE SHALL BE INSTALLED AROUND THE WORK ZONE AND STAGING AREAS

CONSTRUCTION STAGING PLANS

G-4

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 13, SPS 14 AND SPS 16 CONSTRUCTION STAGING PLANS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 4 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — PRINT DCE NAME — RCE # C62882

SUBMITTED BY RYAN GREEK, PROJECT MANAGER
CHECKED BY LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-04-D

CONSULTANT

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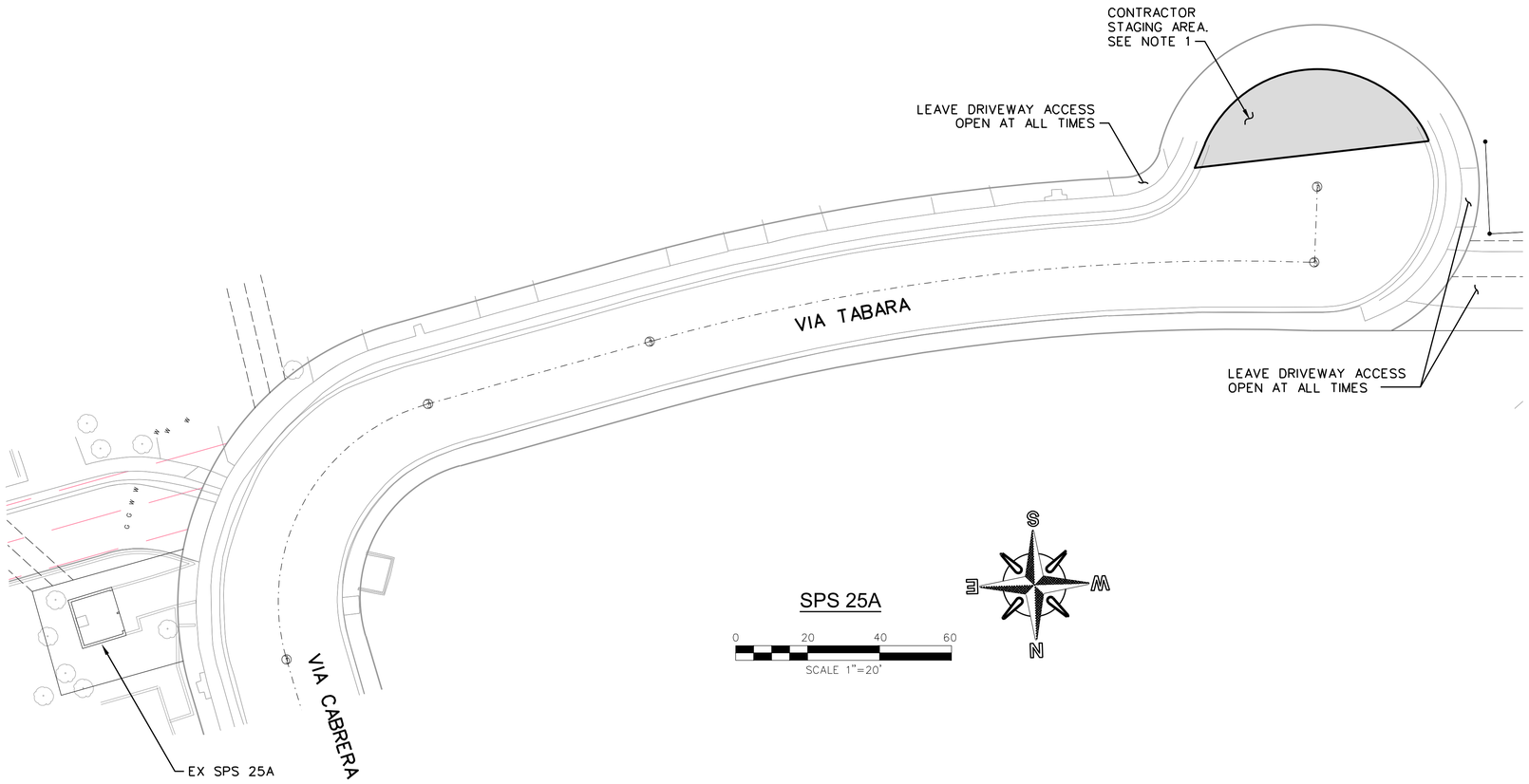
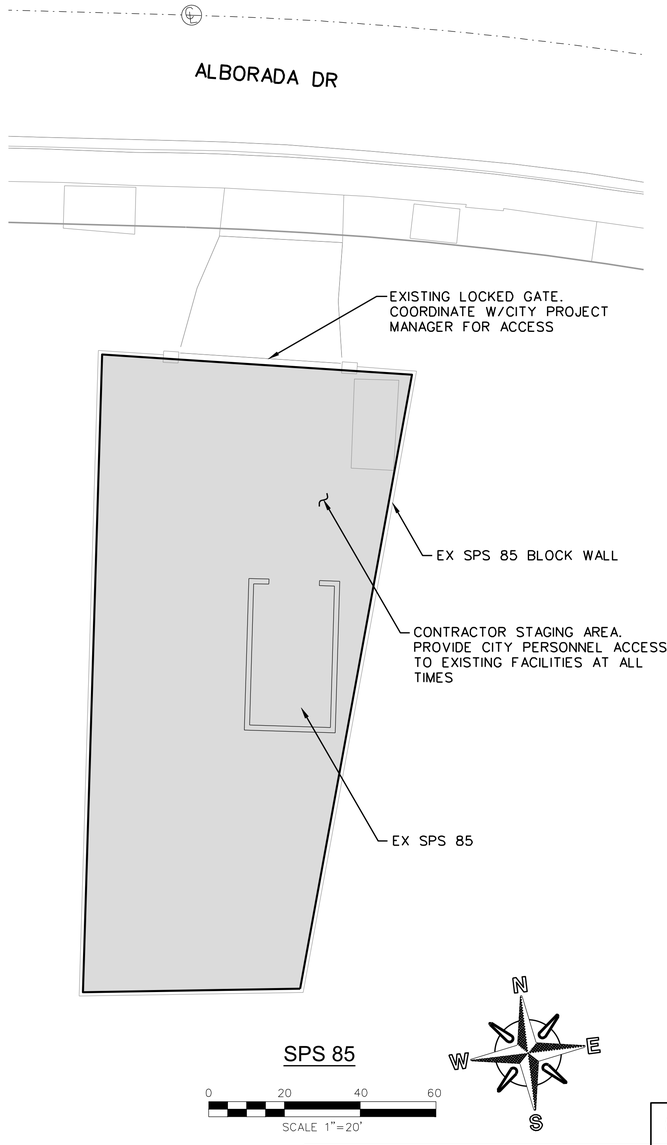
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — Civil — STATE OF CALIFORNIA — 5/4/17





CONSTRUCTION

NOTES:

1. A TEMPORARY CONTINUOUS FENCE SHALL BE INSTALLED AROUND THE WORK ZONE AND STAGING AREAS

G-5

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 25A AND SPS 85 CONSTRUCTION STAGING PLANS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 5 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — RCE # 62882
PRINT DCE NAME

SUBMITTED BY RYAN GREEK, PROJECT MANAGER
CHECKED BY LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS CCS27 COORDINATE
SEE SHEETS CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-05-D

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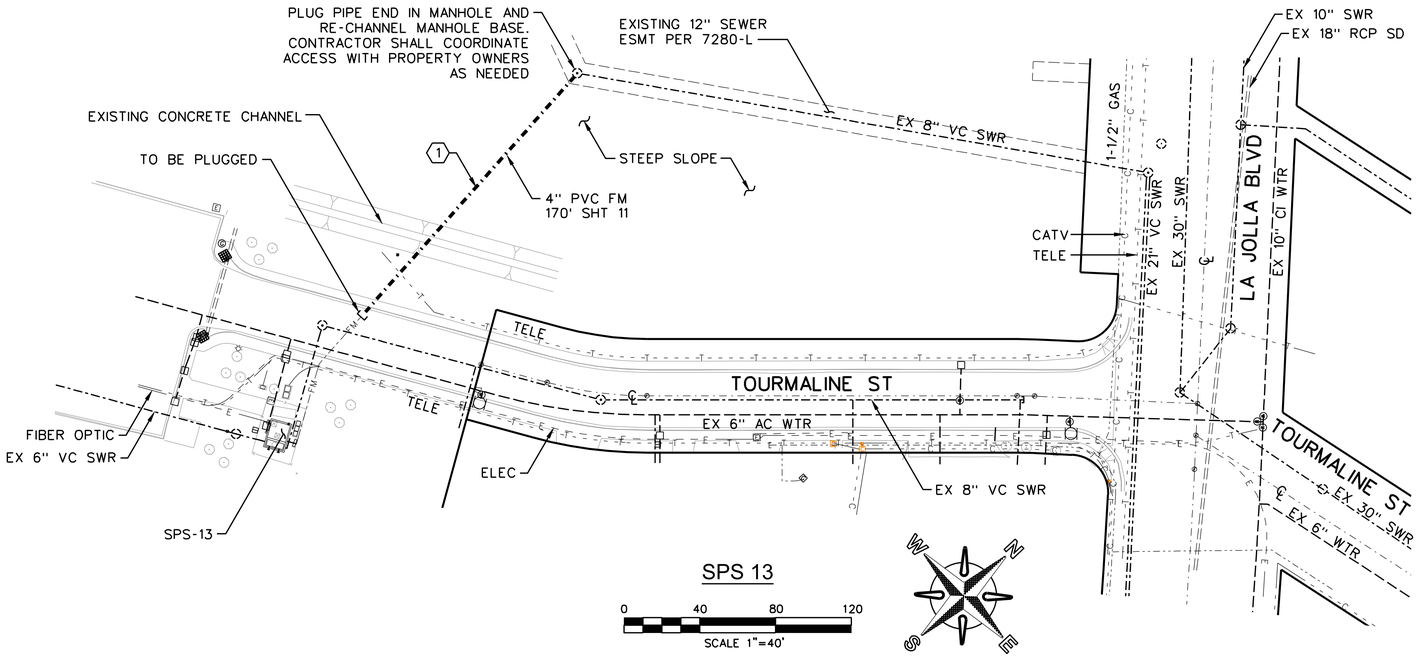
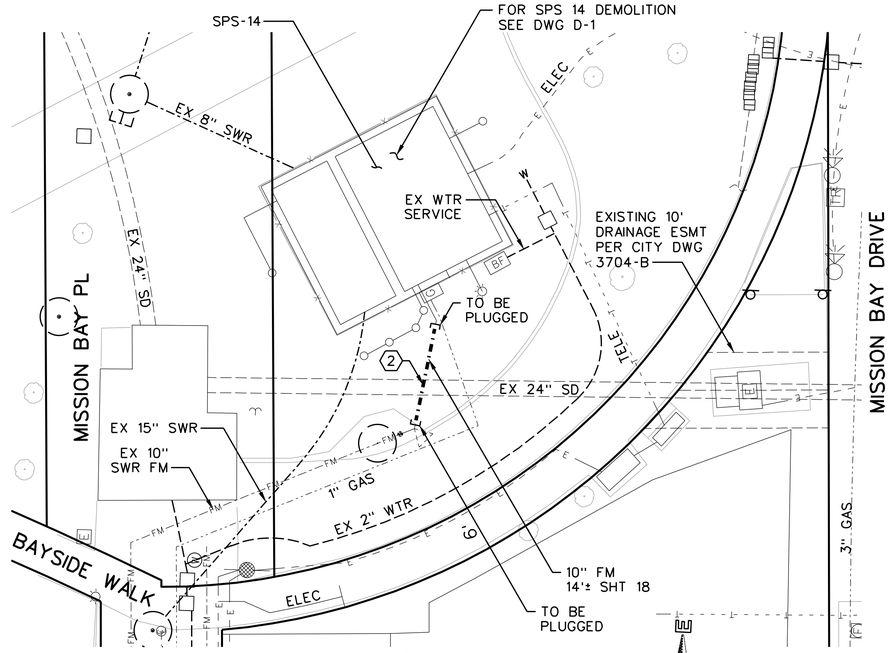
REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — Civil — STATE OF CALIFORNIA
5/4/17



SPS 13

0 40 80 120

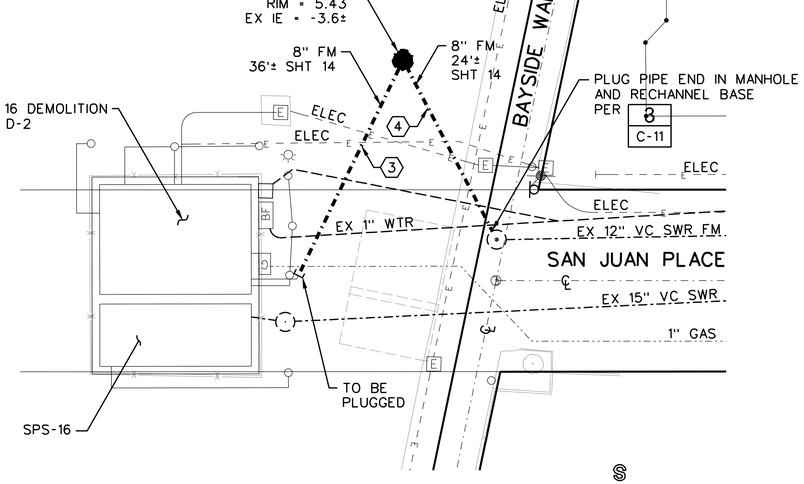
SCALE 1"=40'



SPS 14

0 10 20 30

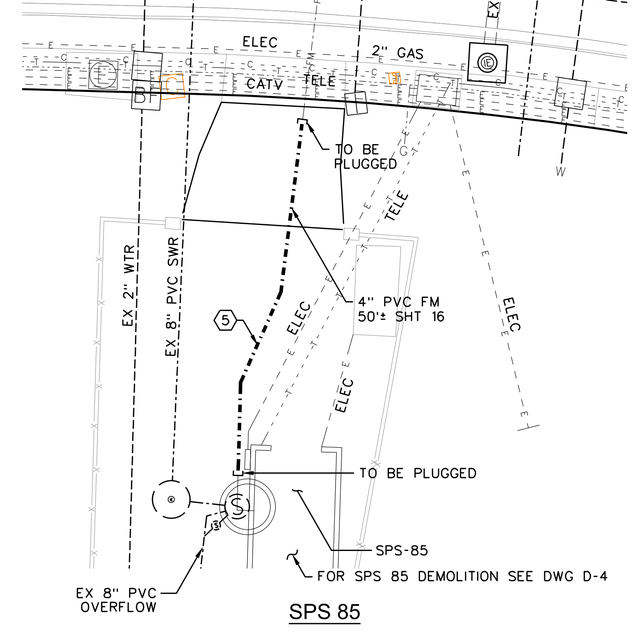
SCALE 1"=10'



SPS 16

0 10 20 30

SCALE 1"=10'



SPS 85

LEGEND

⟨1⟩	SEWER MAIN TO BE ABANDONED NO's
⟨1⟩	SEWER MAIN TO BE ABANDONED
	EXISTING SEWER MAIN
	ABANDON EX MANHOLE

SEWER MAIN TO BE ABANDONED

	LOCATION	SIZE OF PIPE	MATERIAL	LENGTH FT
⟨1⟩	SPS 13 - TOURMALINE ST	4"	PVC	170
⟨2⟩	SPS 14 - BAYSIDE WALK	10"	UNK	14±
⟨3⟩	SPS 16 - BAYSIDE WALK	8"	UNK	36±
⟨4⟩	SPS 16 - BAYSIDE WALK	8"	UNK	24±
⟨5⟩	SPS 85 - ALBORADA DR	4"	PVC	50±
	TOTAL SEWER MAIN TO BE ABANDONED			294±

SEWER ABANDONMENT

AB-1

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

SEWER ABANDONMENT

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 6 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

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REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 Civil STATE OF CALIFORNIA
5/4/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

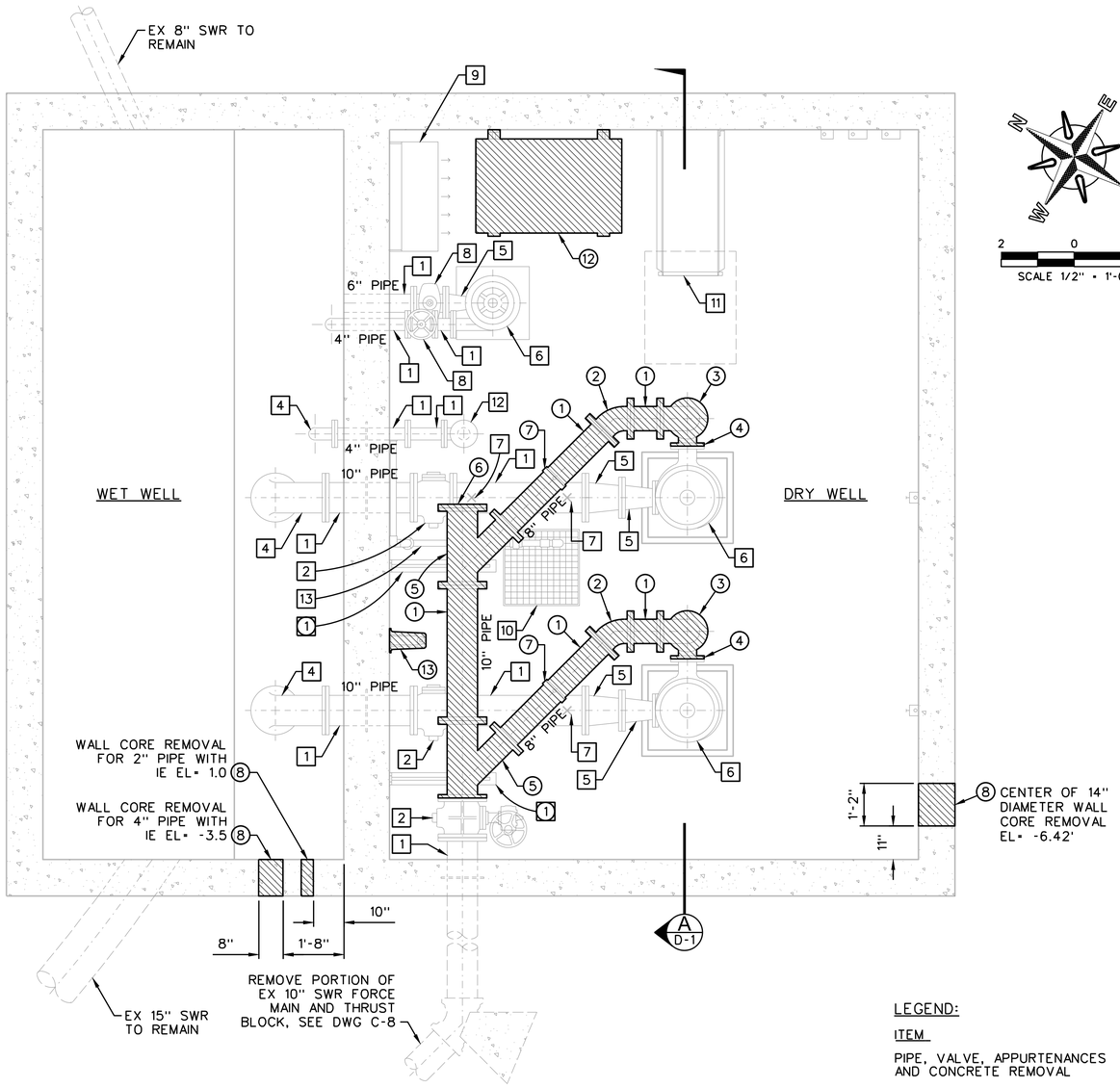
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

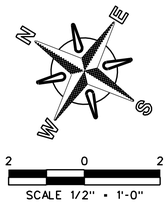
SEE SHEETS CCS27 COORDINATE
SEE SHEETS CCS83 COORDINATE

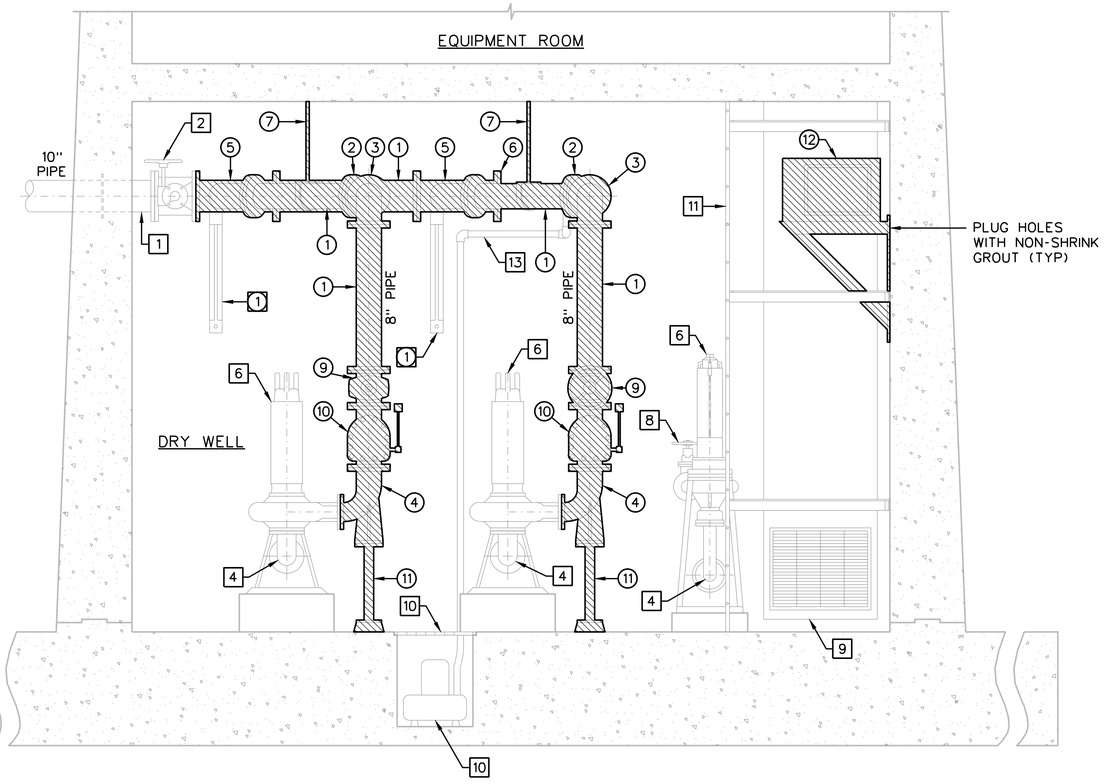
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-06-D



SPS 14 WET WELL/DRY WELL - PLAN 1 / D-1





SPS 14 WET WELL/DRY WELL - SECTION A / D-1

LEGEND:

ITEM	SYMBOL
PIPE, VALVE, APPURTENANCES AND CONCRETE REMOVAL	

DEMOLITION NOTES (REMOVAL):

1. PIPE SPOOL
2. 45° BEND
3. 90° BEND
4. 90° REDUCING BASE BEND
5. 45° LATERAL
6. BLIND FLANGE
7. PIPE HANGER
8. CONCRETE WALL
9. GATE VALVE
10. CHECK VALVE
11. BASE BEND SUPPORT
12. DEHUMIDIFIER AND WALL SUPPORT
13. EXTENSION ARM BRACKET

DEMOLITION NOTES (PROTECT-IN-PLACE):

1. PIPE SPOOL
2. PLUG VALVE
3. 45° LATERAL
4. 90° BEND
5. REDUCER
6. PUMP
7. ADJUSTABLE PIPE SUPPORT
8. GATE VALVE
9. AIR VENT
10. SUMP AND SUMP PUMP
11. LADDER
12. TEE
13. SUMP PIPING

DEMOLITION NOTES (SALVAGE & RELOCATED):

1. ANGLE BRACKET

SPS 14 - DEMOLITION PLAN AND SECTION

D-1

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 14
DEMOLITION PLAN AND SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 7 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) 06/23/2017 DATE C62882 RCE #

SUBMITTED BY RYAN GREEK, PROJECT MANAGER
CHECKED BY LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

218-1689 CCS27 COORDINATE
1858444, 6250407 CCS83 COORDINATE
38545-07-D

CONSULTANT

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401 B Street, Suite 1600
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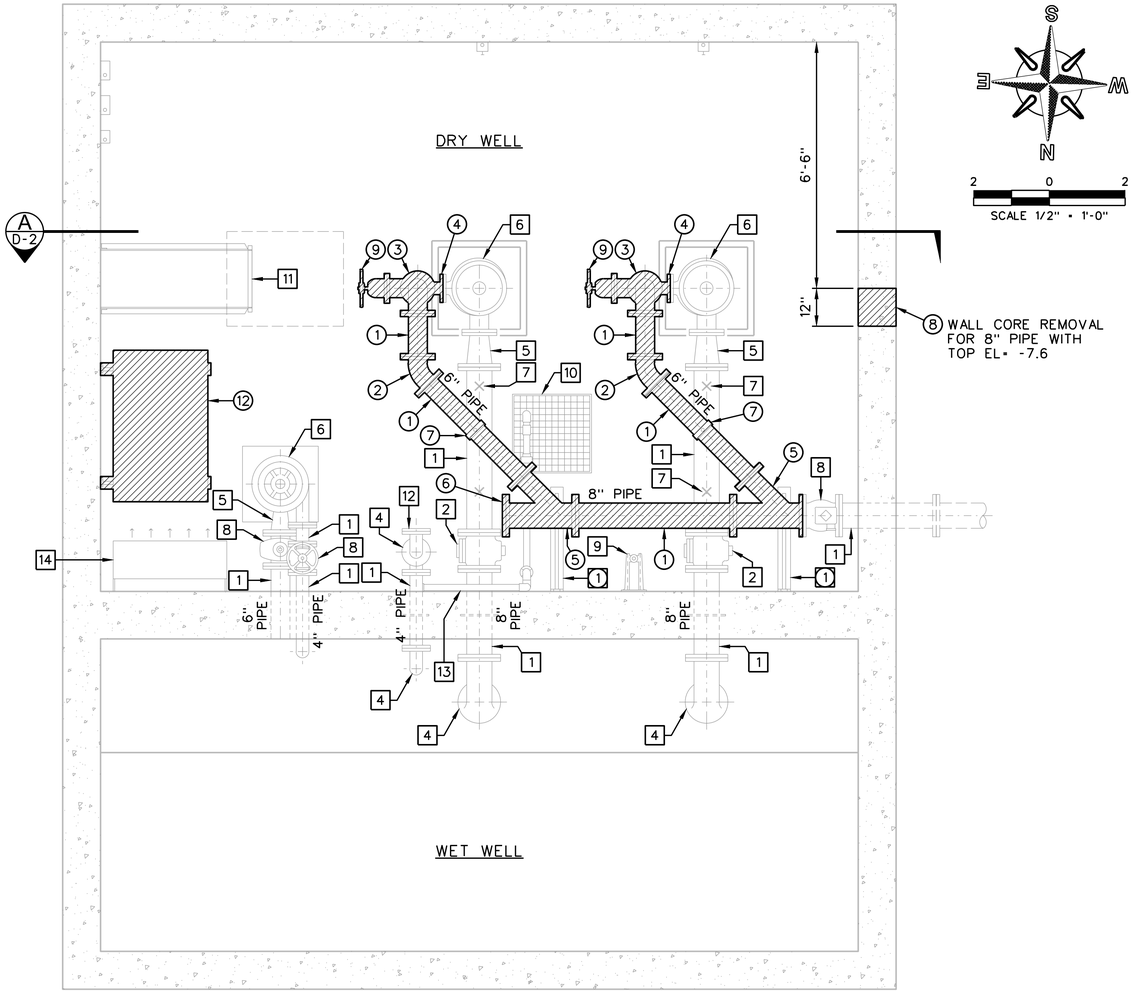
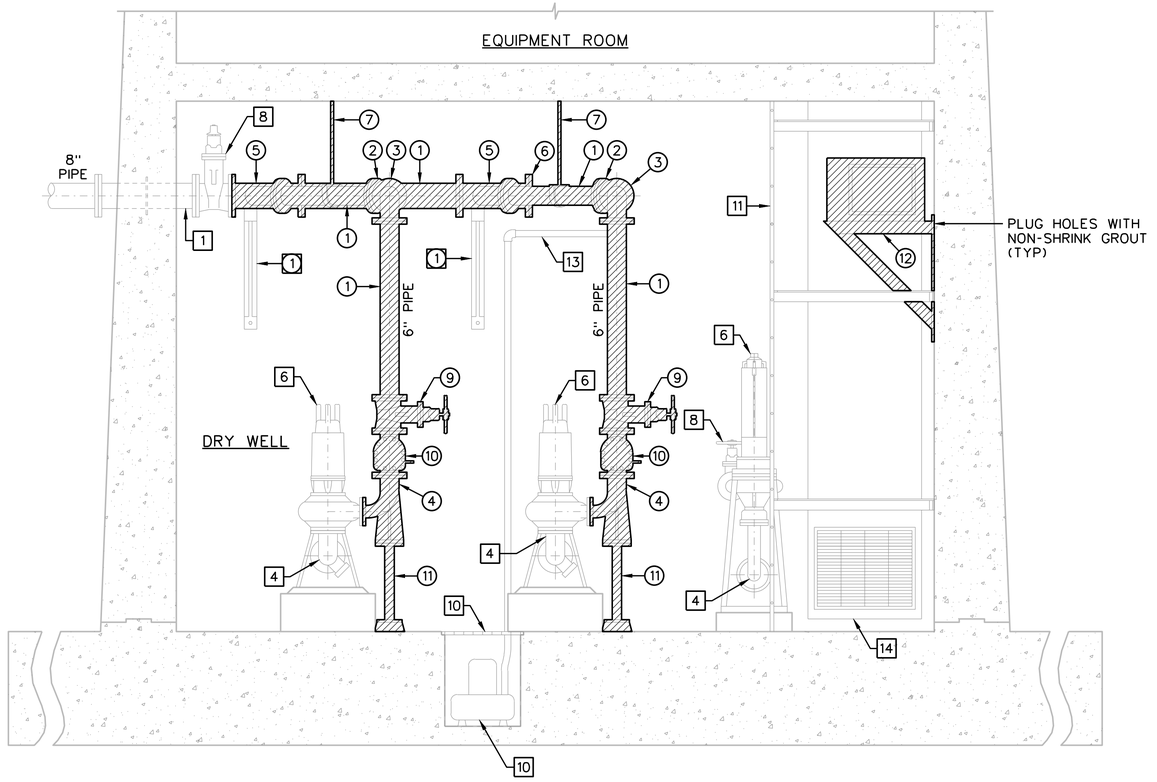
REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA 5/4/17

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED



SPS 16 WET WELL/DRY WELL - PLAN 1 / D-2



SPS 16 WET WELL/DRY WELL - SECTION A / D-2

DEMOLITION NOTES (REMOVAL):

1. PIPE SPOOL
2. 45° BEND
3. 90° BEND
4. 90° REDUCING BASE BEND
5. 45° LATERAL
6. BLIND FLANGE
7. PIPE HANGER
8. CONCRETE WALL
9. GATE VALVE
10. CHECK VALVE
11. BASE BEND SUPPORT
12. DEHUMIDIFIER

DEMOLITION NOTES (PROTECT-IN-PLACE):

1. PIPE SPOOL
2. PLUG VALVE
3. 45° LATERAL
4. 90° BEND
5. REDUCER
6. PUMP
7. ADJUSTABLE PIPE SUPPORT
8. GATE VALVE
9. EXTENSION ARM BRACKET
10. SUMP AND SUMP PUMP
11. LADDER
12. BLIND FLANGE
13. SUMP PIPING
14. AIR VENT

DEMOLITION NOTES (SALVAGE & RELOCATED):

1. ANGLE BRACKET

LEGEND:

ITEM	SYMBOL
PIPE, VALVE, APPURTENANCES AND CONCRETE REMOVAL	

SPS 16 - DEMOLITION PLAN AND SECTION

D-2

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 16
DEMOLITION PLAN AND SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 8 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

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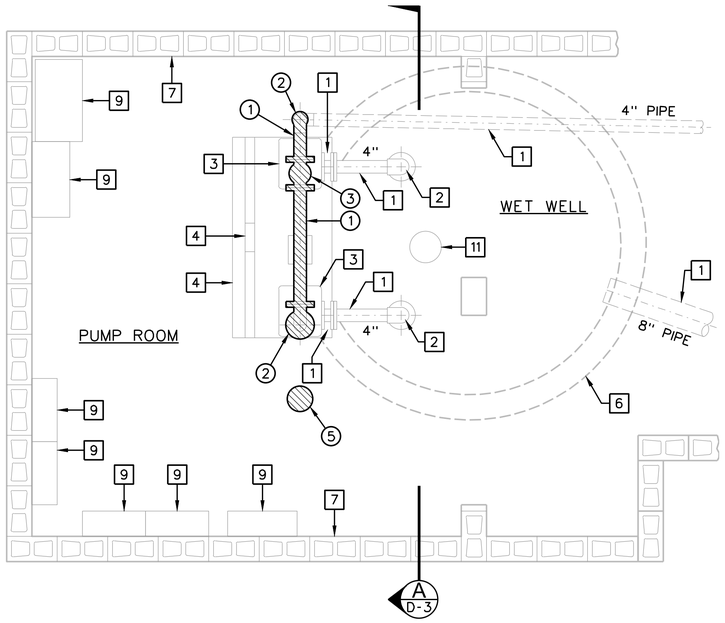
REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN — DATE 06/23/2017 — RCE # C62882

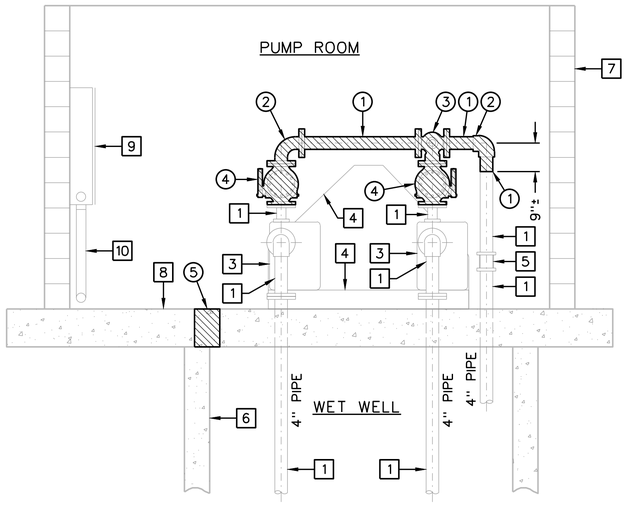
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
222-1689 CCS27 COORDINATE
1862444, 6250407 CCS83 COORDINATE
38545-08-D



SPS 25A - PLAN 1 D-3



SPS 25A - SECTION A D-3

DEMOLITION NOTES (REMOVAL):

1. PIPE SPOOL
2. 90° BEND
3. 3-WAY PLUG VALVE
4. CHECK VALVE
5. CONCRETE FLOOR, SEE DWG M-8

DEMOLITION NOTES (PROTECT-IN-PLACE):

1. PIPE SPOOL
2. 90° BEND
3. PUMP
4. PUMP BASE
5. COUPLING
6. WET WELL
7. PUMP STATION BUILDING
8. PUMP STATION FLOOR
9. ELECTRICAL AND PUMP CONTROL CABINETS
10. CONDUIT
11. STILLING WELL

LEGEND:

ITEM	SYMBOL
PIPE, VALVE, APPURTENANCES AND CONCRETE REMOVAL	

SPS 25A - DEMOLITION PLAN AND SECTION

D-3

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 25A
DEMOLITION PLAN AND SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 9 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER — DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

242-1689 CCS27 COORDINATE
1882444, 6250407 CCS83 COORDINATE
38545-09-D

CONSULTANT

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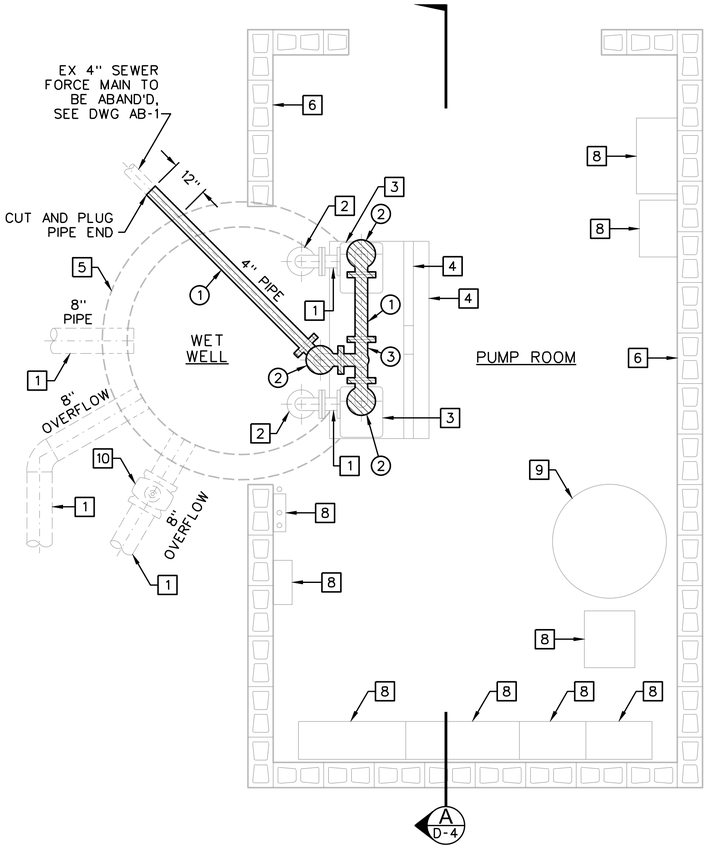
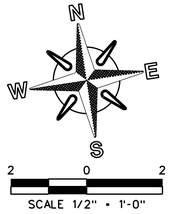
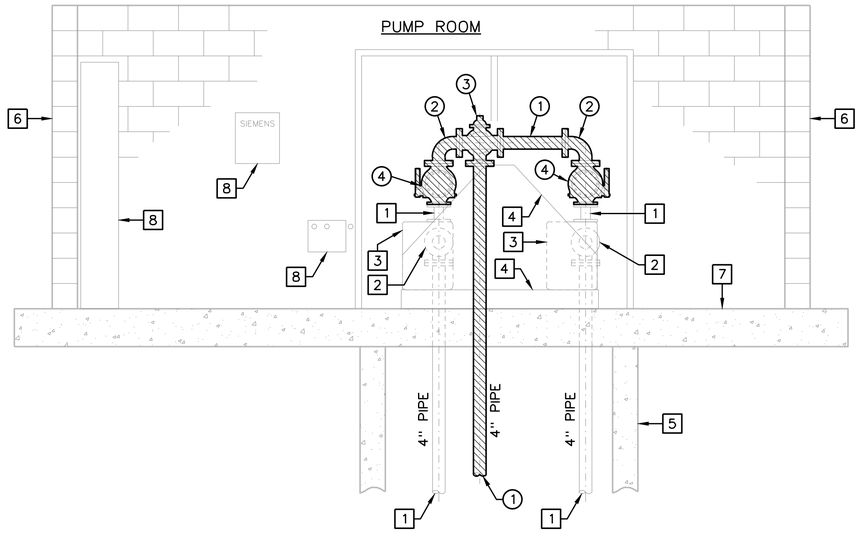
REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____



SPS 85 - PLAN 1 / D-4





SPS 85 - SECTION A / D-4

DEMOLITION NOTES (REMOVAL):

1. PIPE SPOOL
2. 90° BEND
3. 3-WAY PLUG VALVE
4. CHECK VALVE

DEMOLITION NOTES (PROTECT-IN-PLACE):

1. PIPE SPOOL
2. 90° BEND
3. PUMP
4. PUMP BASE
5. WET WELL
6. PUMP STATION BUILDING
7. PUMP STATION FLOOR
8. ELECTRICAL AND PUMP CONTROL CABINETS
9. BIOXIDE TANK
10. VALVE

LEGEND:

ITEM	SYMBOL
PIPE, VALVE, APPURTENANCES AND CONCRETE REMOVAL	

SPS 85 - DEMOLITION PLAN AND SECTION

D-4

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 85
DEMOLITION PLAN AND SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 10 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

318-1743 CCS27 COORDINATE
1958444, 6304407 CCS83 COORDINATE
38545-10-D

CONSULTANT

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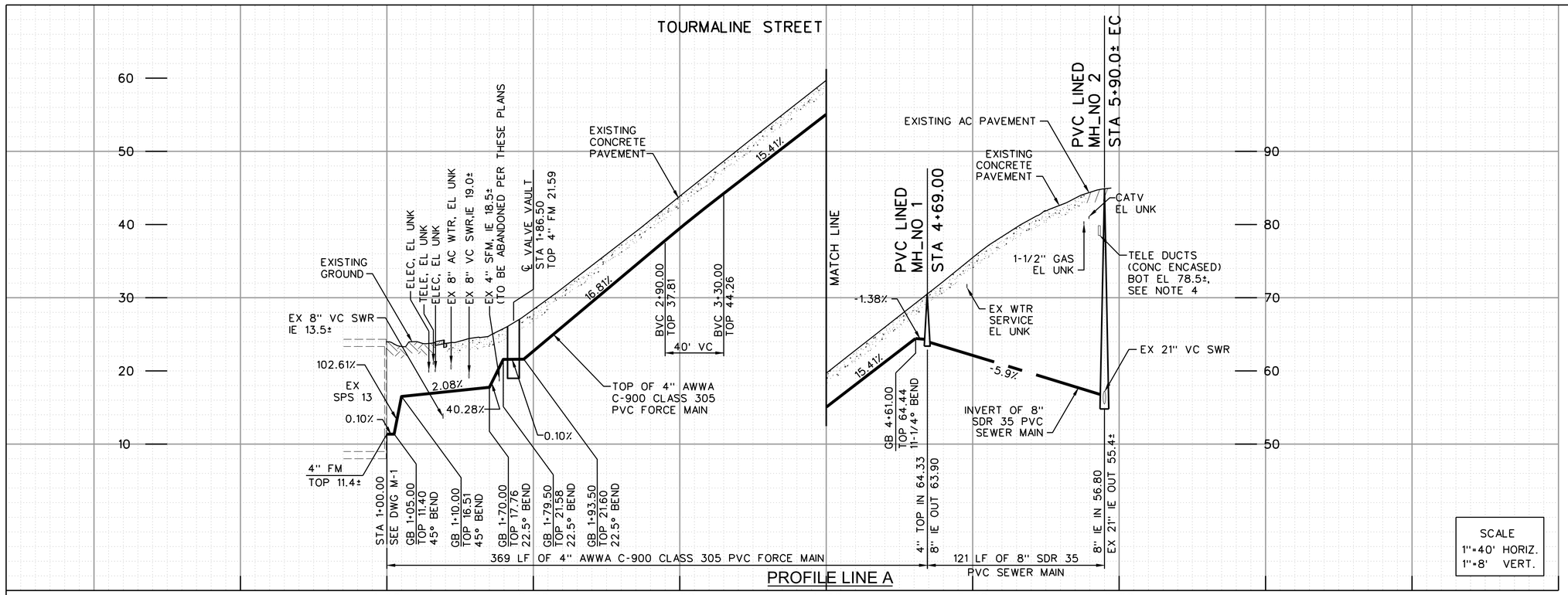
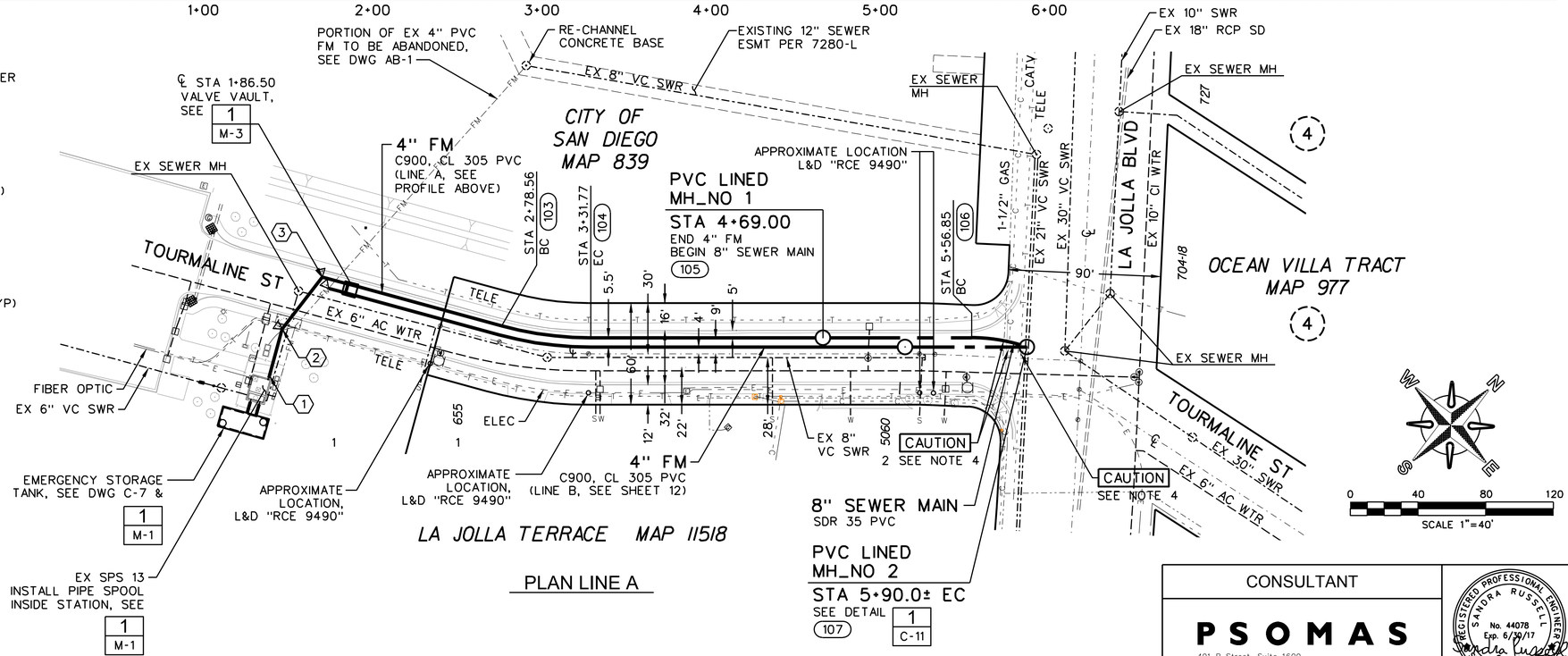
REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____





NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. CONTRACTOR TO SUPPORT ALL UTILITIES CROSSING EXCAVATIONS. COORDINATE WORK WITH UTILITY COMPANIES.

REFERENCE:
WATER: 10606-2-D,
SEWER: 10606-1A-D, 37021-06-D, 13369-14-D, 26259-14-D
STORM DRAIN: N/A
GAS: SDG&E 15600-119085, 15600-119090
ELECTRIC: SDG&E 15600-119085, 15600-119090
CABLE TV: TIME WARNER CABLE
TELEPHONE: AT&T PB1301CA
IMPROVEMENTS:
100' SCALE/FIELD BOOK: B13S
THOMAS BROS.: 1247

RETIREMENTS:
4" FM - PVC - 170' - 1963

SCOPE OF WORK GENERALLY CONSISTS OF:

1. CONSTRUCT 4" FORCE MAIN
2. CONSTRUCT 8" GRAVITY LINE
3. INSTALL 11,800 GALLON PRECAST EMERGENCY STORAGE TANK & PIPING
4. CONSTRUCT DISCHARGE MANHOLE
5. CONSTRUCT MANHOLE ON EX 21" SEWER
6. INSTALL 4" PIPE SPOOL INSIDE EX PUMP STATION
7. CONSTRUCT VALVE VAULT WITH INTER-TIE PIPING

SPS 13 - TOURMALINE ST

C-1

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 13 - TOURMALINE ST.
STA 1+00.00 TO 5+90.0± (LINE A)

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 11 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY RYAN GREEK PROJECT MANAGER

CHECKED BY LUIS CHAVEZ PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE

1870444, 6250407
1874444, 6250407 CCS83 COORDINATE

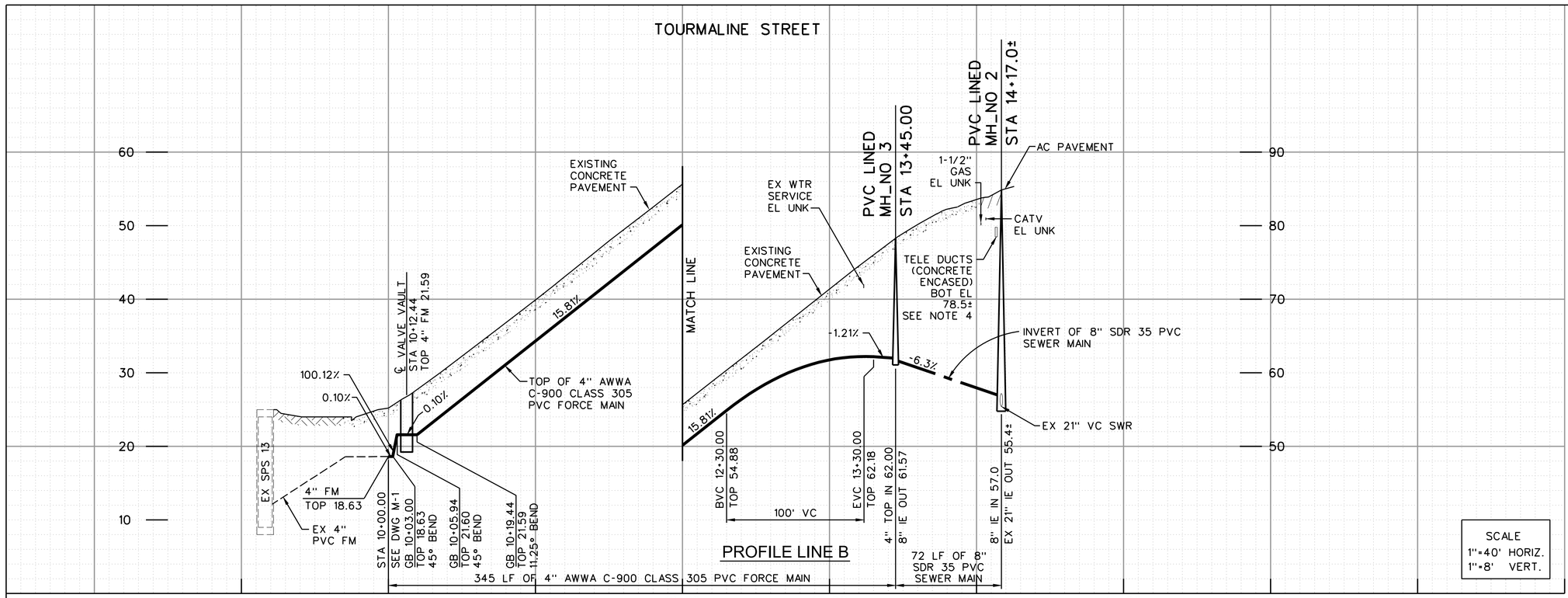
38545-11-D

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA 5/4/17

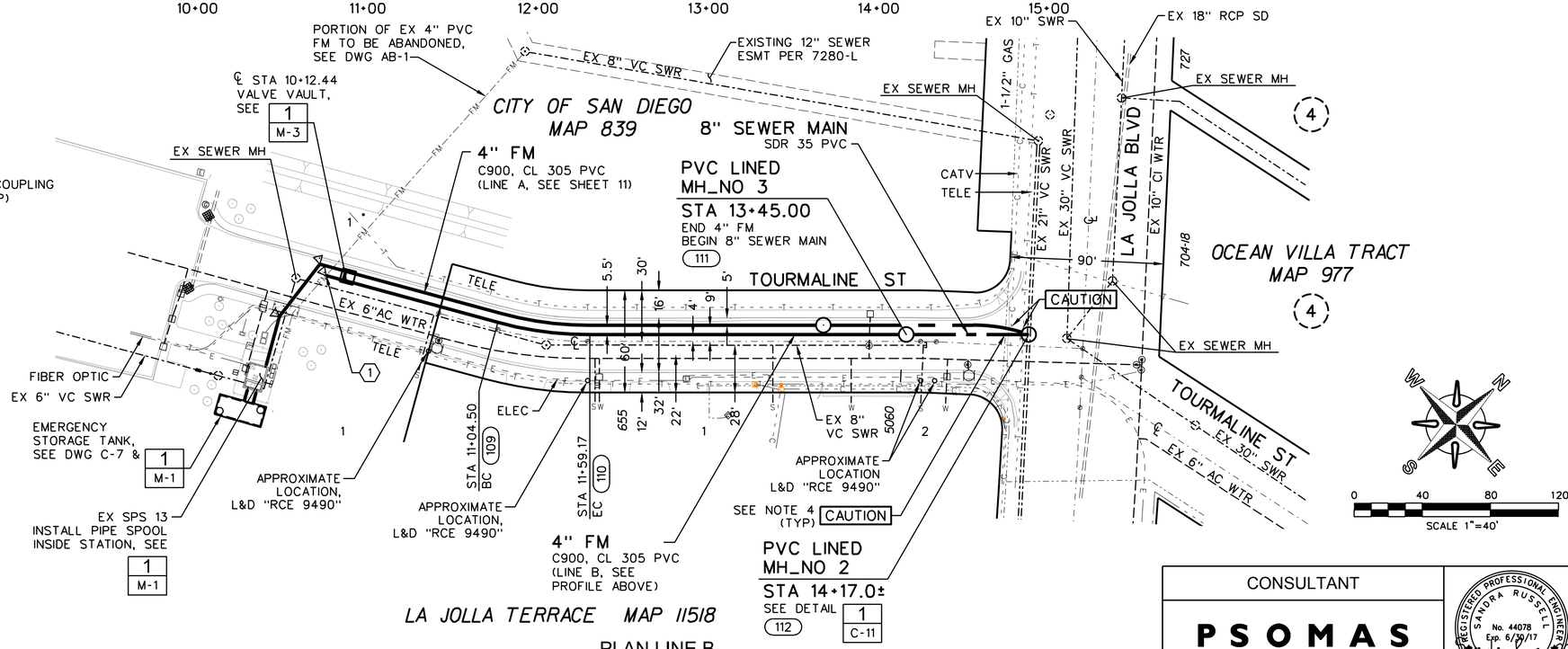
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____



SCALE
1"=40' HORIZ.
1"=8' VERT.

NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. CONTRACTOR TO SUPPORT ALL UTILITIES CROSSING EXCAVATIONS. COORDINATE WORK WITH UTILITY COMPANIES.



REFERENCE:
WATER: 10606-2-D,
SEWER: 10606-1A-D, 37021-06-D, 13369-14-D, 26259-14-D
STORM DRAIN: N/A
GAS: SDG&E 15600-119085, 15600-119090
ELECTRIC: SDG&E 15600-119085, 15600-119090
CABLE TV: TIME WARNER CABLE
TELEPHONE: AT&T PB1301CA
IMPROVEMENTS:
100' SCALE/FIELD BOOK: B13S
THOMAS BROS.: 1247

SCOPE OF WORK GENERALLY CONSISTS OF:

1. CONSTRUCT 4" FORCE MAIN
2. CONSTRUCT 8" GRAVITY LINE
3. INSTALL 11,800 GALLON PRECAST EMERGENCY STORAGE TANK & PIPING
4. CONSTRUCT DISCHARGE MANHOLE
5. CONSTRUCT MANHOLE ON EX 21" SEWER
6. INSTALL 4" PIPE SPOOL INSIDE EX PUMP STATION
7. CONSTRUCT VALVE VAULT WITH INTER-TIE PIPING

SPS 13 - TOURMALINE ST

C-2

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 13 - TOURMALINE ST.
STA 10+00.00 TO 14+17.0± (LINE B)

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 12 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY RYAN GREEK PROJECT MANAGER

CHECKED BY LUIS CHAVEZ PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE

1870444, 6250407
1874444, 6250407 CCS83 COORDINATE

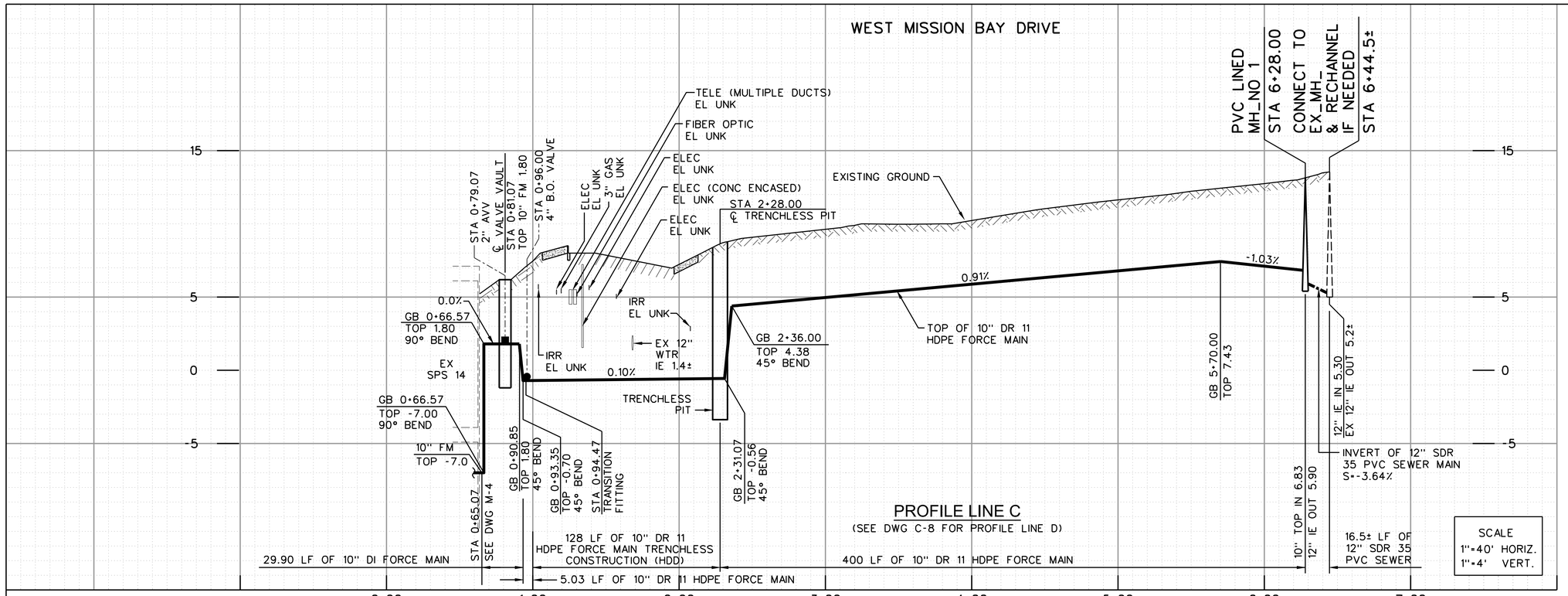
CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

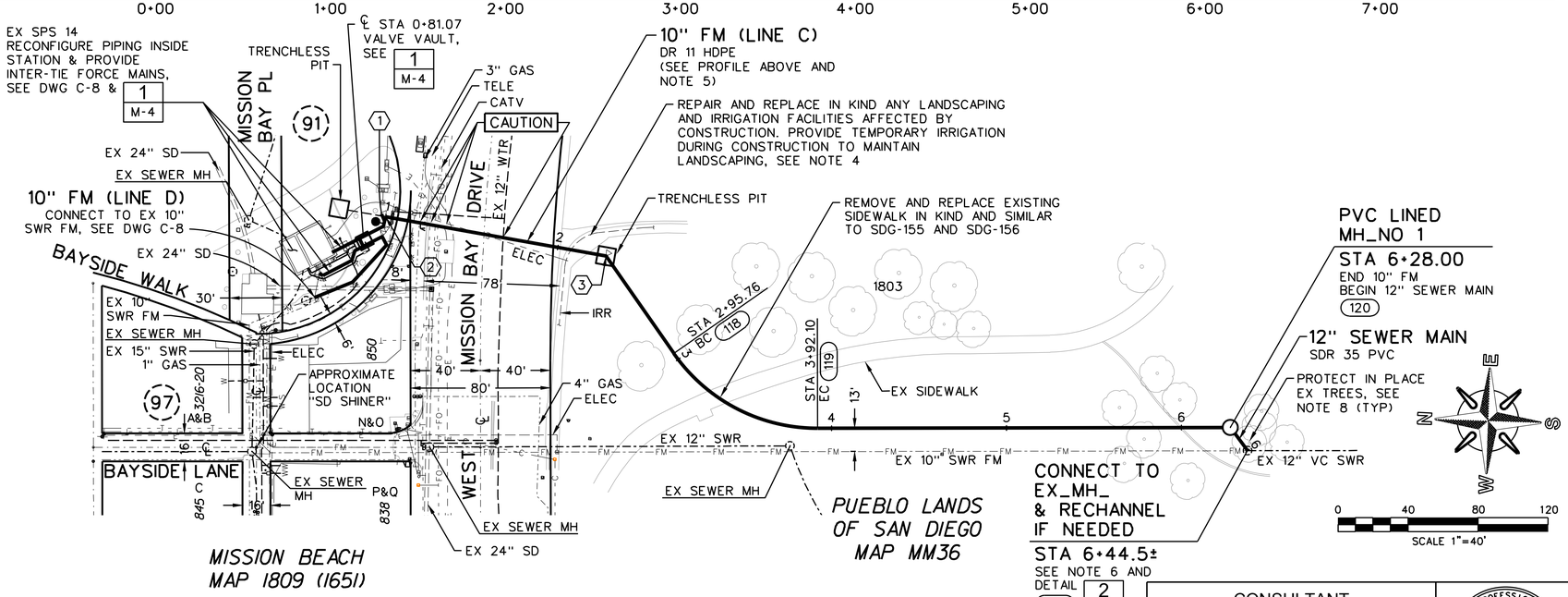
38545-12-D

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17





① STA 0+96.00 (LINE C)
1-4" BLOWOFF

② STA 1+00.00 (LINE C)
1-10" BEND (DI, MJ)
Δ = 90°00'00", SEE NOTE 2 (TYP)
(SEE SITE PLAN DWG C-8 FOR STATION 0+66.57 TO 1+00.00 BEND INFORMATION)
116

③ STA 2+28.00
1 - 10" BEND, SEE NOTE 2 (TYP)
Δ = 45°00'00" RT
117

PLAN LINE A & B

NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. CONTRACTOR TO PROVIDE FULL COVERAGE OF IRRIGATION AT ALL TIMES. ALL WORK SHALL BE COORDINATED WITH CITY OF SAN DIEGO PARKS AND RECREATION STAFF INCLUDING:
   - PRIOR TO STARTING WORK, PARKS AND RECREATION STAFF WILL SHOW CONTRACTOR WHERE IRRIGATION SYSTEM IS LOCATED. IRRIGATION MAIN LINES MAY BE UP TO 5' DEEP.
   - TEMPORARY IRRIGATION SYSTEM MUST BE APPROVED BY PARKS AND RECREATION STAFF
   - REPLACEMENT LANDSCAPE AND IRRIGATION SYSTEM TO BE APPROVED BY PARKS AND RECREATION STAFF
5. CONTRACTOR TO POTHOLE AND VERIFY THE ELEVATION OF ALL CROSSING UTILITY LINES PRIOR TO START OF TRENCHLESS OPERATION.
6. REHABILITATE EX SWR MH PER DETAILS ON DWG C-13.
7. ON SOUTH SIDE OF MISSION BAY DRIVE, CONTRACTOR MAY NOT START WORK UNTIL AFTER 10:00am ON TUESDAYS.
8. CONTRACTOR TO SURVEY EXACT LOCATION OF TREES AND ADJUST ALIGNMENT AS NECESSARY TO AVOID THEM.

REFERENCE:
WATER: 24635-9-D
SEWER: 13003-4-D, 23198-2-D, 24635-9-D, 26086-3-D
STORM DRAIN: N/A
GAS: SDG&E 15630-118960, 15630-118965
ELECTRIC: SDG&E 15630-118960, 15630-118965
CABLE TV: TIME WARNER CABLE
TELEPHONE: AT&T PB1113DB, PB113DD
IMPROVEMENTS:
100' SCALE/FIELD BOOK: B17S
THOMAS BROS.: 1267

RETIREMENTS:
10" FM - 14' - 1993

SCOPE OF WORK GENERALLY CONSISTS OF:
1. CONSTRUCT 10" FORCE MAIN
2. CONSTRUCT 12" GRAVITY SEWER
3. RECONFIGURE PIPING INSIDE PUMP STATION
4. CONSTRUCT DISCHARGE MANHOLE
5. CONSTRUCT VALVE VAULT WITH INTER-TIE PIPING

SPS 14 - MISSION BAY PLACE

C-3

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 14 - MISSION BAY PLACE
STA 0+66.57 TO 6+44.5± (LINE C)

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 13 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

218-1689 CCS27 COORDINATE
1858444, 6250407 CCS83 COORDINATE

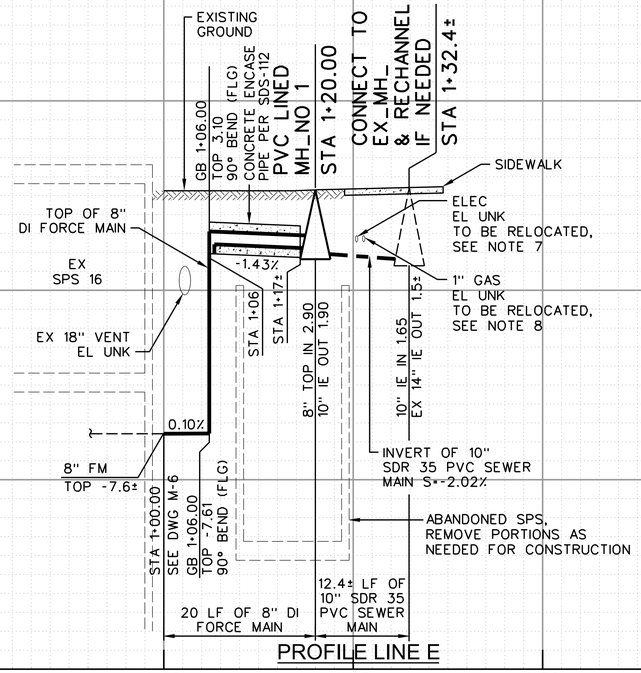
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

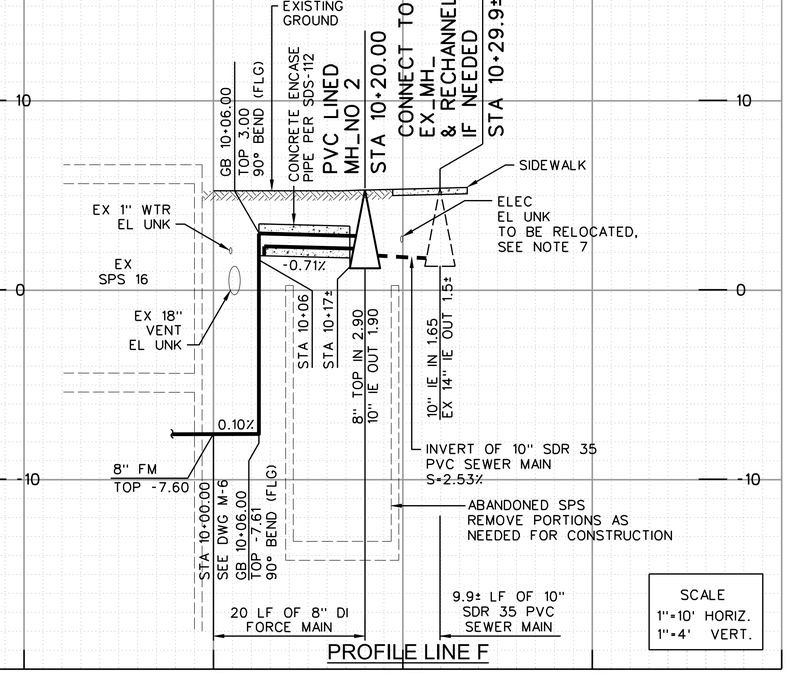
38545-13-D

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

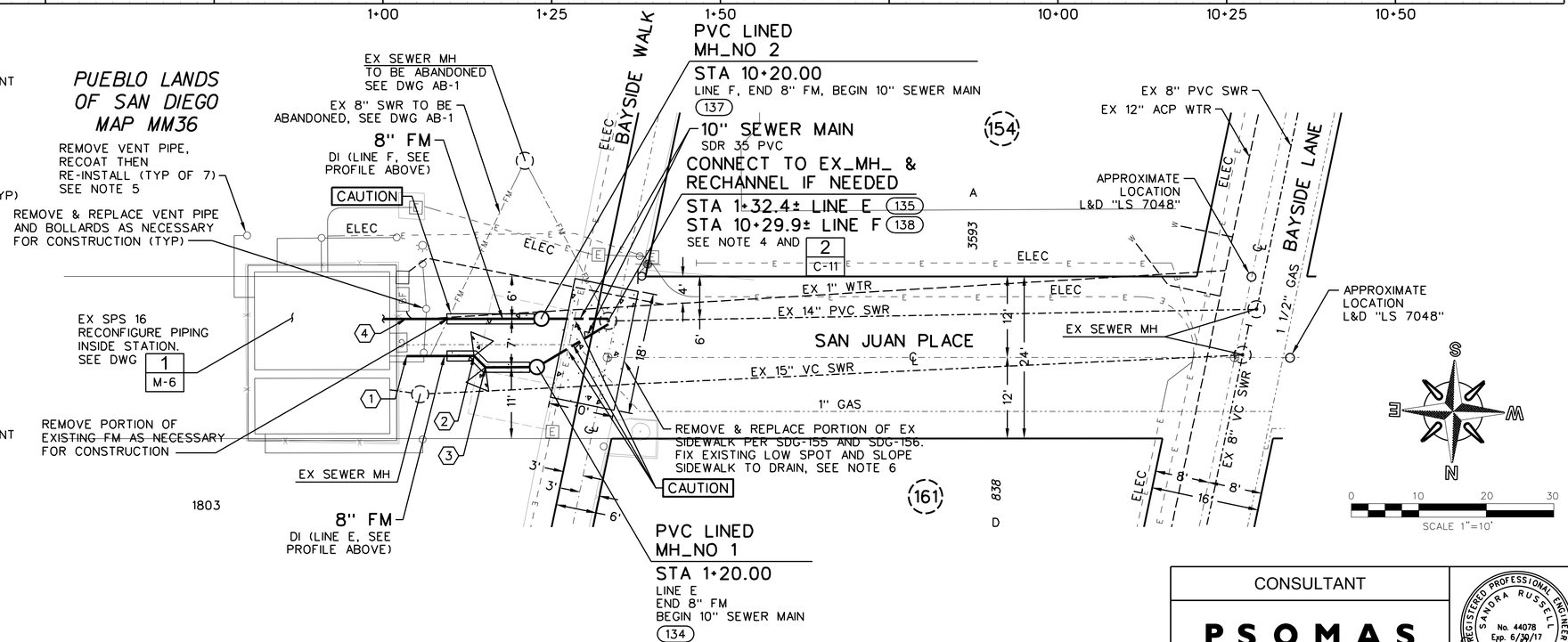




SCALE
1"=10' HORIZ.
1"=4' VERT.

NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. REHABILITATE EX SWR MH PER DETAILS ON DWG C-13.
5. VENT PIPE RE-COATING TO MATCH EXISTING.
6. SIDEWALK SLOPE CANNOT EXCEED 5% LONGITUDINALLY AND 2% CROSS SLOPE. NEW SIDEWALK SHALL BE FLUSH WITH EXISTING (NO LIPS OR RAISED EDGES).
7. CONTRACTOR TO RELOCATE ELECTRIC LINE AS NECESSARY. COORDINATE ALL WORK WITH CITY PROJECT MANAGER.
8. EXISTING GAS SERVICE TO BE RELOCATED AS NECESSARY. COORDINATE WORK WITH SDG&E AND CITY PROJECT MANAGER.



REFERENCE:
WATER: 24635-9-D
SEWER: 24635-9-D, 24635-18-D
STORM DRAIN: N/A
GAS: SDG&E 15630-118990, 15630-118995
ELECTRIC: SDG&E 15630-118990, 15630-118995
CABLE TV: N/A
TELEPHONE: N/A
IMPROVEMENTS:
100' SCALE/FIELD BOOK: B16S
THOMAS BROS.:

RETIREMENTS:
8" FM - 60' - 1993
SMH - 1993

SCOPE OF WORK GENERALLY CONSISTS OF:
1. CONSTRUCT 8" FORCE MAINS
2. CONSTRUCT 10" GRAVITY LINES
3. RECONFIGURE PIPING INSIDE PUMP STATION
4. CONSTRUCT 2 DISCHARGE MANHOLES
5. REMOVE & REPLACE PORTION OF SIDEWALK
6. RE-COAT VENT PIPES

SPS 16 - SAN JUAN PLACE

C-4

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 16 - SAN JUAN PLACE
STA 1+00.00 TO 1+32.4± (LINE E)
STA 10+00.00 TO 10+29.9± (LINE F)

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 14 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

APPROVED FOR CITY ENGINEER 06/23/2017 DATE
DEBBIE VAN MARTIN PRINT DCE NAME C62882 RCE #

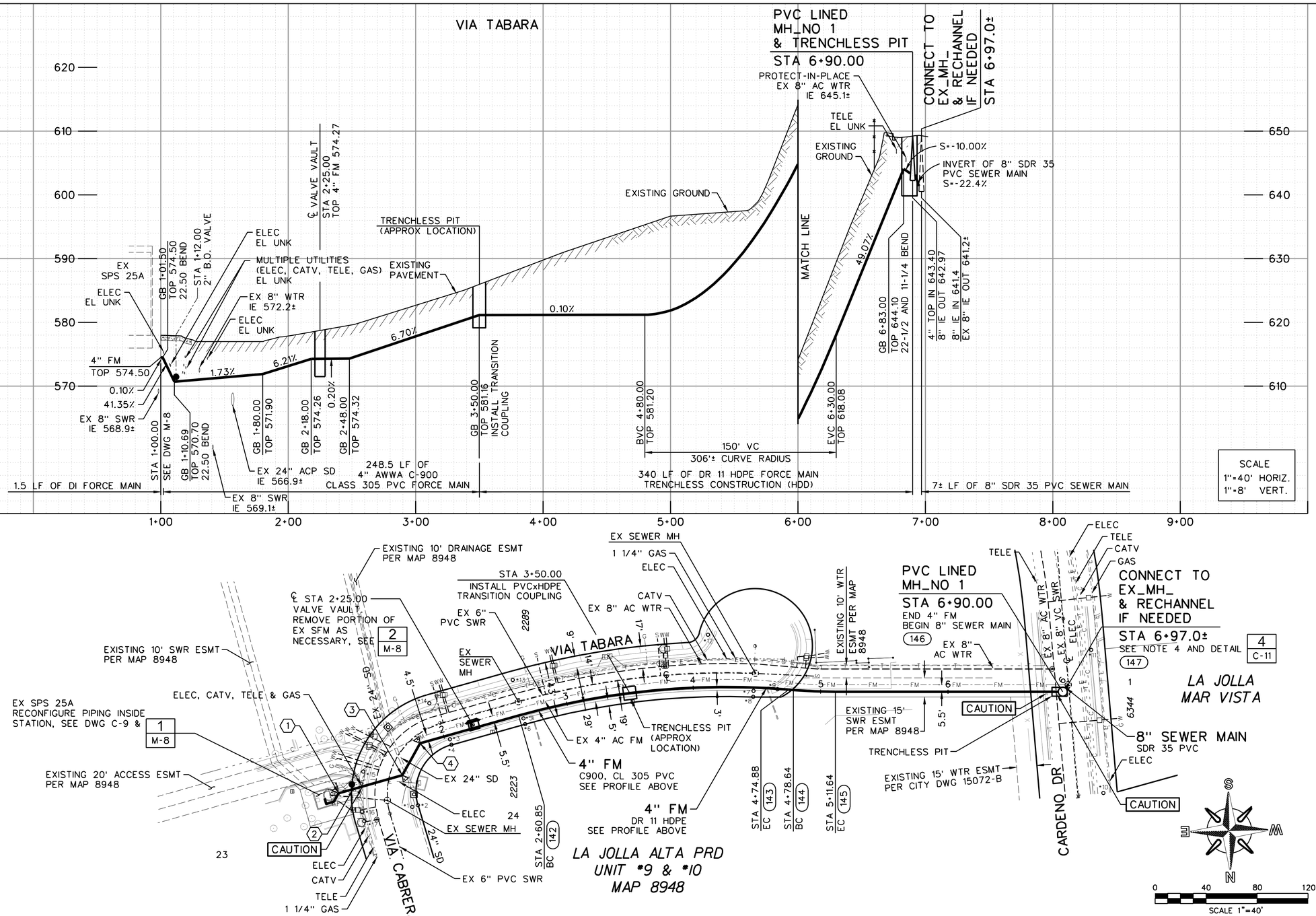
SUBMITTED BY RYAN GREEK PROJECT MANAGER
CHECKED BY LUIS CHAVEZ PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

222-1689 CCS27 COORDINATE
1862444, 6250407 CCS83 COORDINATE

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

38545-14-D



NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. REHABILITATE EX SWR MH PER DETAILS ON DWG C-13.
5. CONTRACTOR TO SUPPORT ALL UTILITIES CROSSING EXCAVATIONS.

FOUND SURVEY MONUMENTS

No.	Description
1	CHSL
2	1/2" SQR PIN
3	CHSL
4	1/2" SQR PIN
5	CHSL
6	1/2" SQR PIN
7	CHSL
8	1/2" SQR PIN
9	L&D "LS 2813"
10	L&D "RCE 1534"
11	L&D "RCE 1534"
12	BRK NAIL HOLE
13	L&D "LS 2813"
14	BRK NAIL HOLE
15	L&D "LS 2813"
16	L&D "LS 2813"
17	BRK NAIL HOLE

REFERENCE:
WATER: 17564-2-D, 17564-5-D, 17564-7-D
SEWER: 17564-2-D, 17564-5-D, 17564-7-D
STORM DRAIN: 17564-5-D
GAS: SDG&E 15637-119175, 15645-119175
ELECTRIC: SDG&E 15645-119175
CABLE TV: N/A
TELEPHONE: AT&T LJ0805AA, LJ0805AB
IMPROVEMENTS:
100' SCALE/FIELD BOOK: B11S
THOMAS BROS.:

SCOPE OF WORK GENERALLY CONSISTS OF:

1. CONSTRUCT 4" FORCE MAIN
2. CONSTRUCT 8" GRAVITY LINE
3. RECONFIGURE PIPING INSIDE PUMP STATION
4. CONSTRUCT DISCHARGE MANHOLE
5. CONSTRUCT VALVE VAULT WITH INTER-TIE PIPING

SPS 25A - VIA TABARA

C-5

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 25A - VIA TABARA
STA 1+00.00 TO 6+97.0±

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 15 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER
SANDRA RUSSELL
No. 44078
Exp. 6/30/17
Civil
STATE OF CALIFORNIA
5/4/17

APPROVED 06/23/2017
FOR CITY ENGINEER DATE
DEBBIE VAN MARTIN C62882
PRINT DCE NAME RCE #

SUBMITTED BY
RYAN GREEK
PROJECT MANAGER

CHECKED BY
LUIS CHAVEZ
PROJECT ENGINEER

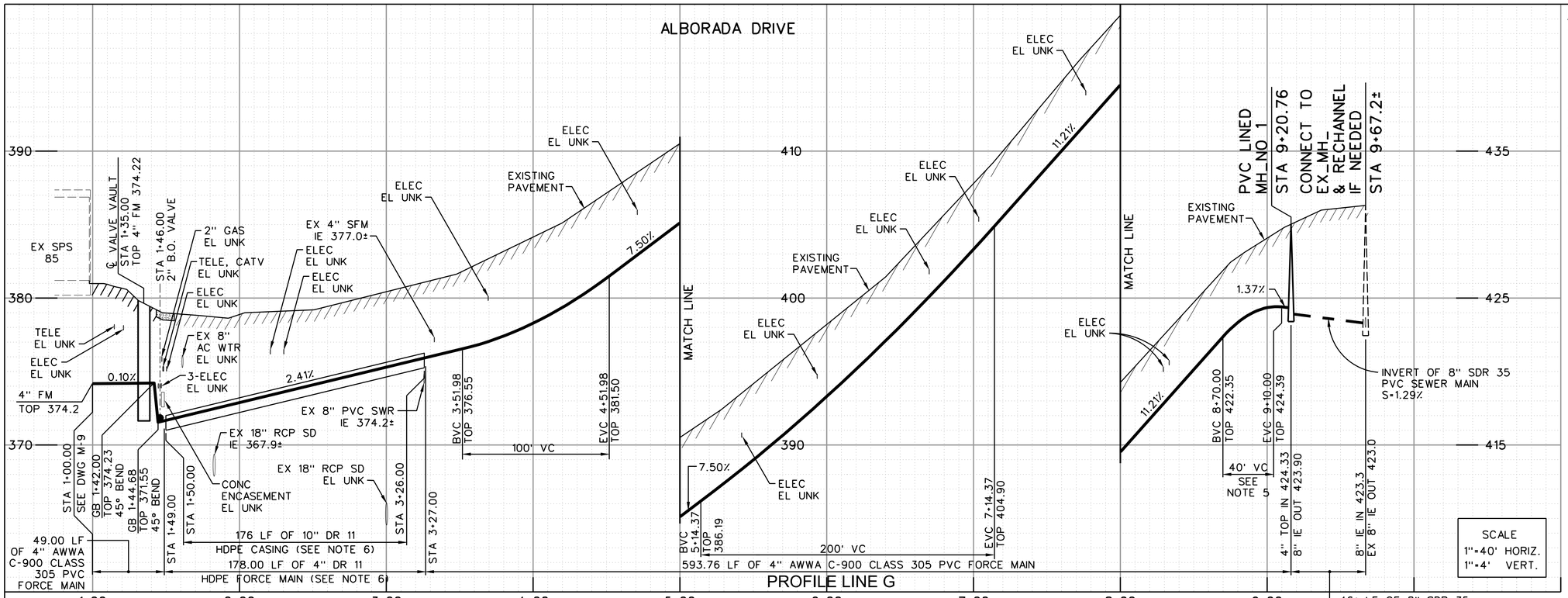
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

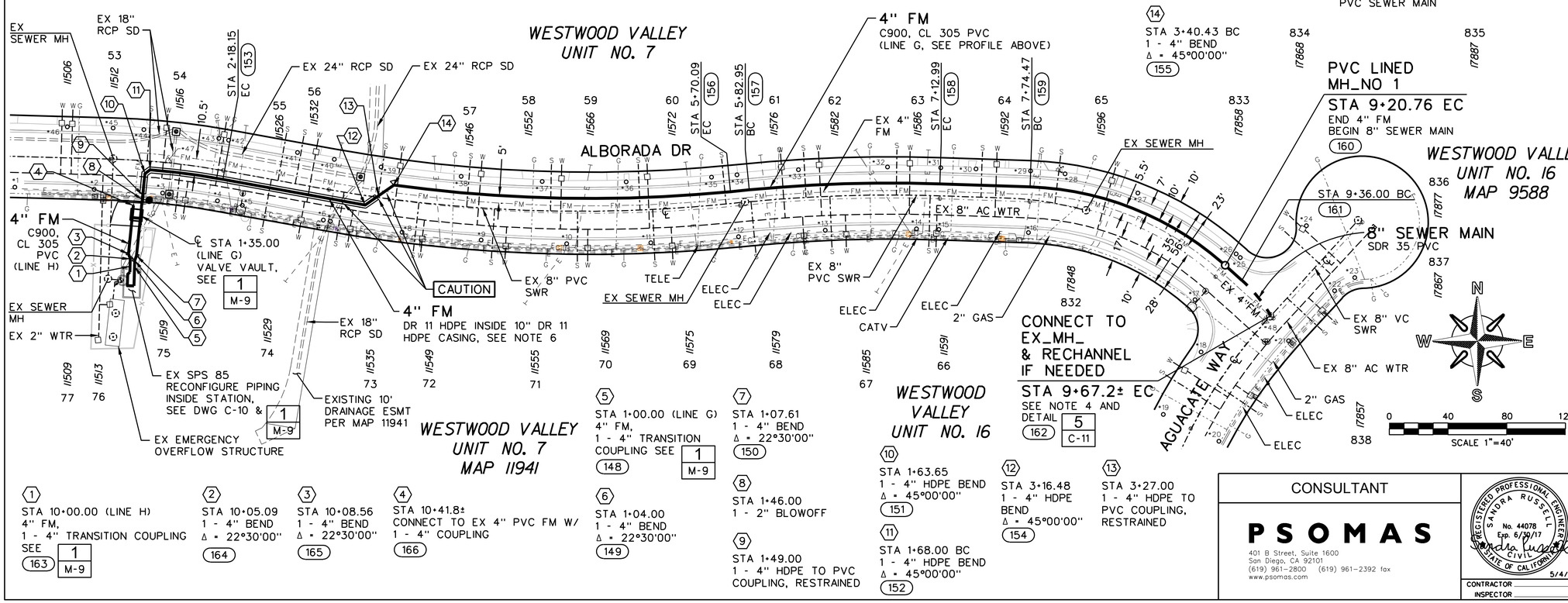
242-1689
CCS27 COORDINATE

1882444, 6250407
CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-15-D





1. STA 1+00.00 (LINE H) 4" FM, 1 - 4" TRANSITION COUPLING SEE 1/M-9
2. STA 10+05.09 1 - 4" BEND Δ = 22°30'00"
3. STA 10+08.56 1 - 4" BEND Δ = 22°30'00"
4. STA 10+41.8± CONNECT TO EX 4" PVC FM W/ 1 - 4" COUPLING
5. STA 1+00.00 (LINE G) 4" FM, 1 - 4" TRANSITION COUPLING SEE 1/M-9
6. STA 1+04.00 1 - 4" BEND Δ = 22°30'00"
7. STA 1+07.61 1 - 4" BEND Δ = 22°30'00"
8. STA 1+46.00 1 - 2" BLOWOFF
9. STA 1+49.00 1 - 4" HDPE TO PVC COUPLING, RESTRAINED
10. STA 1+63.65 1 - 4" HDPE BEND Δ = 45°00'00"
11. STA 1+68.00 BC 1 - 4" HDPE BEND Δ = 45°00'00"
12. STA 3+16.48 1 - 4" HDPE BEND Δ = 45°00'00"
13. STA 3+27.00 1 - 4" HDPE TO PVC COUPLING, RESTRAINED
14. STA 3+40.43 BC 1 - 4" BEND Δ = 45°00'00"

NOTES:

1. SURVEY MONUMENTS SHALL BE PRESERVED PER MONUMENTATION/SURVEY NOTES ON DWG G-1.
2. INSTALL THRUST BLOCKS AT ALL BURIED HORIZONTAL AND VERTICAL BENDS UNLESS NOTED OTHERWISE. THRUST BLOCKS SHALL BE PER STD DWG SDW-151.
3. TRENCH SECTION SHALL BE PER DETAIL 1, DWG C-12.
4. REHABILITATE EX SWR MH PER DETAILS ON DWG C-13.
5. VERTICAL CURVE CAN BE ACHIEVED BY USING 5° HIGH DEFLECTION COUPLINGS.
6. 4"x8" HDPE DUAL CONTAINMENT PIPE AND FITTINGS (DR 11) CAN BE USED AT CONTRACTOR'S OPTION.

FOUND SURVEY MONUMENTS

No.	Description	No.	Description
1	L&D "RCE 8192"	27	"RCE 8195"
2	L&D "RCE 8192"	28	"RCE 8195"
3	L&D "RCE 8192"	29	"RCE 8195"
4	L&D "RCE 8192"	30	"RCE 8195"
5	L&D "RCE 8192"	31	"RCE 8195"
6	L&D "RCE 8192"	32	"RCE 8195"
7	L&D "RCE 8192"	33	BRKN NAIL W/SCRIB IN HOLE
8	L&D "RCE 8192"	34	"RCE 8195"
9	L&D "RCE 8192"	35	"RCE 8195"
10	L&D "RCE 8192"	36	L&D "RCE 8192"
11	L&D "RCE 8192"	37	L&D "RCE 8192"
12	L&D "RCE 8192"	38	L&D "RCE 8192"
13	UNK	39	L&D "RCE 8192"
14	"RCE 8195"	40	L&D "RCE 8192"
15	"RCE 8195"	41	L&D "RCE 8192"
16	"RCE 8195"	42	L&D "RCE 8192"
17	"LS 3499"	43	L&D "RCE 8192"
18	"LS 3499"	44	L&D "RCE 8192"
19	"LS 3499"	45	L&D "RCE 8192"
20	"LS 3499"	46	L&D "RCE 8192"
21	"LS 3499"	47	FOUND WELL MONUMENT 3" BRASS CAP "RCE 8195"
22	"LS 3499"	48	FOUND WELL MONUMENT "LS 3499"
23	"LS 3499"		
24	"LS 3499"		
25	"LS 3499"		
26	"LS 3499"		

REFERENCE:

WATER: 22872-6-D, 22872-21-D
SEWER: 22872-6-D, 22872-21-D
STORM DRAIN: 22872-6-D
GAS: SDG&E 16147-119945, 16147-119950, 16155-119945
ELECTRIC: SDG&E 16147-119945
CABLE TV: TIME WARNER CABLE
TELEPHONE: AT&T RB0308A, RB0308DA, RB0308DB
IMPROVEMENTS:
100' SCALE/FIELD BOOK: K09N
THOMAS BROS.:
HGL:

RETIREMENTS:

4" FM - PVC - 50' - 1994

SCOPE OF WORK GENERALLY CONSISTS OF:

1. CONSTRUCT 4" FORCE MAIN
2. CONSTRUCT 8" GRAVITY LINE
3. RECONFIGURE 4" FORCE MAIN
4. RECONFIGURE PIPING INSIDE PUMP STATION
5. CONSTRUCT DISCHARGE MANHOLE
6. CONSTRUCT VALVE VAULT WITH INTER-TIE PIPING

C-6

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR
SPS 85 - ALBORADA DRIVE
STA 1+00.00 TO 9+67.2± (LINE G)
STA 10+00.00 TO 10+41.8± (LINE H)

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 16 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — 06/23/2017 DATE — C62882 RCE #

SUBMITTED BY: RYAN GREEK PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

318-1743 CCS27 COORDINATE
1958444, 6304407 CCS83 COORDINATE
38545-16-D

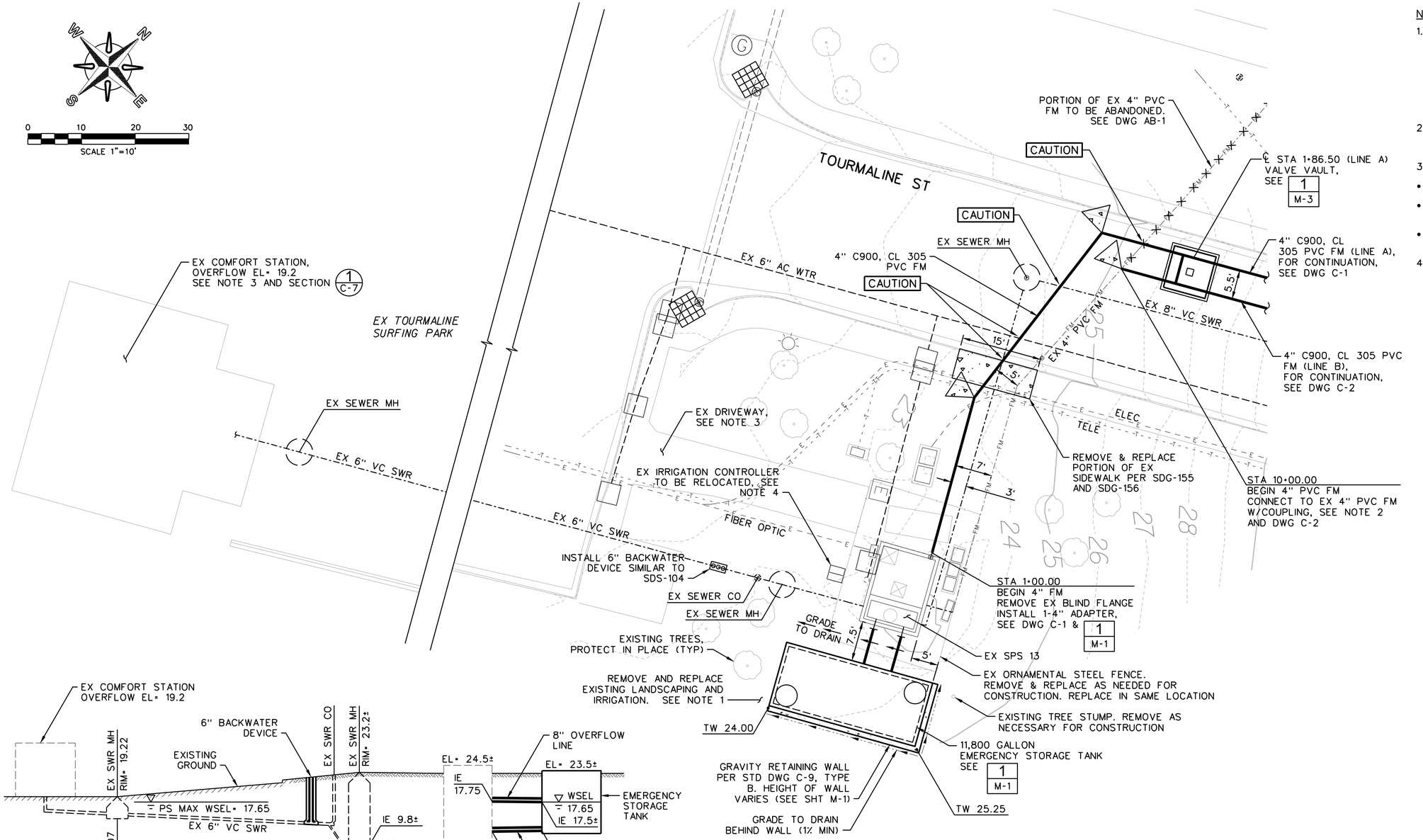
CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

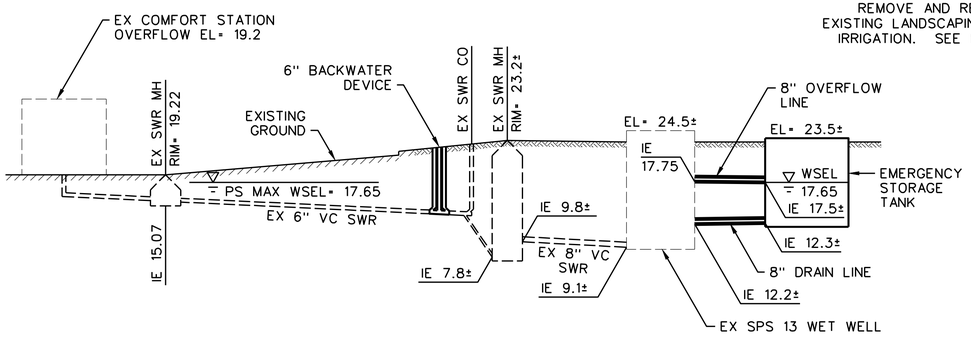
REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA 5/4/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SPS 85 - ALBORADA DRIVE



SPS 13



EMERGENCY OVERFLOW TANK WSEL SCHEMATIC 1/C-7
NOT TO SCALE

NOTES:

1. REMOVE AND REPLACE LANDSCAPE AND IRRIGATION LINES AS NECESSARY FOR CONSTRUCTION. INSTALLATION OF THE IRRIGATION SYSTEM SHALL BE COORDINATED WITH CITY OF SAN DIEGO PARKS AND RECREATION STAFF TO ASSURE FULL IRRIGATION COVERAGE IS PROVIDED. LANDSCAPE GRASS TO BE REPLACED IN KIND. IRRIGATION SYSTEM TO BE REPLACED WITH INDUSTRIAL QUALITY PARTS AS APPROVED BY PARKS AND RECREATION STAFF.
2. CONTRACTOR TO FIELD VERIFY EXISTING FORCEMAIN PIPE MATERIAL, DIMENSIONS AND LOCATION PRIOR TO ORDERING COUPLING AND START OF WORK.
3. DURING CONSTRUCTION, THE CONTRACTOR SHALL:
   - KEEP THE EXISTING COMFORT STATION OPERATIONAL
   - PROVIDE ACCESS TO THE EXISTING SEWER PUMP STATION AND ADJACENT DRIVEWAY
   - KEEP AT LEAST ONE LANE OF TRAFFIC OPEN ON TOURMALINE STREET
4. CONTRACTOR TO RELOCATE EXISTING IRRIGATION CONTROLLER SO IT IS OUTSIDE THE EXISTING FENCE. CONTROLLER SHALL BE RE-INSTALLED ON A 48" HIGH, 3/16" THICK TYPE 316 STAINLESS STEEL BACK BOARD BOLTED TO THE FENCE WITH TYPE 316 STAINLESS STEEL HARDWARE. COORDINATE LOCATION AND WORK WITH PARKS AND RECREATION STAFF.

SPS 13 SITE PLAN

C-7

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 13
SITE PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 17 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER

CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE

1870444, 6250407
1874444, 6250407 CCS83 COORDINATE

38545-17-D

CONSULTANT

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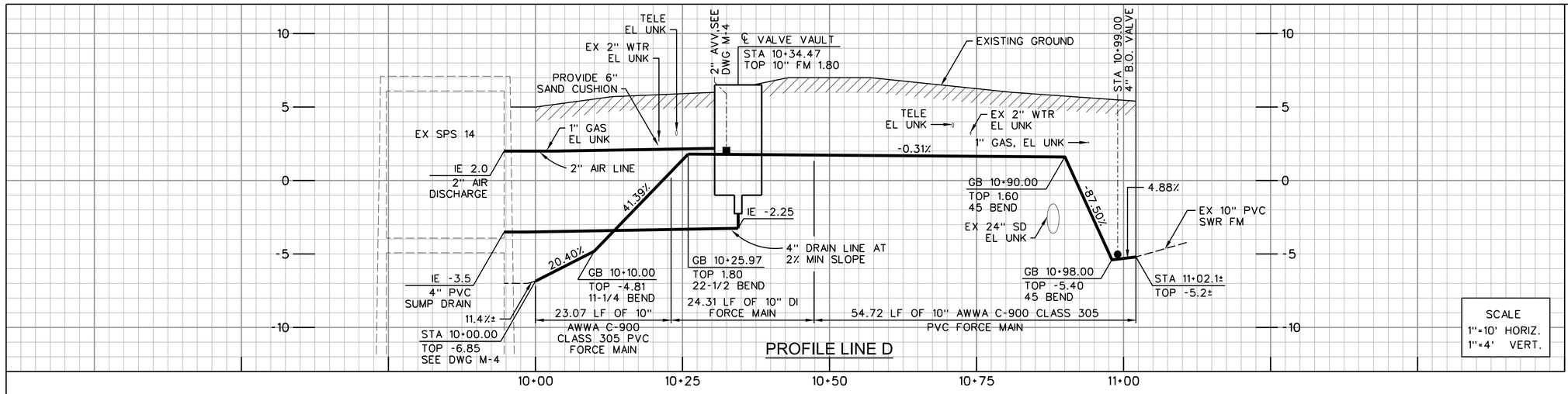
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____



PROFILE LINE D

SCALE
1"=10' HORIZ.
1"=4' VERT.

① STA 0+65.07 (LINE C)
10" DI FM
SEE 1 / M-4
(113)

② STA 0+94.43
1 - 10" BEND
Δ = 45°00'00" LT
(114)

③ STA 1+00.00 (LINE C)
SEE PLAN & PROFILE DWG C-3
1 - 10" BEND
Δ = 90°00'00"
(116)

④ STA 10+00.00 (LINE D)
BEGIN 10" PVC/DI FM
REMOVE EX BEND, THRUST
BLOCK & CONNECT TO EX
10" FM WITH TRANSITION
COUPLING
(122)

⑤ STA 10+01.33
1 - 10" BEND
Δ = 45°00'00"
(123)

⑥ STA 10+02.76
1 - 10" BEND
Δ = 45°00'00"
(124)

⑦ STA 10+21.17
1 - 10" BEND
Δ = 45°00'00"
(125)

⑧ STA 10+27.05
1 - 10" BEND
Δ = 45°00'00"
(126)

⑨ STA 10+44.62
1 - 10" BEND
Δ = 90°00'00"
(127)

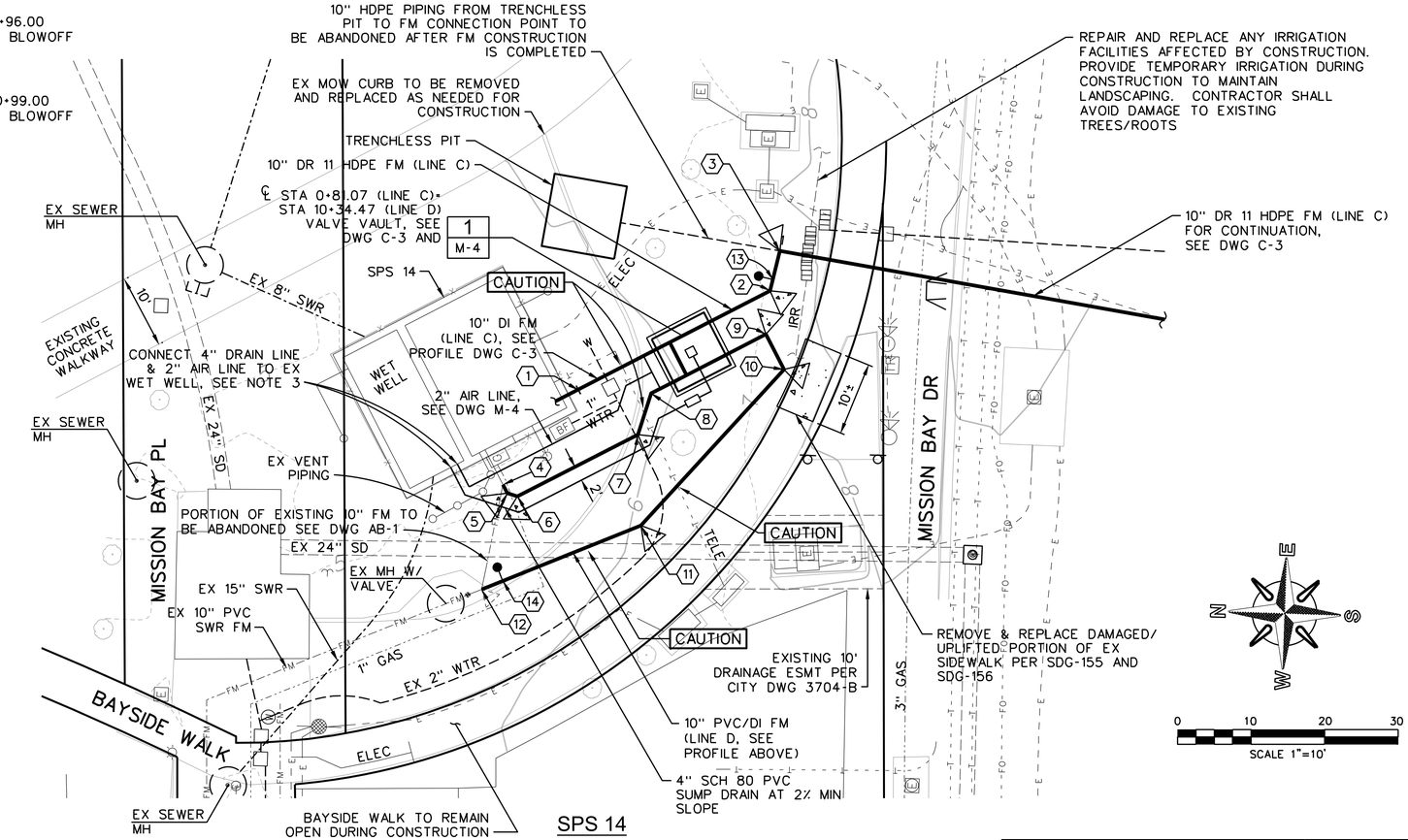
⑩ STA 10+50.00
1 - 10" BEND
Δ = 45°00'00"
Δ = 22°30'00"
(128)

⑪ STA 10+78.80
1 - 10" BEND
Δ = 22°30'00"
(129)

⑫ STA 11+02.1±
REMOVE EX BEND, THRUST
BLOCK AND CONNECT TO
EX 10" FM WITH RESTRAINED
COUPLING, SEE NOTE 1 AND 2
(130)

⑬ STA 0+96.00
1 - 4" BLOWOFF

⑭ STA 10+99.00
1 - 4" BLOWOFF



NOTES:

1. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
2. RESTRAINED COUPLING SHALL BE EBAA IRON SERIES 3800 OR APPROVED EQUAL.
3. PIPE SHALL BE CUT FLUSH WITH INSIDE FACE OF WALL. PIPE PENETRATION SHALL BE PER DETAIL 5, DWG M-10.

SPS 14 SITE PLAN AND LINE D FM PROFILE

C-8

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 14
SITE PLAN AND LINE D FM PROFILE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 18 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
401 B Street, Suite 1600
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www.psomas.com

REGISTERED PROFESSIONAL ENGINEER
SANDRA RUSSELL
No. 44078
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA
5/4/17

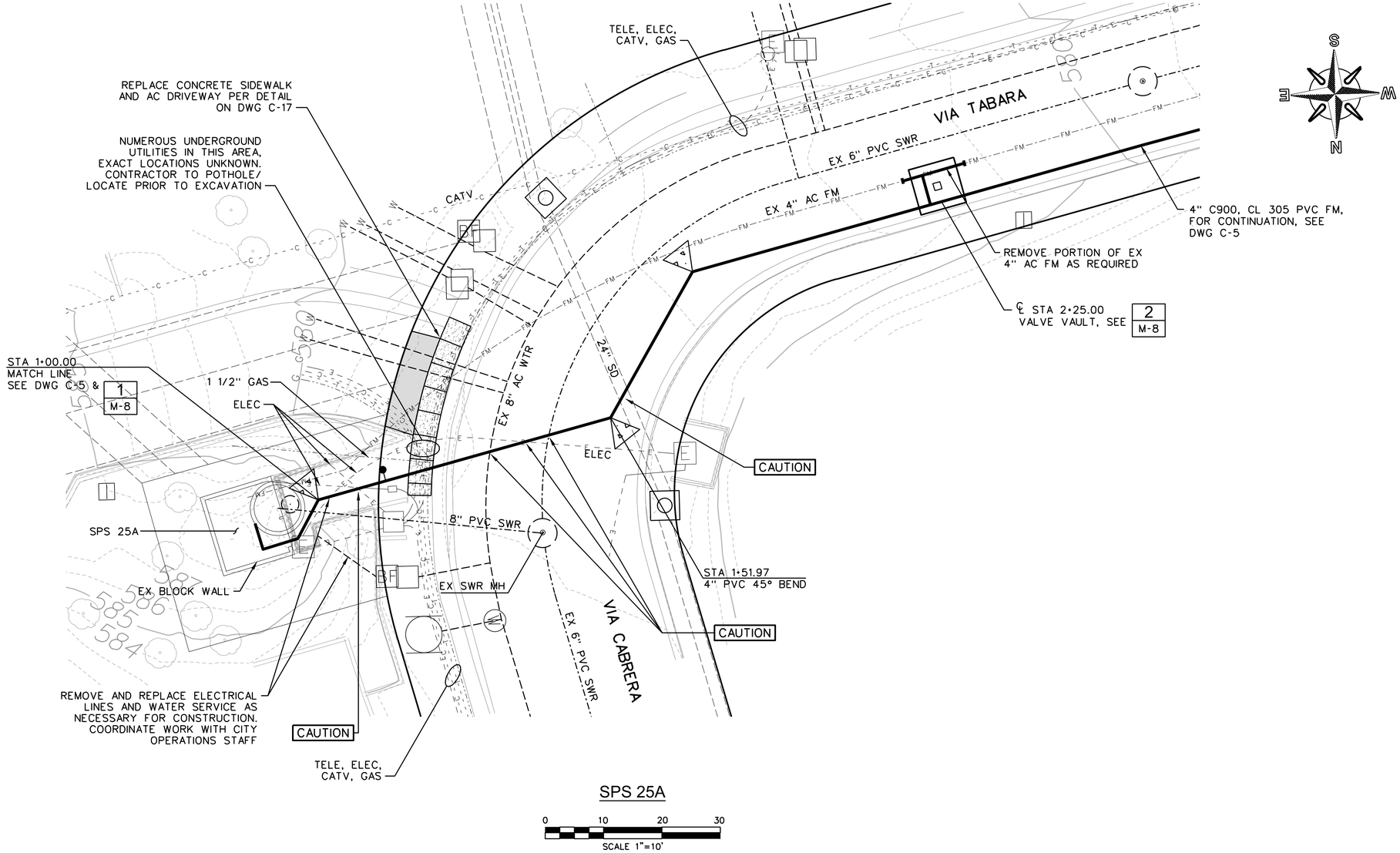
APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY RYAN GREEK PROJECT MANAGER
CHECKED BY LUIS CHAVEZ PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

218-1689 CCS27 COORDINATE
1858444, 6250407 CCS83 COORDINATE
38545-18-D

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED



SPS 25A

0 10 20 30

SCALE 1"=10'

SPS 25A SITE PLAN

C-9

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 25A
SITE PLAN

CONSULTANT

PSOMAS

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REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 19 OF 49 SHEETS

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # CE2882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

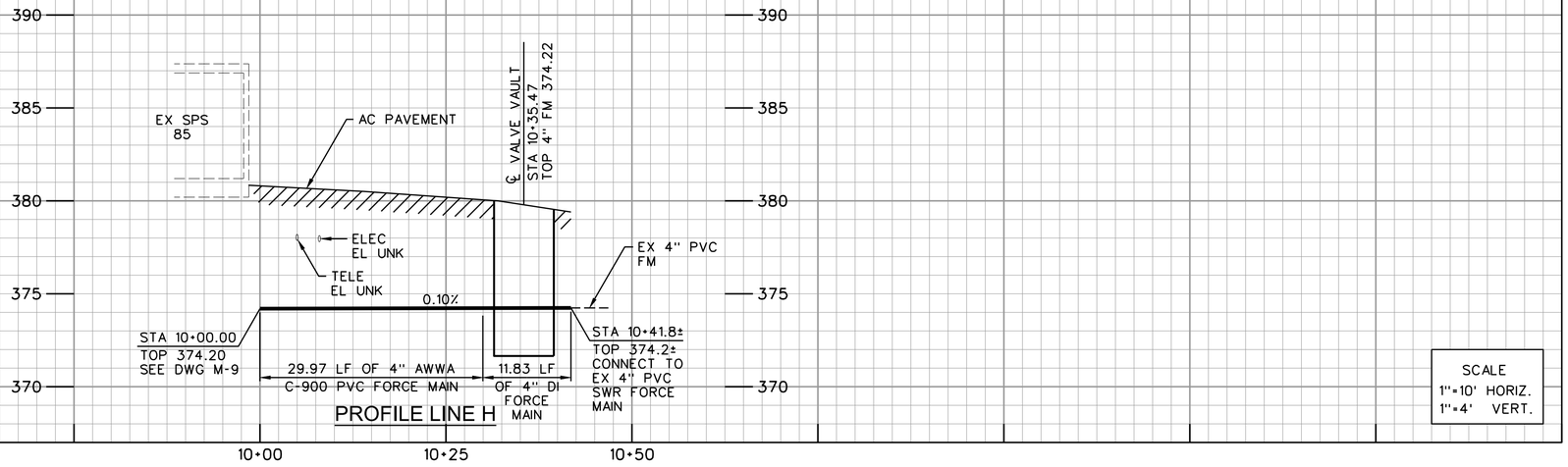
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

WATER WBS N/A
SEWER WBS B-00501

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

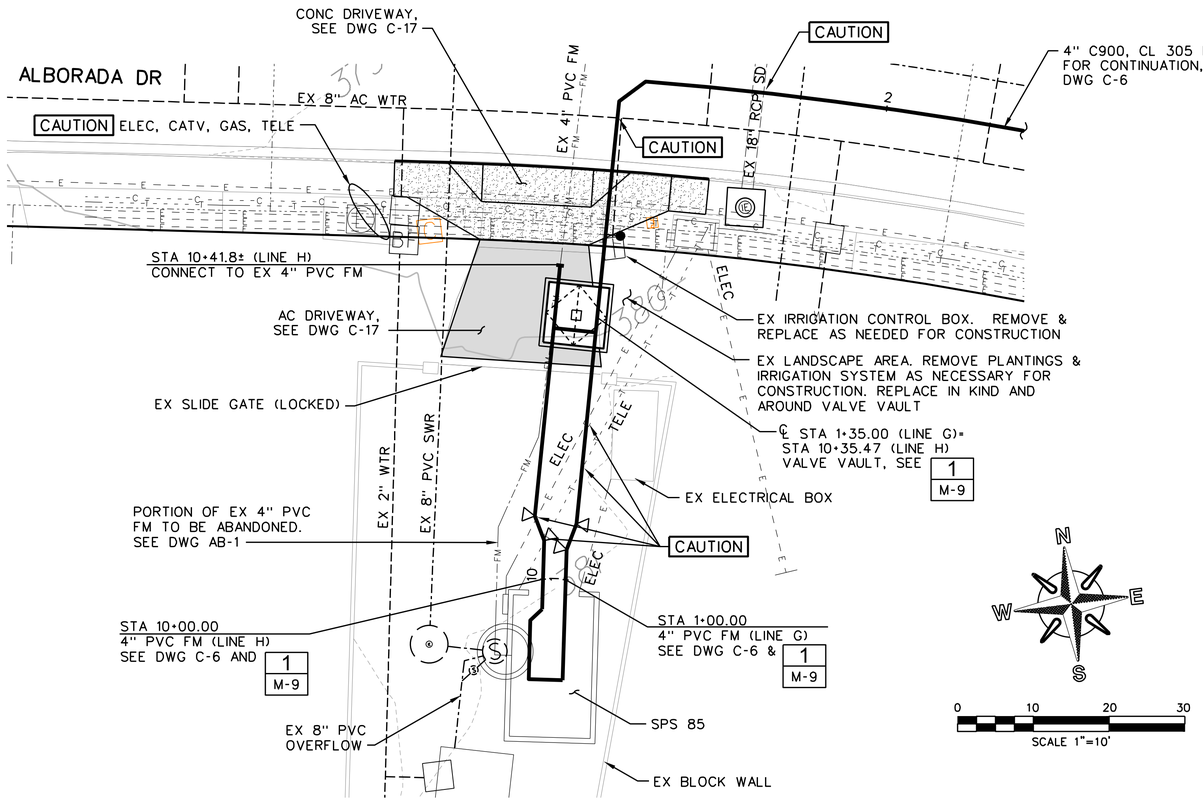
242-1689 CCS27 COORDINATE
1882444, 6250407 CCS83 COORDINATE

38545-19-D



PROFILE LINE H

SCALE
1"=10' HORIZ.
1"=4' VERT.



SPS 85

SPS 85 SITE PLAN AND LINE H FM PROFILE

C-10

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 85
SITE PLAN AND LINE H FM PROFILE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 20 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

318-1743 CCS27 COORDINATE
1958444, 6304407 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-20-D

CONSULTANT

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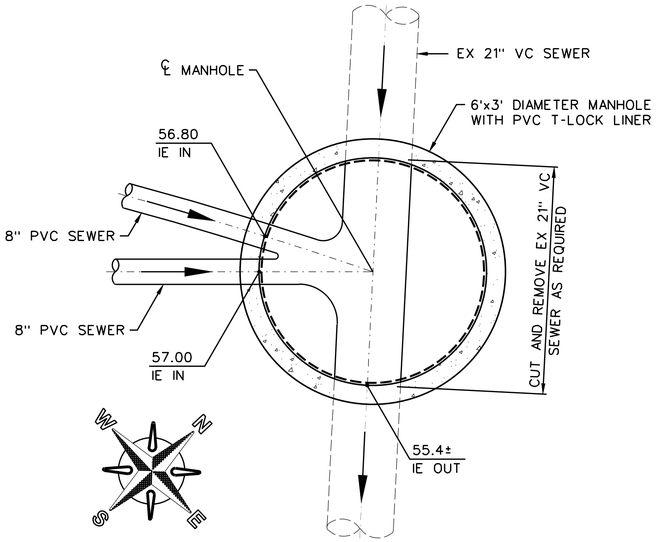
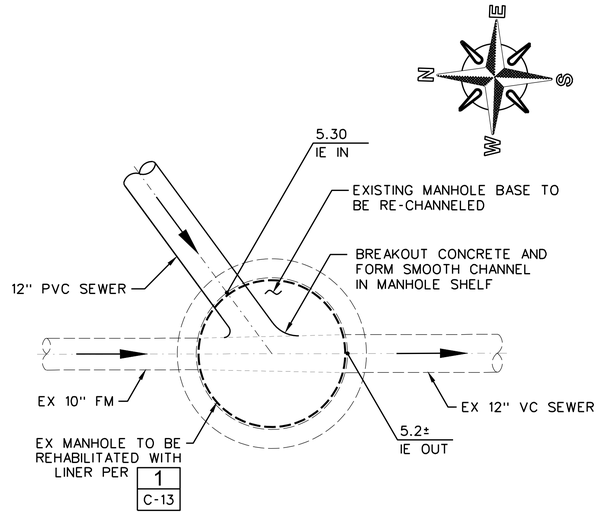
REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17



SPS 13 — MANHOLE — 1 / C-11

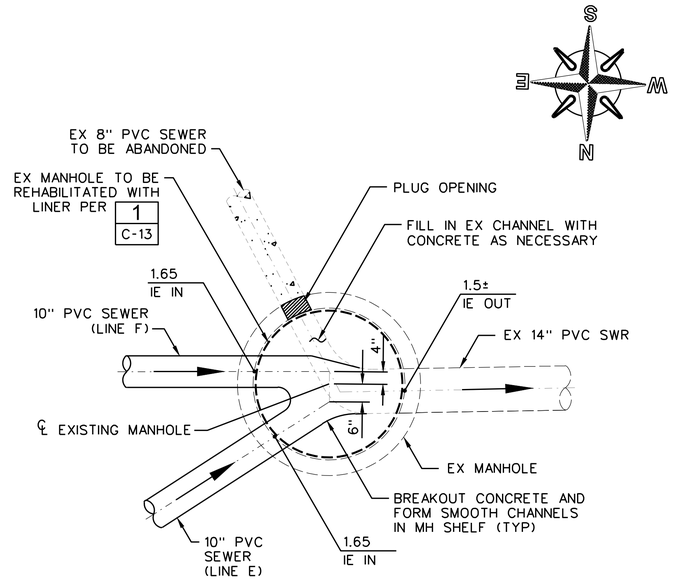
STA 5+90.0± (LINE "A")
STA 14+17± (LINE "B")

2 0 2
SCALE 1/2" = 1'-0"



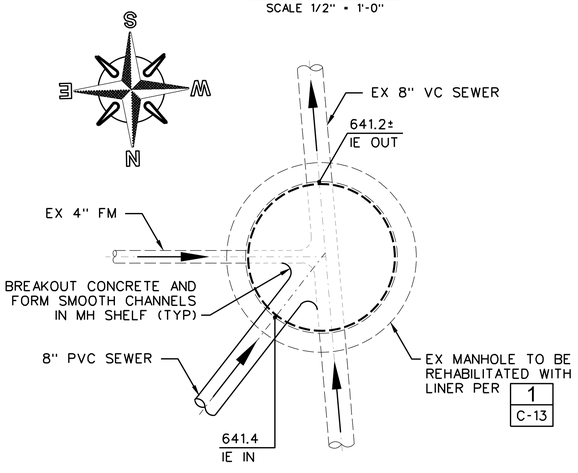
SPS 14 — EXISTING MANHOLE STA 6+44.5± — 2 / C-11

2 0 2
SCALE 1/2" = 1'-0"



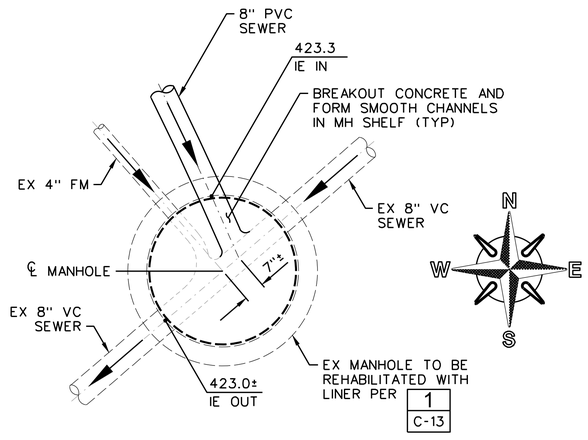
SPS 16 — EXISTING MANHOLE STA 1+32.4± (LINE E) STA 10+29.9± (LINE F) — 3 / C-11

2 0 2
SCALE 1/2" = 1'-0"



SPS 25A — EXISTING MANHOLE STA 6+97.0± — 4 / C-11

2 0 2
SCALE 1/2" = 1'-0"



SPS 85 — EXISTING MANHOLE STA 9+67.2± — 5 / C-11

2 0 2
SCALE 1/2" = 1'-0"

MANHOLE CONNECTION DETAILS

C-11

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

MANHOLE CONNECTION DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 21 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-21-D

CONSULTANT

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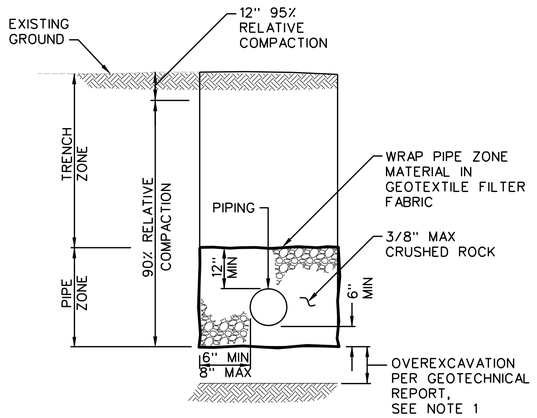
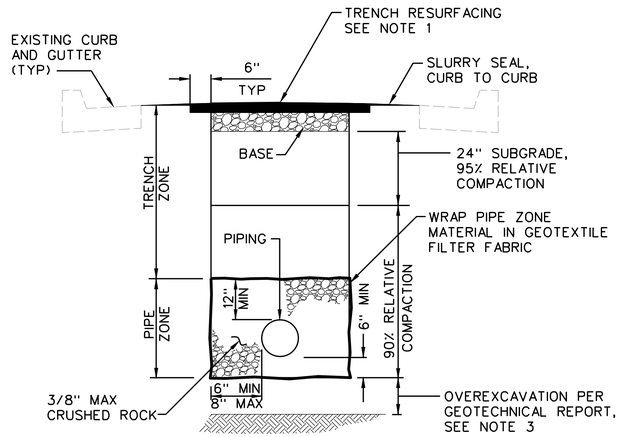
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17



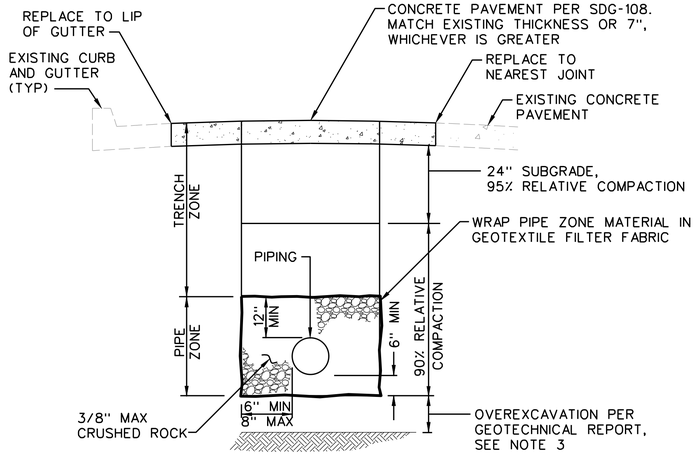
NOTES:
1. WHERE WET & LOOSE OR SOFT SOIL CONDITIONS ARE ENCOUNTERED, THE EXCAVATION SHOULD BE EXTENDED TO APPROX 1' OR MORE BELOW THE PIPE INVERT ELEVATION & SHOULD BE BACKFILLED WITH CRUSHED ROCK, WRAPPED IN FILTER FABRIC PER GREENBOOK 213-1.

DIRT / GRASS PIPE TRENCH



NOTES:
1. AC TRENCH RESURFACING TO BE PER SDG-107, TYPE 2.
2. CONCRETE CURBS/GUTTERS/SIDEWALKS SHALL BE REPLACED IN KIND.
3. WHERE WET & LOOSE OR SOFT SOIL CONDITIONS ARE ENCOUNTERED, THE EXCAVATION SHOULD BE EXTENDED TO APPROX 1' OR MORE BELOW THE PIPE INVERT ELEVATION & SHOULD BE BACKFILLED WITH CRUSHED ROCK, WRAPPED IN FILTER FABRIC PER GREENBOOK 213-1.

AC PAVEMENT PIPE TRENCH



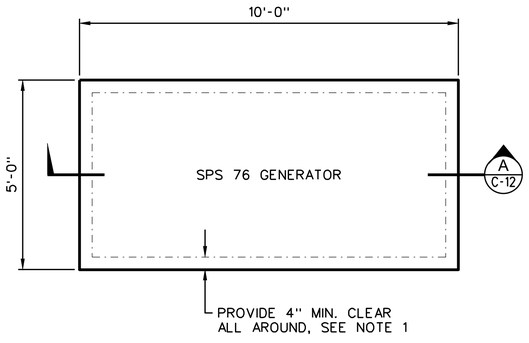
NOTES:
1. CONCRETE TRENCH PAVEMENT SHALL BE REPLACED PER SDG-108. PROVIDE 24" 95% RELATIVE COMPACTION BENEATH CONCRETE.
2. CONCRETE CURBS/GUTTERS/SIDEWALKS SHALL BE REPLACED IN KIND.
3. WHERE WET & LOOSE OR SOFT SOIL CONDITIONS ARE ENCOUNTERED, THE EXCAVATION SHOULD BE EXTENDED TO APPROX 1' OR MORE BELOW THE PIPE INVERT ELEVATION & SHOULD BE BACKFILLED WITH CRUSHED ROCK, WRAPPED IN FILTER FABRIC PER GREENBOOK 213-1.

CONCRETE PAVEMENT PIPE TRENCH

PIPE TRENCH DETAILS

NOT TO SCALE

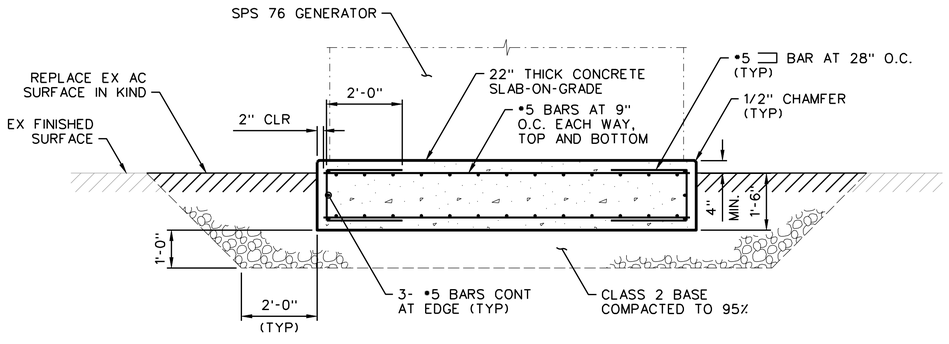
1
C-12



PLAN

NOTES:

1. GENERATOR DIMENSIONS AND WEIGHT VARIES BY MANUFACTURER. CONTRACTOR AND MANUFACTURER SHALL VERIFY AND ADJUST CONCRETE SLAB DIMENSIONS AND REINFORCING AS NECESSARY TO SUPPORT NEW GENERATOR.
2. ANCHOR GENERATOR PER MANUFACTURER'S RECOMMENDATIONS.



SECTION A-A

SPS 76 GENERATOR EQUIPMENT SLAB

NOT TO SCALE

2
C-12

DETAILS

C-12

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 22 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN (PRINT DCE NAME) — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-22-D

CONSULTANT

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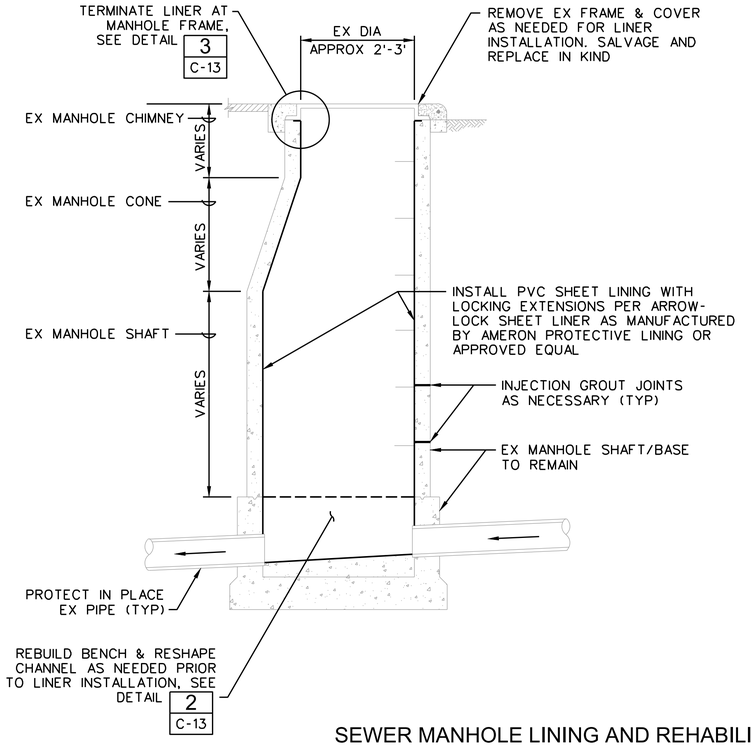
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17

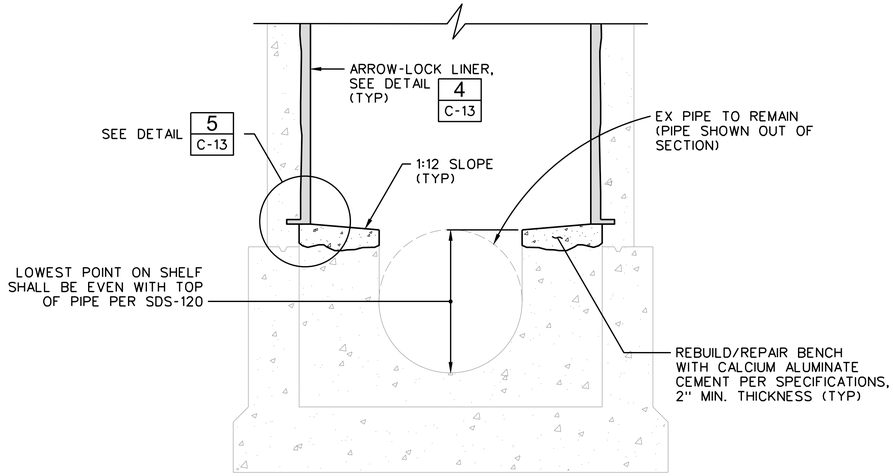


SEWER MANHOLE LINING AND REHABILITATION — 1 C-13

NOT TO SCALE

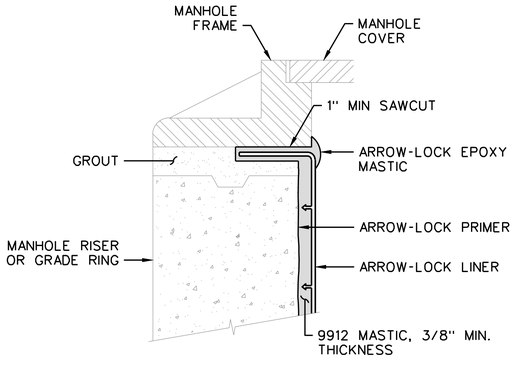
MANHOLE REHABILITATION NOTES:

1. MANHOLE REHABILITATION SHALL BE PER WHITEBOOK/ GREENBOOK SPECIFICATION SECTION 500-2 AND THE PROJECT SPECIFICATIONS.
2. IN GENERAL, REHABILITATION WORK WILL INCLUDE BUT NOT BE LIMITED TO:
   - CLEAN, INSPECT AND DOCUMENT EXISTING CONDITIONS AND DIMENSIONS IN MANHOLE
   - PRESSURE WASH ALL INTERIOR SURFACES
   - CUT AND REMOVE ANY EXISTING PVC LINER ON WALLS AND BENCH. ONLY EXISTING MANHOLE AT SPS 16 HAS AN EXISTING PVC LINER, ALL OTHER MANHOLES DO NOT.
   - REMOVE STEPS 1/2" INTO MANHOLE WALL. FILL HOLE WITH REPAIR MORTAR
   - STOP ACTIVE INFILTRATION INTO MANHOLE BY INJECTION GROUTING AS NECESSARY
   - APPLY CALCIUM ALUMINATE CEMENT (FIBER REINFORCED) OVER BENCH FOR REPAIRS PER SPECIFICATIONS. USE MATERIAL ALSO FOR MAKING SPOT REPAIRS AS NECESSARY PER SPECIFICATIONS
   - INSTALL A PVC LINER SYSTEM ON ALL INTERIOR WALLS. LINER SHALL BE ARROW-LOCK OR APPROVED EQUAL
3. IN GENERAL, EXISTING MANHOLES MAY BE ECCENTRIC OR CONCENTRIC. CONTRACTOR TO FIELD VERIFY EXISTING MANHOLE CONFIGURATION, MATERIAL, DIMENSIONS AND ELEVATIONS PRIOR TO ORDERING SUPPLIES FOR LINING OPERATION, AS NECESSARY.



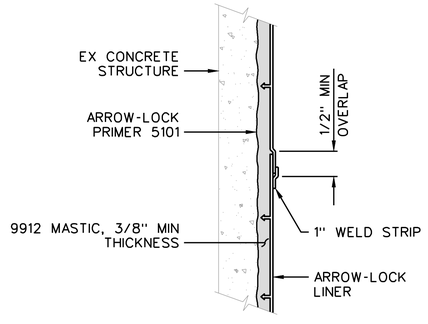
LINER TERMINATION AND BENCH REPAIR — 2 C-13

NOT TO SCALE



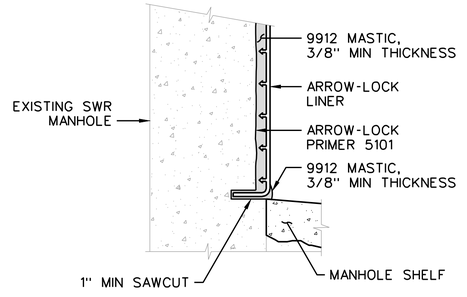
TERMINATION OF LINER AT MANHOLE FRAME — 3 C-13

NOT TO SCALE



LINER JOINTS FOR CONCRETE STRUCTURE — 4 C-13

NOT TO SCALE



ARROW-LOCK TERMINATION — 5 C-13

NOT TO SCALE

DETAILS

C-13

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 23 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # 62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

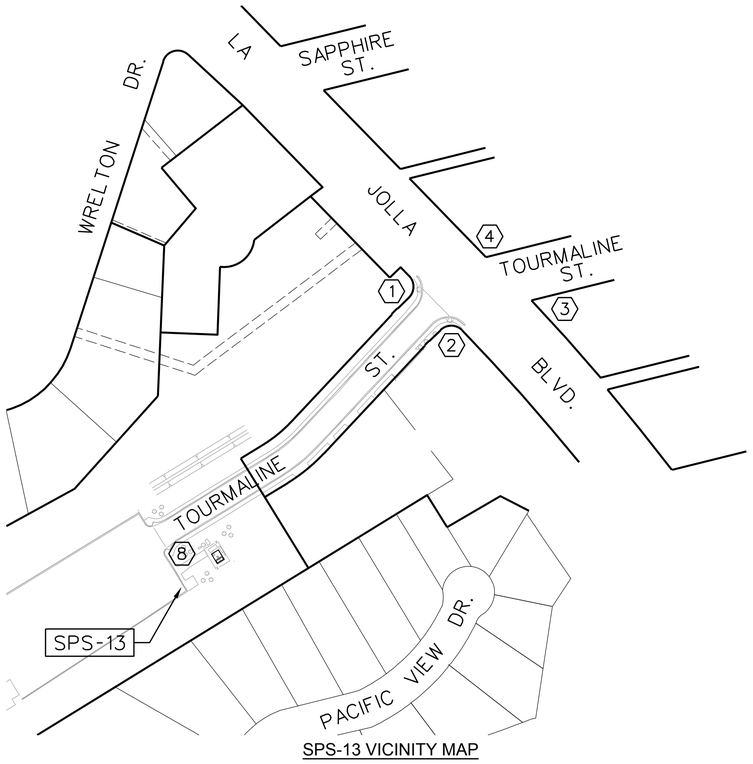
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-23-D

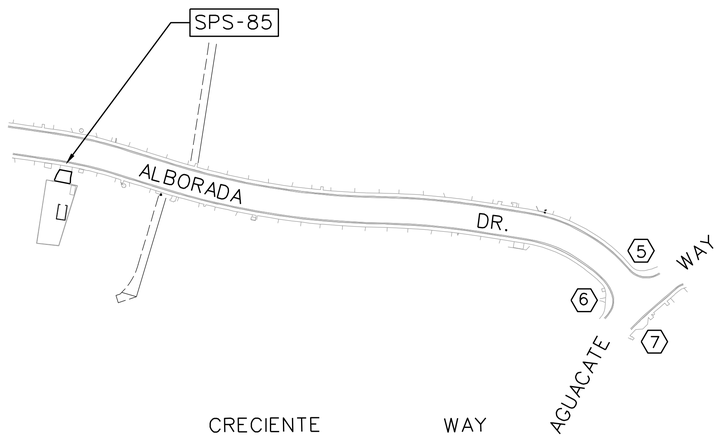
CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 — Exp. 6/30/17 — Civil — STATE OF CALIFORNIA — 5/4/17



SPS-13 VICINITY MAP



SPS-85 VICINITY MAP

NOTES:

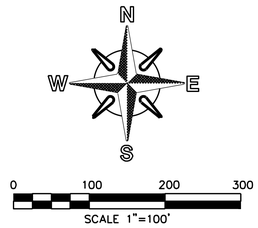
1. REMOVE EXIST CURB, GUTTER, SIDEWALK AND PAVEMENT AS REQUIRED TO CONSTRUCT NEW CURB RAMP IN CONFORMANCE WITH STANDARD DRAWING AS SHOWN IN THE PLAN DETAIL. REPLACE SIDEWALK ADJACENT TO NEW RAMP TO PROVIDE SMOOTH TRANSITION TO EXISTING SIDEWALK. PROTECT EXISTING PRIVATE IMPROVEMENTS BEHIND SIDEWALK.
2. PATCH PAVEMENT REMOVED WITH FULL DEPTH AS COMPACTED TO 95% PER SDG-113. REPLACE CURB AND GUTTER IN CONFORMANCE WITH STANDARD DRAWING SDG-156 AND PROVIDE SMOOTH TRANSITION TO EXISTING CURB AND GUTTER.
3. RE-STRIPE CROSSWALK AFTER SLURRY FILL.
4. THE REQUIRED DETECTABLE WARNING (TRUNCATED DOMES) ON CURB RAMPS ARE TO COMPLY WITH THE STANDARDS (SDG-130) AND SPECIFICATIONS. A 6"x"6" (MIN) SAMPLE OF THE DETECTABLE WARNING, THE PRODUCTS TEST REPORT AND A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTION MUST BE SUBMITTED TO THE DESIGNATED CITY RESIDENT ENGINEER FOR REVIEW PRIOR TO INSTALLATION. FAILURE TO COMPLY WITH THE STANDARDS, SPECIFICATIONS AND SAMPLE SUBMITTAL REVIEW PROCESS WILL RESULT IN THE REMOVAL OR REPLACEMENT OF THE DETECTABLE WARNING AND/OR CURB RAMPS AT CONTRACTOR'S AND/OR OWNER'S EXPENSE
5. 4'x4' AREA AT BOTTOM OF RAMP (5% MAX SLOPE TOWARD CURB, 1.5% MAX CROSS SLOPE).
6. DIMENSIONS SHOWN WITH ASTERISK (*) ARE LENGTHS MEASURED ALONG CURB LINE.
7. CONTRACTOR SHALL HAVE INSPECTOR CHECK ALL RAMP DIMENSIONS AND SLOPES TO VALIDATE FORMWORK PRIOR TO CONCRETE POUR.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARK WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED WITH APPROPRIATE ORNAMENTATION BY A LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR ACT.

   IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION MUST BE NOTIFIED, IN WRITING, AT LEAST 3 DAYS PRIOR TO THE CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.
9. CONTRACTOR MAY USE NON STAINLESS STEEL MATERIAL PER THE CITY'S AML IF THE DWT HAS TO BE TRIMMED TO CONFORM WITH THE CURB RAMP CONFIGURATION.
10. THE DESIGN OF THE CURB RAMP SHALL NOT AFFECT THE DRAINAGE PATTERN ON THE STREET.
11. CONTRACTOR TO REPLACE LIFTED, DAMAGED OR MISSING SIDEWALK WITHIN THE ENTIRE CURB RETURN AND ALONG THE IMMEDIATE SIDEWALK AREAS LEADING TO THE CURB RETURN.
12. CONTRACTOR TO NOTIFY THE RESIDENT ENGINEER OF ANY OTHER DAMAGED AND LIFTED SIDEWALK THAT ARE OUTSIDE THE SCOPE OF WORK BUT WITHIN THE PROJECT AREA AND LEADING TO THE CORNERS THAT WILL BE IMPROVED BY THE PROJECT. THE RESIDENT ENGINEER SHALL CONTACT THE CITY'S STREET DIVISION TO REQUEST FOR AN IMMEDIATE REPAIR OF THE DAMAGED AND/OR LIFTED SIDEWALK PANELS.
13. COUNTER SLOPES (CURB RAMP SLOPE PLUS STREET SLOPE) WHEN ADDED CANNOT EXCEED 13%. WITH THE EXCEPTION OF A TYPE C2 AND C1, ADJUST THE SLOPE OF THE MAIN RAMP AND/OR STREET IF IF THE COUNTER SLOPE EXCEEDS 5.0%.

CURB RAMP REPLACEMENT TABLE

LOCATION (NO)	RAMP TYPE	NEW	REPLACEMENT	HISTORIC STAMPS	TRUNCATED DOME MATERIAL * STAINLESS STEEL	TRUNCATED DOME MATERIAL * OTHER	CONSTRAINTS	COMMENTS / MODIFICATIONS
1	A		X		X			
2	A		X		X			
3	A		X		X			
4	C-1		X		X			
5	A		X		X			MOVING RAMP TO ALIGN WITH OTHER RAMPS
6	A		X		X			
7	B		X		X			
8	B	X			X			

* THE DETECTABLE WARNING TILES SHALL BE 36" x FULL WIDTH OPENING (48" MIN.) AND SHALL BE STAINLESS STEEL PER THE CITY'S APPROVED MATERIALS LIST



LEGEND

- (2) CURB RAMP NO's
- EX UTILITY POLE
- EX FIRE HYDRANT
- EX STREET LIGHT
- T EX TREE
- EX STREET SIGN
- EX CURB RAMP

PROPOSED CURB RAMPS PER STANDARD DRAWINGS:

A & B	SDG-132
C1	SDG-134
C2	SDG-135
D	SDG-136
GEN NOTES	SDG-130/SDG-137
ISLAND REFUGE/ PASSAGEWAY DETAILS	SDG-138

NOTE:

CONTRACTOR TO NOTIFY SURVEYING 30 DAYS PRIOR TO REMOVAL OF SIDEWALK FOR CURB RAMP CONSTRUCTION TO RELOCATE ANY SURVEY MARKERS.

C-14

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

CURB RAMP LOCATIONS

CONSULTANT

PSOMAS

401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER JAMES S. BLISS No. 41795 Exp. 3-31-18 CIVIL STATE OF CALIFORNIA

5/9/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

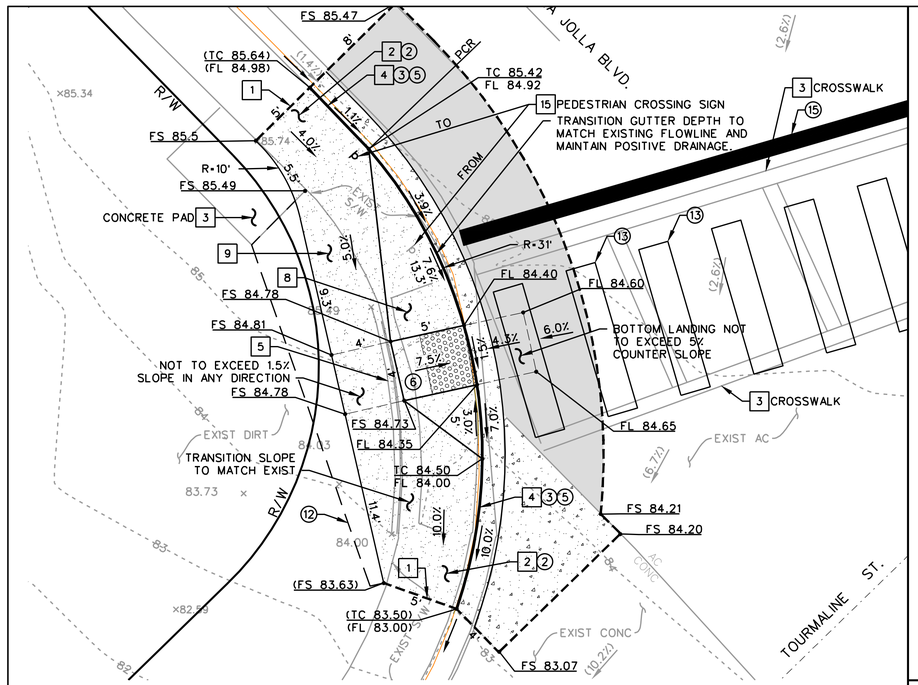
CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 24 OF 49 SHEETS

APPROVED: _____ 06/23/2017
FOR CITY ENGINEER DATE
DEBBIE VAN MARTIN C62882
PRINT DCE NAME RCE #

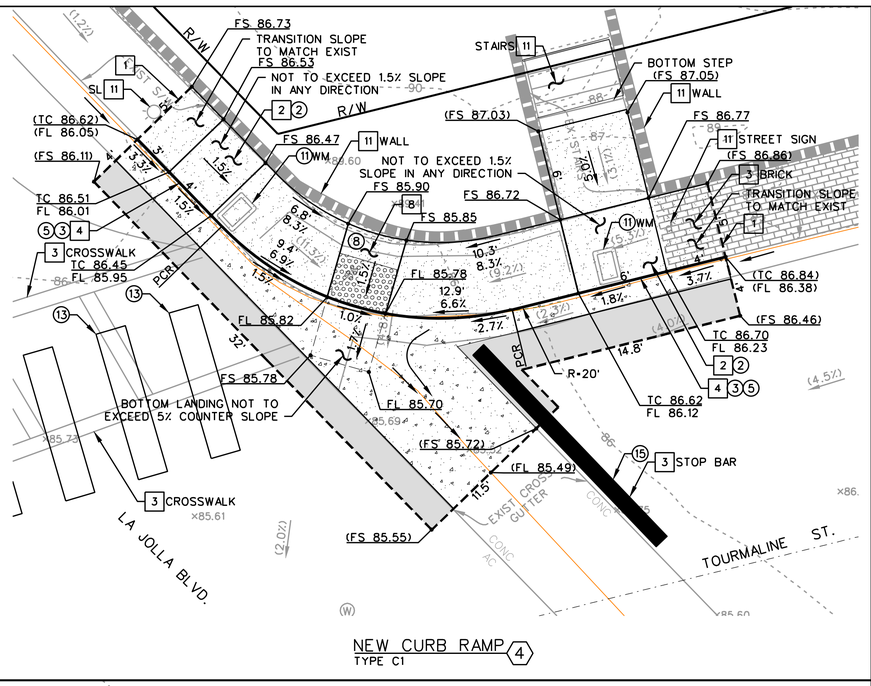
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO	JB/CAD		

WATER WBS N/A
SEWER WBS B-00501
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE
38545-24-D

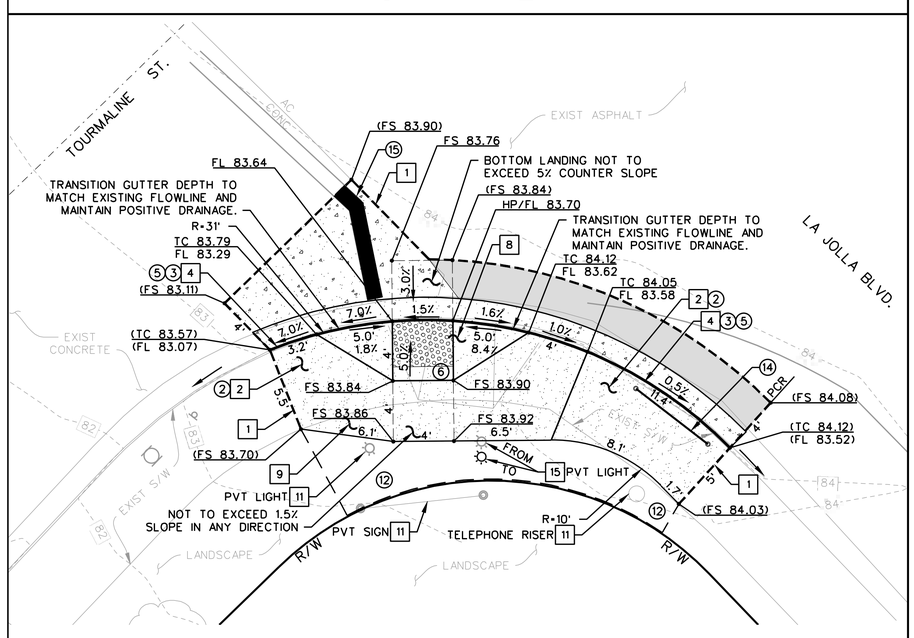
CURB RAMP LOCATIONS



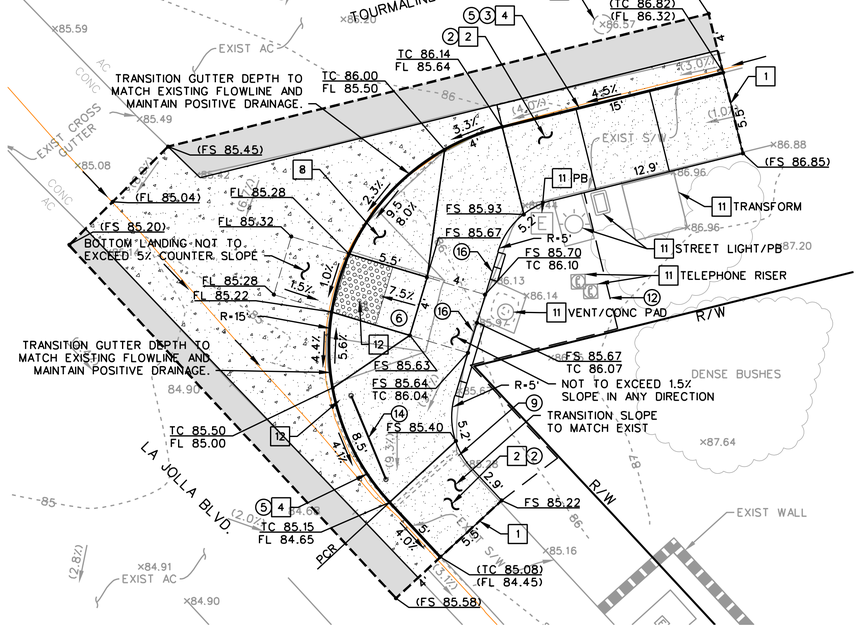
NEW CURB RAMP
TYPE A 1



NEW CURB RAMP
TYPE C1 4



NEW CURB RAMP
TYPE A 2



NEW CURB RAMP
TYPE A 3

LEGEND:

- DETECTABLE WARNING TILE PER SDG-130
- CONCRETE REMOVAL/REPLACEMENT PER SDG-113
- SIDEWALK PER SDG-155
- AC PAVEMENT REMOVAL/REPLACEMENT PER SDG-113
- SAWCUT
- COLD PLANE EXIST AC (VARIABLE THICKNESS)

DEMOLITION NOTES:

1. SAWCUT
2. REMOVE EXISTING SIDEWALK
3. REMOVE EXISTING AS NOTED
4. REMOVE EXISTING PCC CURB AND GUTTER
5. REMOVE EXISTING PCC CURB
6. REMOVE EXISTING RETAINING WALL
7. REMOVE EXISTING CURB INLET
8. REMOVE EXISTING CURB RAMP
9. CLEAR AND GRUB LANDSCAPE AREA
10. RELOCATE EXISTING SIGN
11. PROTECT IN PLACE AS NOTED
12. RESET EXISTING BENCHMARK. SEE NOTE NO. 8 PER SHEET C-14.
13. RELOCATE WATER METER AS SHOWN
14. RELOCATE EXISTING HISTORIC MONUMENT PER RSD SDG-115
15. REMOVE AND REINSTALL AS NOTED
16. PROTECT HISTORIC MONUMENT IN PLACE
17. REMOVE EXISTING AC/BASE DRIVEWAY

CONSTRUCTION NOTES:

1. CONSTRUCT COMMERCIAL CONCRETE DRIVEWAY SIMILAR TO RSD SDG-159
2. CONSTRUCT 4" MIN PCC SIDEWALK PER RSD SDG-155
3. CONSTRUCT 6" PCC CURB AND GUTTER PER RSD SDG-151
4. CONSTRUCT 6" PCC CURB (UNLESS NOTED OTHERWISE) PER RSD SDG-150
5. PAINT RED CURB
6. CONSTRUCT TYPE A CURB RAMP PER RSD SDG-132
7. CONSTRUCT TYPE B CURB RAMP PER RSD SDG-132
8. CONSTRUCT TYPE C1 CURB RAMP PER RSD SDG-134
9. REMOVE & REINSTALL SIDEWALK UNDERDRAIN PIPE PER RSD D-27
10. 6" MONOLITHIC CURB
11. ADJUST TO GRADE AS NOTED
12. TRANSITION LANDSCAPE AREA TO NEW SIDEWALK WITH 4:1 MAX. SLOPES. MODIFY EXISTING IRRIGATION SYSTEM TO ADJUST SPRAY HEAD COVERAGE TO NEW LANDSCAPE LIMIT CONFIGURATION. REPLACE LANDSCAPE MATERIAL IN KIND. REPLACEMENT OF GRASS SHALL BE WITH SOD.
13. RESTRIPE CONTINENTAL CROSSWALK PER RSD SDM-116
14. INSTALL PEDESTRIAN BARRICADE PER RSD SDE-103
15. RESTRIPE STOP BAR (12" WIDE STOP BAR)
16. 3"± MONOLITHIC CURB (MATCH TOP OF EXISTING SLAB AT WATER VALVE CAN)

N
W E
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0 2.5 5 10 15

SCALE 1"=5'

CURB RAMP IMPROVEMENTS

C-15

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

CURB RAMP IMPROVEMENTS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 25 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — RCE # C62882
PRINT DCE NAME

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO	JB/CAD		

234-1689 CCS27 COORDINATE
6250407-187444 CCS83 COORDINATE

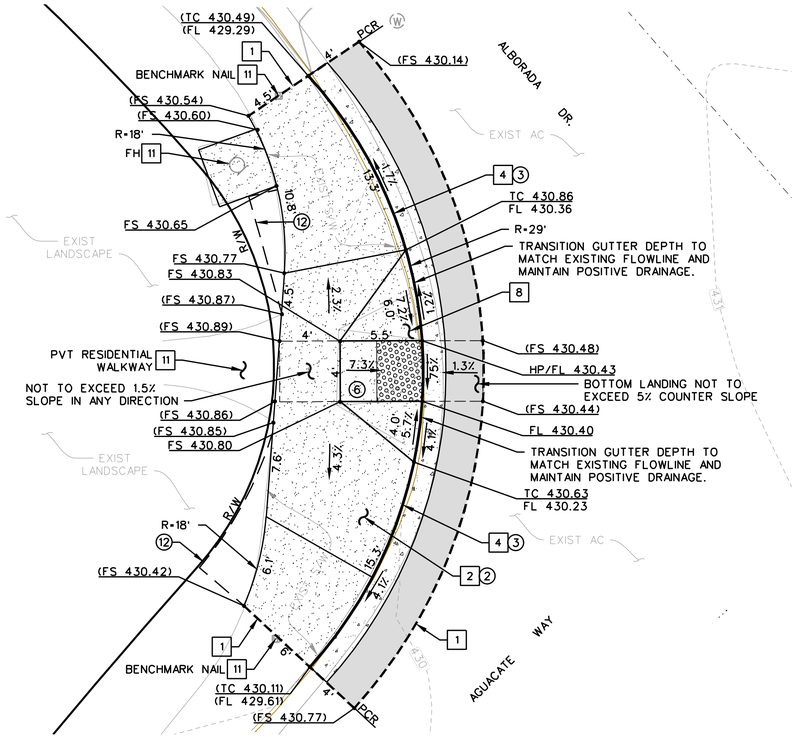
CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

38545-25-D

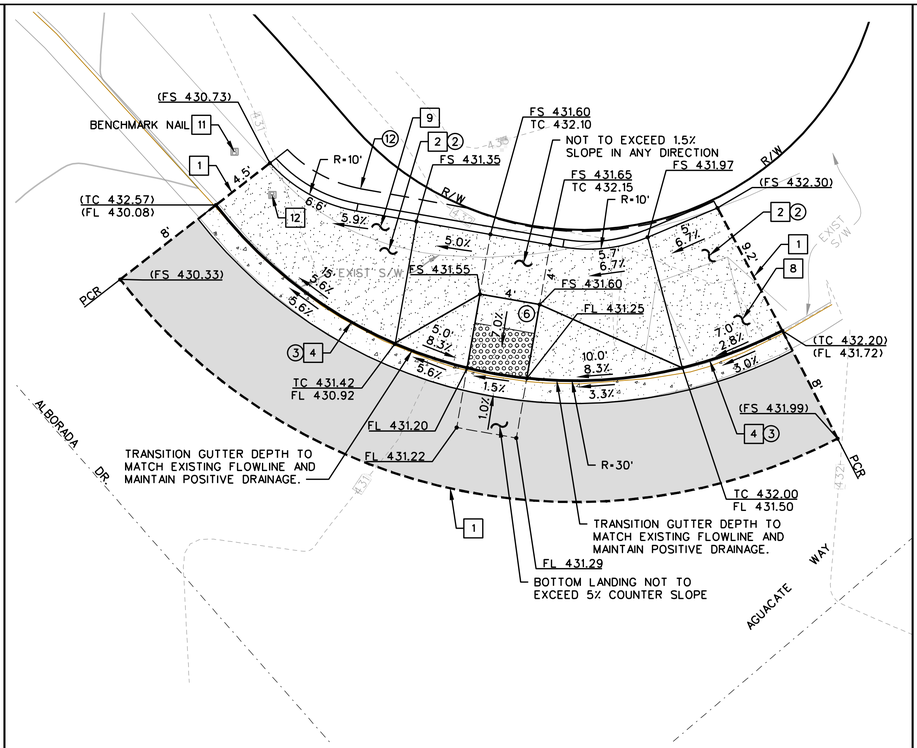
CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

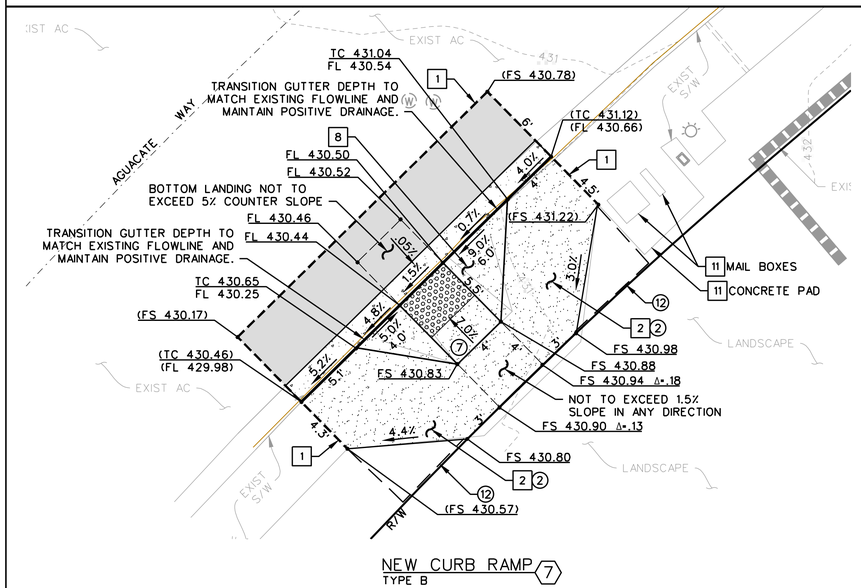
REGISTERED PROFESSIONAL ENGINEER — JAMES S. BLISS — No. 41795 — Exp. 3-31-18 — CIVIL — STATE OF CALIFORNIA — 5/4/17



NEW CURB RAMP 6
TYPE A



NEW CURB RAMP 5
TYPE A



NEW CURB RAMP 7
TYPE B

LEGEND:

- DETECTABLE WARNING TILE PER SDG-130
- CONCRETE REMOVAL/REPLACEMENT PER SDG-113
- SIDEWALK PER SDG-155
- AC PAVEMENT REMOVAL/REPLACEMENT PER SDG-113
- SAWCUT
- COLD PLANE EXIST AC (VARIABLE THICKNESS)

DEMOLITION NOTES:

1. SAWCUT
2. REMOVE EXISTING SIDEWALK
3. REMOVE EXISTING AS NOTED
4. REMOVE EXISTING PCC CURB AND GUTTER
5. REMOVE EXISTING PCC CURB
6. REMOVE EXISTING RETAINING WALL
7. REMOVE EXISTING CURB INLET
8. REMOVE EXISTING CURB RAMP
9. CLEAR AND GRUB LANDSCAPE AREA
10. RELOCATE EXISTING SIGN
11. PROTECT IN PLACE AS NOTED
12. RESET EXISTING BENCHMARK. SEE NOTE NO. 8 PER SHEET C-14.
13. RELOCATE WATER METER AS SHOWN
14. RELOCATE EXISTING HISTORIC MONUMENT PER RSD SDG-115
15. REMOVE AND REINSTALL AS NOTED
16. PROTECT HISTORIC MONUMENT IN PLACE
17. REMOVE EXISTING AC/BASE DRIVEWAY

CONSTRUCTION NOTES:

1. CONSTRUCT COMMERCIAL CONCRETE DRIVEWAY SIMILAR TO RSD SDG-159
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N
W E
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0 2.5 5 10 15
SCALE 1"=5'

CURB RAMP IMPROVEMENTS

C-16

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

CURB RAMP IMPROVEMENTS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 26 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

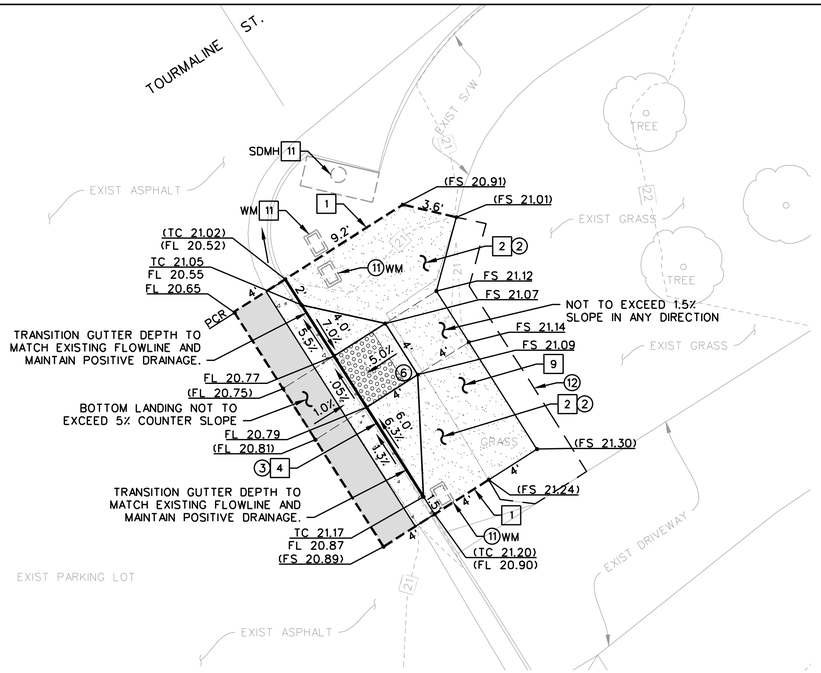
REGISTERED PROFESSIONAL ENGINEER
JAMES S. BLISS
No. 41795
Exp. 3-31-18
CIVIL
STATE OF CALIFORNIA
5/4/17

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — 06/23/2017 DATE — C62882 RCE #

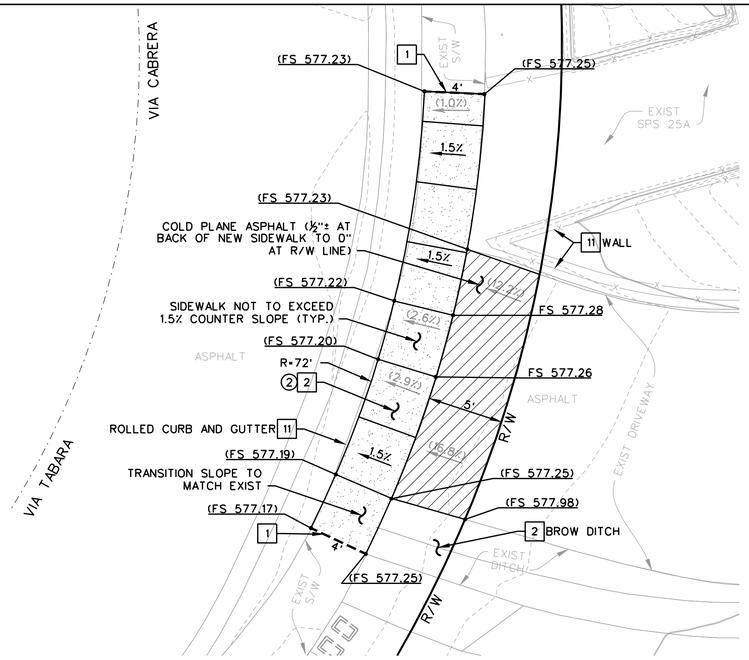
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO	JB/CAD		

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

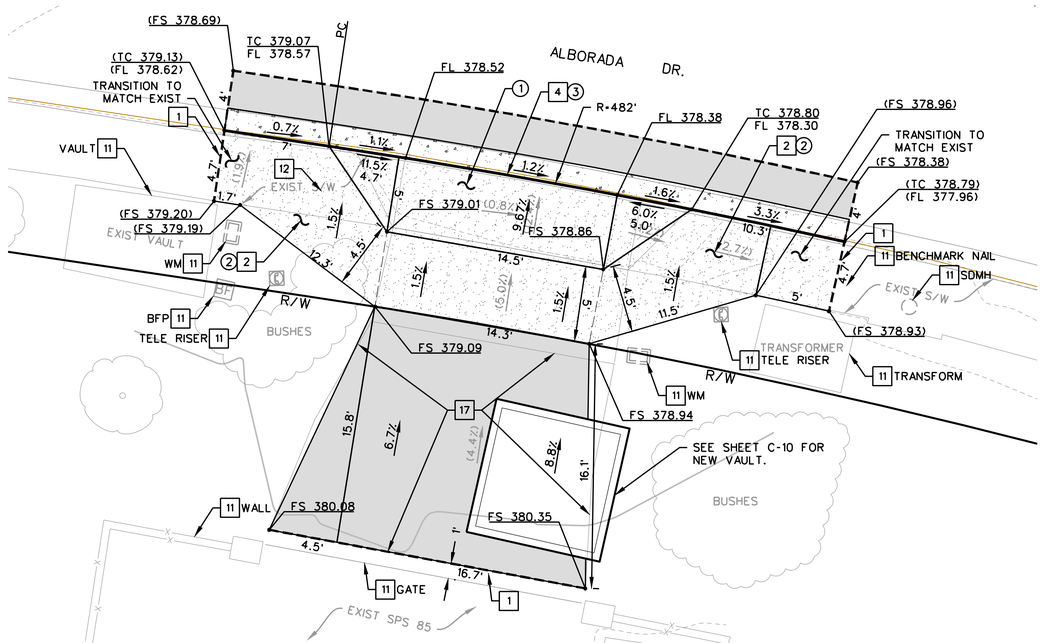
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
318-1743 CCS27 COORDINATE
6304407-1958444 CCS83 COORDINATE
38545-26-D



NEW CURB RAMP (8)
TYPE B



SIDEWALK IMPROVEMENTS
VIA TABARA AT VIA CABRERA



COMMERCIAL DRIVEWAY IMPROVEMENTS
ALBORADA DR.

LEGEND:

- DETECTABLE WARNING TILE PER SDG-130
- CONCRETE REMOVAL/REPLACEMENT PER SDG-113
- SIDEWALK PER SDG-155
- AC PAVEMENT REMOVAL/REPLACEMENT PER SDG-113
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3. REMOVE EXISTING AS NOTED
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9. CLEAR AND GRUB LANDSCAPE AREA
10. RELOCATE EXISTING SIGN
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12. RESET EXISTING BENCHMARK. SEE NOTE NO. 8 PER SHEET C-14.
13. RELOCATE WATER METER AS SHOWN
14. RELOCATE EXISTING HISTORIC MONUMENT PER RSD SDG-115
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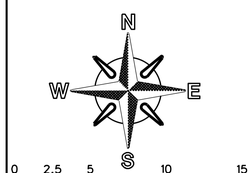

234-1689
242-1689
318-1743
CCS27 COORDINATE

6250407-1874444
6250407-1882444
6304407-1958444
CCS83 COORDINATE

C-17

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

CURB RAMP AND DRIVEWAY IMPROVEMENTS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 27 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER — DEBBIE VAN MARTIN (PRINT DCE NAME) — 06/23/2017 (DATE) — C62882 (RCE #)

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO	JB/CAD		

SEE ABOVE CCS27 COORDINATE
SEE ABOVE CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-27-D

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
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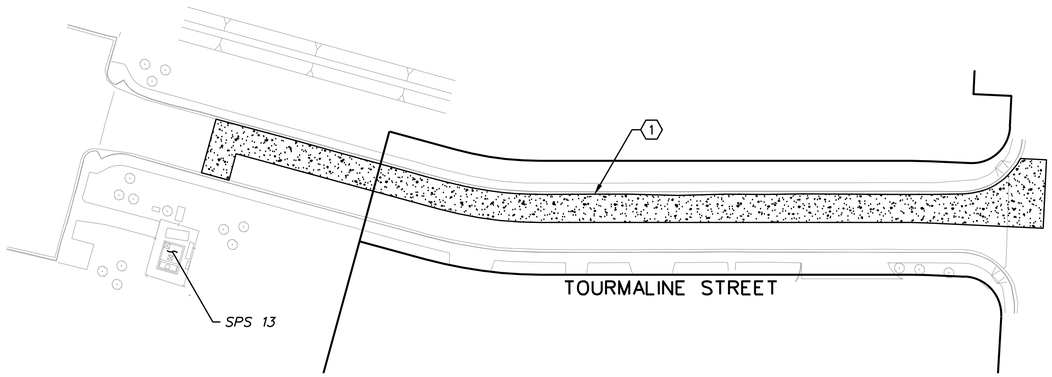
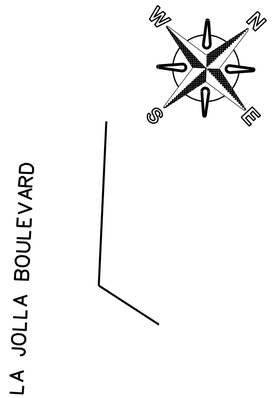
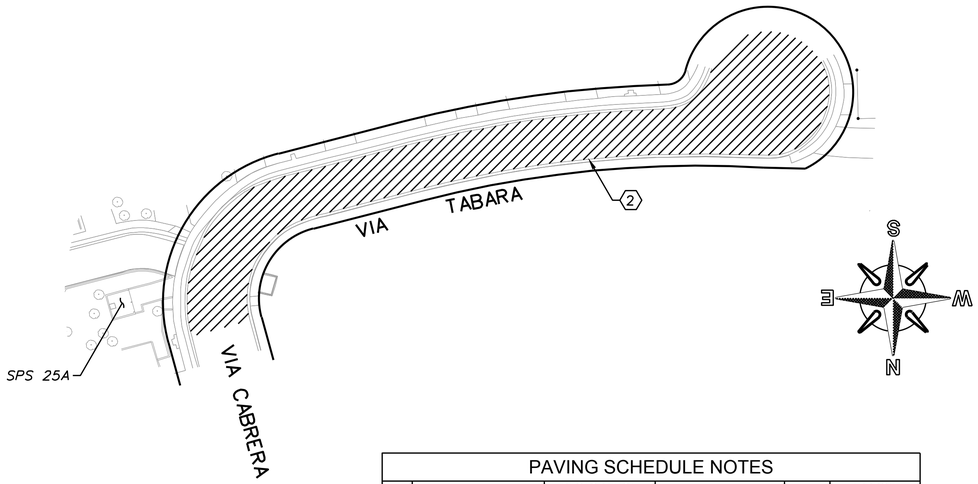
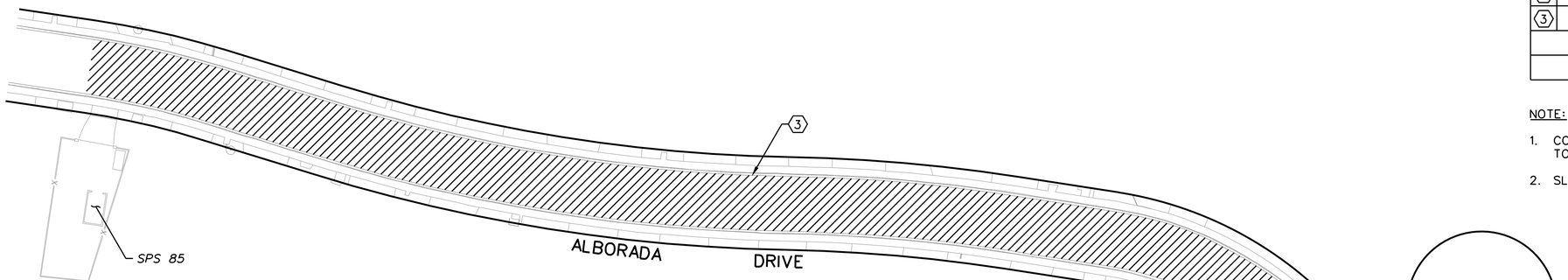
REGISTERED PROFESSIONAL ENGINEER — JAMES S. BLISS — No. 41795 — Exp. 3-31-18 — CIVIL — STATE OF CALIFORNIA — 5/4/17

CURB RAMP AND DRIVEWAY IMPROVEMENTS









PAVING SCHEDULE NOTES						
NO.	LOCATION	RESTORATION REQUIRED	FROM	TO	WIDTH	APPROX. AREA
1	TOURMALINE ST	CONCRETE	1+40	6+00±	15'±	7,000 SF
2	VIA TABARA	SLURRY SEAL	1+20	4+60±	24'	12,000 SF
3	ALBORADA DR	SLURRY SEAL	1+50	9+70	33'	30,000 SF
				TOTAL AREA OF SLURRY SEAL		42,000 SF
				TOTAL AREA OF RESURFACE CONCRETE		7,000 SF

NOTE:

1. CONTRACTOR SHALL RAISE EXISTING VALVE AND MANHOLE COVERS TO GRADE AFTER STREET RESURFACING.
2. SLURRY SEAL SHALL BE TYPE I OVER TYPE II.

LEGEND	
	APPROXIMATE LIMITS OF SLURRY SEAL
	REPLACE CONCRETE PER SDG-108 SDSD AND 1 C-12
5	LOCATION PER PAVING SCHEDULE NOTES (THIS SHEET)

0 40 80 120
SCALE 1"=40'

C-18

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS & SPS 76 GENERATOR

STREET RESURFACING

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 28 OF 49 SHEETS

APPROVED FOR CITY ENGINEER: DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE: 06/23/2017 — RCE #: 62882

WATER WBS: N/A
SEWER WBS: B-00501
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-28-D

CONSULTANT
PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17

STREET RESURFACING

Report Results

*Horizontal Alignment Report
*Project Name: B00501

Tangent*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
100	1+00.00	1874417.615	6251003.948
101	1+29.97	1874443.133	6250988.235
Length*	29.97	Bearing*	N 31° 37' 26" W

Tangent*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
101	1+29.97	1874443.133	6250988.235
102	1+68.79	1874481.468	6250982.078
Length*	38.83	Bearing*	N 09° 07' 26" W

Tangent*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
102	1+68.79	1874481.468	6250982.078
103	2+78.56	1874539.024	6251075.546
Length*	109.77	Bearing*	N 58° 22' 34" E

Curve Point Data*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
103	2+78.56	1874539.024	6251075.546
RP*		1874709.325	6250970.678
104	3+31.77	1874572.586	6251116.631

Circular Curve Data*			
Delta*	15° 14' 35"	Type*	LEFT
Radius*	200.00		
Length*	53.21	Tangent*	26.76
Mid-Ord*	1.77	External*	1.78
Chord*	53.05	Bearing*	N 50° 45' 16.50" E

Tangent*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
104	3+31.77	1874572.586	6251116.631
105	4+69.00	1874672.733	6251210.455
Length*	137.23	Bearing*	N 43° 07' 59" E

Tangent*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
105	4+69.00	1874672.733	6251210.455
106	5+56.85	1874736.842	6251270.517
Length*	87.85	Bearing*	N 43° 07' 59" E

Curve Point Data*		Alignment: sps13-line-a	
Pt *	Station	Northing	Easting
106	5+56.85	1874736.842	6251270.517
RP*		1874668.472	6251343.494
107	5+90.0±	1874756.95	6251296.892

Circular Curve Data*			
Delta*	19° 05' 28"	Type*	RIGHT
Radius*	100.00		
Length*	33.32	Tangent**	16.82
Mid-Ord*	1.38	External*	1.40
Chord*	33.17	Bearing*	N 52° 40' 43" E

Tangent*		Alignment: sps13-line-b	
Pt *	Station	Northing	Easting
108	10+00.00	1874479.549	6250989.451
109	11+04.50	1874534.34	6251078.43
Length*	104.50	Bearing*	N 58° 22' 34" E

Curve Point Data		Alignment: sps13-line-b	
Pt *	Station	Northing	Easting
109	11+04.50	1874534.34	6251078.43
RP*		1874709.325	6250970.678
110	11+59.17	1874568.826	6251120.645

Circular Curve Data			
Delta*	15° 14' 35"	Type*	LEFT
Radius*	205.50		
Length*	54.67	Tangent*	27.49814613
Mid-Ord*	1.82	External*	1.83
Chord*	54.51	Bearing*	N 50° 45' 16" E

Tangent*		Alignment: sps13-line-b	
Pt *	Station	Northing	Easting
110	11+59.17	1874568.826	6251120.645
111	13+45.00	1874704.441	6251247.698
Length*	185.83	Bearing*	N 43° 07' 59" E

Tangent*		Alignment: sps13-line-b	
Pt *	Station	Northing	Easting
111	13+45.00	1874704.441	6251247.698
112	14+17.0±	1874756.95	6251296.892
Length*	72.0±	Bearing*	N 43° 07' 59" E

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
113	0+65.07	1862252.884	6254405.727
114	0+94.43	1862227.286	6254420.103
Length:	29.36	Bearing*	S 29° 19' 10" E

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
114	0+94.43	1862227.286	6254420.103
115	1+00.00	1862226.155	6254425.56
Length:	5.57	Bearing*	S 78° 17' 28" E

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
116	1+00.00	1862226.155	6254425.56
117	2+28.00	1862099.43	6254407.536
Length*	128.00	Bearing*	S 08° 05' 43" W

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
117	2+28.00	1862099.43	6254407.536
118	2+95.76	1862058.745	6254353.349
Length*	67.76	Bearing*	S 53° 05' 57" W

Curve Point Data		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
118	2+95.76	1862058.745	6254353.349
RP*		1861978.777	6254413.392
119	3+92.10	1861975.119	6254313.459

Circular Curve Data			
Delta*	55° 11' 44"	Type*	LEFT
Radius*	100.00		
Length*	96.33	Tangent*	52.27372289
Mid-Ord*	11.38	External*	12.84
Chord*	92.65	Bearing*	S 25° 30' 05" W

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
119	3+92.10	1861975.119	6254313.459
120	6+28.00	1861739.374	6254322.087
Length*	235.90	Bearing*	S 02° 05' 46" E

Tangent*		Alignment: sps14-line-c	
Pt *	Station	Northing	Easting
120	6+28.00	1861739.374	6254322.087
121	6+44.5±	1861729.146	6254309.163
Length*	16.5±	Bearing*	S 51° 38' 35" W

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
122	10+00.00	1862262.685	6254392.516
123	10+01.33	1862262.039	6254391.358
Length:	1.33	Bearing*	S 60° 48' 32" W

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
123	10+01.33	1862262.039	6254391.358
124	10+02.76	1862260.659	6254390.968
Length:	1.43	Bearing*	S 15° 48' 32" W

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
124	10+02.76	1862260.659	6254390.968
125	10+21.17	1862244.586	6254399.947
Length:	18.41	Bearing*	S 29° 11' 28" E

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
125	10+21.17	1862244.586	6254399.947
126	10+27.05	1862242.984	6254405.605
Length:	5.88	Bearing*	S 74° 11' 28" E

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
126	10+27.05	1862242.984	6254405.605
127	10+44.62	1862227.648	6254414.173
Length:	17.57	Bearing*	S 29° 11' 28" E

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
127	10+44.62	1862227.648	6254414.173
128	10+50.00	1862225.025	6254409.478
Length:	5.38	Bearing*	S 60° 48' 32" W

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
128	10+50.00	1862225.025	6254409.478
129	10+78.80	1862243.76	6254387.604
Length:	28.80	Bearing*	N 49° 25' 08" W

Tangent*		Alignment: sps14-line-d	
Pt *	Station	Northing	Easting
129	10+78.80	1862243.76	6254387.604
130	11+02.1±	1862265.101	6254378.161
Length:	23.3±	Bearing*	N 23° 52' 08" W

Tangent*		Alignment: sps16-line-e	
Pt *	Station	Northing	Easting
131	1+00.00	1865209.915	6253898.782
132	1+10.00	1865209.638	6253888.786
Length:	10.00	Bearing*	S 88° 24' 34" W

Tangent*		Alignment: sps16-line-e	
Pt *	Station	Northing	Easting
132	1+10.00	1865209.638	6253888.786
133	1+12.37	1865211.268	6253887.062
Length:	2.37	Bearing*	N 46° 35' 26" W

Tangent*		Alignment: sps16-line-e	
Pt *	Station	Northing	Easting
133	1+12.37	1865211.268	6253887.062
134	1+20.00	1865211.056	6253879.435
Length:	7.63	Bearing*	S 88° 24' 34" W

Tangent*		Alignment: sps16-line-e	
Pt *	Station	Northing	Easting
134	1+20.00	1865211.056	6253879.435
135	1+32.4±	1865204.408	6253869.035
Length:	12.3±	Bearing*	S 57° 24' 41" W

Tangent*		Alignment: sps16-line-f	
Pt *	Station	Northing	Easting
136	10+00.00	1865204.423	6253898.934
137	10+20.00	1865203.879	6253878.959
Length*	19.98	Bearing*	S 88° 26' 22" W

Tangent*		Alignment: sps16-line-f	
Pt *	Station	Northing	Easting
137	10+20.00	1865203.879	6253878.959
138	10+29.9±	1865203.609	6253869.057
Length*	9.9±	Bearing*	S 88° 26' 22" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
139	1+00.00	1883488.231	6255805.787
140	1+51.97	1883475.29	6255755.45
Length:	51.97	Bearing*	S 75° 34' 56" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
140	1+51.97	1883475.29	6255755.45
141	1+80.65	1883450.606	6255740.862
Length:	28.67	Bearing*	S 30° 34' 56" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
141	1+80.65	1883450.606	6255740.862
142	2+60.85	1883430.636	6255663.183
Length:	80.20	Bearing*	S 75° 34' 56" W

Curve Point Data		Alignment: sps25a	
Pt *	Station	Northing	Easting
142	2+60.85	1883430.636	6255663.183
RP:		1884011.74	6255513.79
143	4+74.88	1883415.049	6255450.862

Circular Curve Data			
Delta:	20° 26' 16"	Type:	RIGHT
Radius:	600.00		
Length:	214.02	Tangent:	108.16
Mid-Ord:	9.52	External:	9.67
Chord:	212.89	Bearing*	S 85° 48' 05" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
143	4+74.88	1883415.049	6255450.862
144	4+78.64	1883415.443	6255447.119
Length:	3.76	Bearing*	N 83° 58' 47" W

Curve Point Data		Alignment: sps25a	
Pt *	Station	Northing	Easting
144	4+78.64	1883415.443	6255447.119
RP:		1883017.65	6255405.167
145	5+11.64	1883417.547	6255414.201

Circular Curve Data			
Delta:	04° 43' 34"	Type:	LEFT
Radius:	400.00		
Length:	33.00	Tangent:	16.51
Mid-Ord:	0.34	External:	0.34
Chord:	32.99	Bearing*	N 86° 20' 34" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
145	5+11.64	1883417.547	6255414.201
146	6+90.00	1883421.576	6255235.878
Length:	178.37	Bearing*	N 88° 42' 21" W

Tangent*		Alignment: sps25a	
Pt *	Station	Northing	Easting
146	6+90.00	1883421.576	6255235.878
147	6+97.0±	1883416.191	6255231.481
Length:	7.0±	Bearing*	S 39° 13' 57" W

HORIZONTAL ALIGNMENT REPORT

C-19

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

HORIZONTAL ALIGNMENT
COORDINATE INDEX REPORT

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 29 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-29-D

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17

Report Results

*Horizontal Alignment Report
*Project Name: B00501

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
148	1+00.00	1960359.107	6306429.059
149	1+04.00	1960363.063	6306429.654
Length*	4.00	Bearing*	N 08° 34' 02" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
149	1+04.00	1960363.063	6306429.654
150	1+07.61	1960366.259	6306431.341
Length*	3.61	Bearing*	N 27° 49' 19" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
150	1+07.61	1960366.259	6306431.341
151	1+63.65	1960420.929	6306443.617
Length*	56.03	Bearing*	N 12° 39' 21" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
151	1+63.65	1960420.929	6306443.617
152	1+68.00	1960423.086	6306447.397
Length*	4.35	Bearing*	N 60° 17' 40" E

Curve Point Data		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
152	1+68.00	1960423.086	6306447.397
RP*		1959932.937	6306348.631
153	2+18.15	1960410.732	6306495.982

Circular Curve Data			
Delta*	05° 44' 49"	Type*	RIGHT
Radius*	500.00		
Length*	50.15	Tangent*	25.10
Mid-Ord*	0.63	External*	0.63
Chord*	50.13	Bearing*	S 75° 44' 02" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
153	2+18.15	1960410.732	6306495.982
154	3+16.48	1960381.754	6306589.946
Length*	98.33	Bearing*	S 72° 51' 37" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
154	3+16.48	1960381.754	6306589.946
155	3+40.43	1960392.947	6306611.123
Length*	23.95	Bearing*	N 62° 08' 23" E

Curve Point Data		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
155	3+40.43	1960392.947	6306611.123
RP*		1961349.785	6306861.288
156	5+70.09	1960361.058	6306838.039

Circular Curve Data			
Delta*	13° 18' 18"	Type*	LEFT
Radius*	989.00		
Length*	229.66	Tangent*	115.3493027
Mid-Ord*	6.66	External*	6.70
Chord*	229.15	Bearing*	S 82° 00' 02" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
156	5+70.09	1960361.058	6306838.039
157	5+82.95	1960360.756	6306850.891
Length*	12.86	Bearing*	S 88° 39' 11" E

Curve Point Data		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
157	5+82.95	1960360.756	6306850.891
RP*		1959361.033	6306827.383
158	7+12.99	1960349.267	6306980.333

Circular Curve Data			
Delta*	07° 27' 03"	Type*	RIGHT
Radius*	1000.00		
Length*	130.04	Tangent*	65.11
Mid-Ord*	2.11	External*	2.12
Chord*	129.95	Bearing*	S 84° 55' 39" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
158	7+12.99	1960349.267	6306980.333
159	7+74.47	1960339.864	6307041.088
Length*	61.48	Bearing*	S 81° 12' 08" E

Curve Point Data		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
159	7+74.47	1960339.864	6307041.088
RP*		1960132.334	6307008.968
160	9+20.76	1960270.902	6307166.763

Circular Curve Data			
Delta*	39° 54' 50"	Type*	RIGHT
Radius*	210.00		
Length*	146.29	Tangent*	76.26
Mid-Ord*	12.61	External*	13.42
Chord*	143.35	Bearing*	S 61° 14' 42" E

Tangent*		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
160	9+20.76	1960270.902	6307166.763
161	9+36.00	1960259.453	6307176.816
Length*	15.24	Bearing*	S 41° 17' 17" E

Curve Point Data		Alignment: sps85-line-g	
Pt *	Station	Northing	Easting
161	9+36.00	1960259.453	6307176.816
RP*		1960193.469	6307101.676
162	9+67.2±	1960233.199	6307193.445

Circular Curve Data			
Delta*	17° 52' 43"	Type*	RIGHT
Radius*	100.00		
Length*	31.20	Tangent*	15.73
Mid-Ord*	1.21	External*	1.23
Chord*	31.08	Bearing*	S 32° 20' 56" E

Tangent*		Alignment: sps85-line-h	
Pt *	Station	Northing	Easting
163	10+00.00	1960359.554	6306426.092
164	10+05.09	1960364.587	6306426.85
Length*	5.09	Bearing*	N 08° 34' 02" E

Tangent*		Alignment: sps85-line-h	
Pt *	Station	Northing	Easting
164	10+05.09	1960364.587	6306426.85
165	10+08.56	1960367.96	6306426.014
Length*	3.47	Bearing*	N 13° 55' 58" W

Tangent*		Alignment: sps85-line-h	
Pt *	Station	Northing	Easting
165	10+08.56	1960367.96	6306426.014
166	10+41.8±	1960400.363	6306433.29
Length*	33.21	Bearing*	N 12° 39' 21" E

HORIZONTAL ALIGNMENT REPORT

C-20

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

HORIZONTAL ALIGNMENT
COORDINATE INDEX REPORT

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 30 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
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REGISTERED PROFESSIONAL ENGINEER
SANDRA RUSSELL
No. 44078
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA
5/4/17

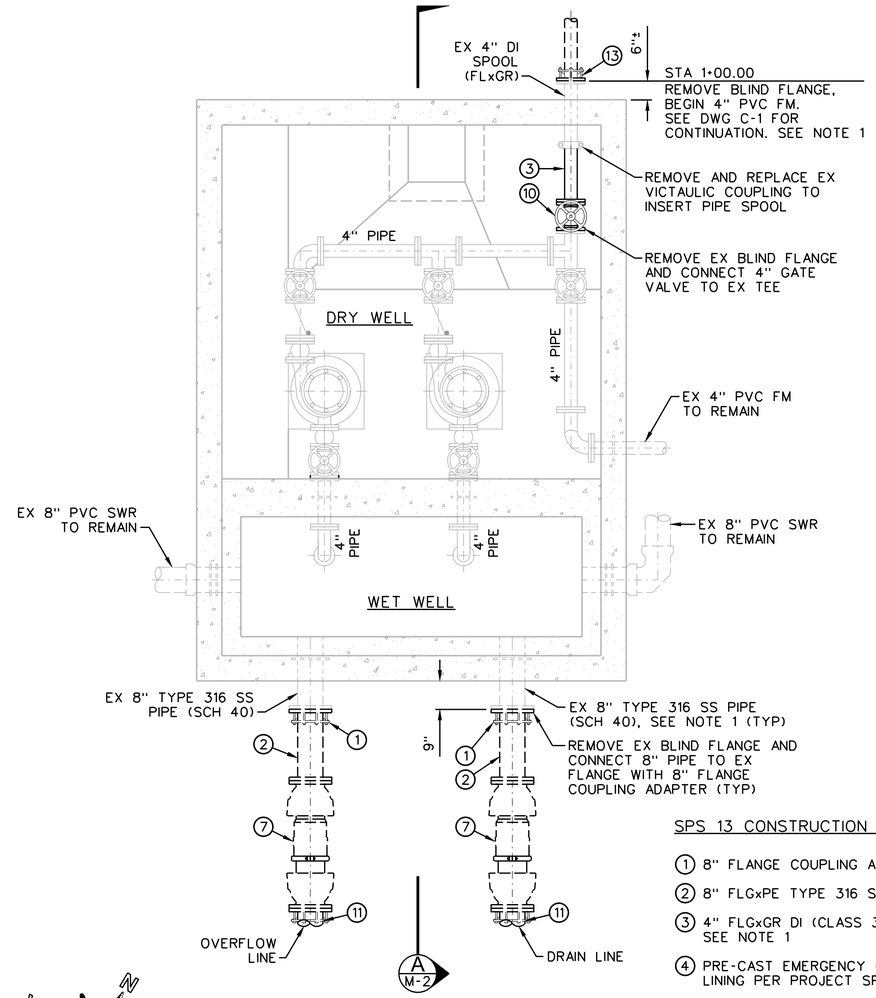
APPROVED: FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — PRINT DCE NAME — RCE # C62882

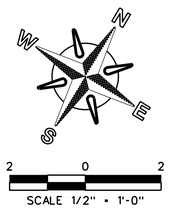
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

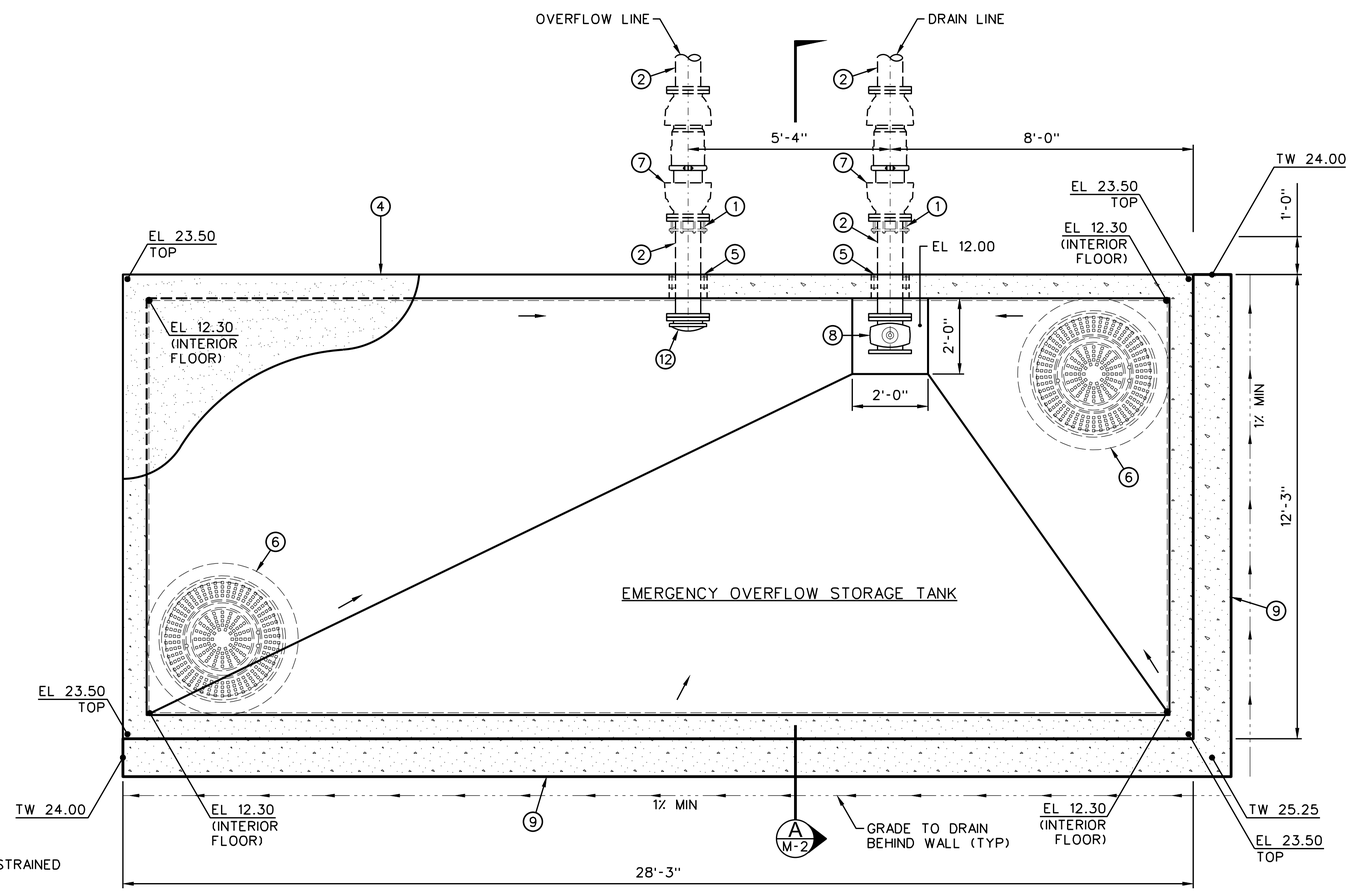
38545-30-D





2 0 2

SCALE 1/2" = 1'-0"



SPS 13 CONSTRUCTION ITEMS:

1. 8" FLANGE COUPLING ADAPTER, RESTRAINED
2. 8" FLGxPE TYPE 316 SS PIPE
3. 4" FLGxGR DI (CLASS 350) PIPE SPOOL, LENGTH AS REQUIRED, SEE NOTE 1
4. PRE-CAST EMERGENCY OVERFLOW STORAGE TANK WITH PVC T-LOCK LINING PER PROJECT SPECIFICATIONS (27'x11' INSIDE DIMENSION)
5. WALL PENETRATION PER DETAIL 5 / M-10
6. 36" DIAMETER MANHOLE LOCKING COVER (AT GRADE)
7. 8" FLEXIBLE EXPANSION JOINT
8. 8" FLG GATE VALVE
9. GRAVITY RETAINING WALL PER CITY OF SAN DIEGO STD DWG NO. C-9, TYPE "B"
10. 4" FLG GATE VALVE WITH HAND WHEEL OPERATOR
11. 8" FLG TYPE 316 SS PIPE
12. 8" FLG FLAP GATE
13. 4" FLG COUPLING ADAPTER

SPS 13 - MECHANICAL PLAN 1 / M-1

EMERGENCY OVERFLOW STORAGE TANK DATA:

EMERGENCY HOLDING TANK FLOW IN
- MIN FLOW: 0.8 GPM
- AVERAGE FLOW: 3.4 GPM
- PEAK FLOW: 110 GPM

EMERGENCY HOLDING CAPACITY (TO ELEV 17.5)
- TANK: 11,800 GALLONS

TOTAL EMERGENCY HOLDING CAPACITY (TO SPILL ELEV 19.2)
- TANK: 15,330 GALLONS
- PIPING: 480 GALLONS
- MANHOLES: 870 GALLONS
- WET WELL: 2,510 GALLONS
- TOTAL: 19,190 GALLONS

HOLDING TIME BEFORE SPILL OCCURS
- LOW FLOW: 16.7 DAYS
- AVERAGE FLOW: 3.9 DAYS
- PEAK FLOW: 2.9 HOURS

NOTES:

1. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
2. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL PLAN

M-1

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR
SPS 13 AND EMERGENCY OVERFLOW STORAGE TANK MECHANICAL PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 31 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT DCE NAME — 06/23/2017 DATE — C62882 RCE #

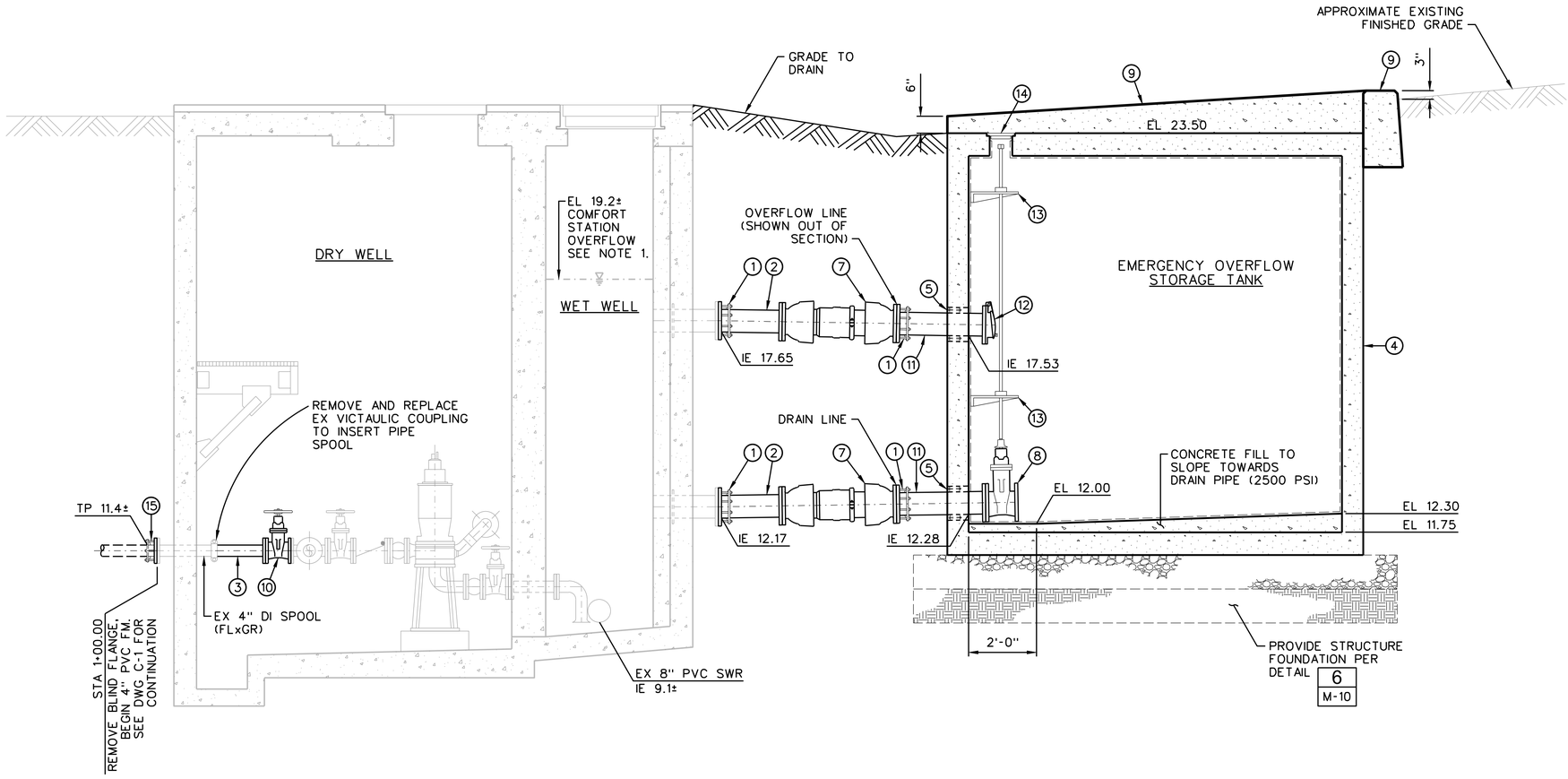
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE
1870444, 6250407 1874444, 6250407 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-31-D



SPS 13 WET WELL/DRY WELL & EMERGENCY OVERFLOW TANK - SECTION (A / M-2)

2 0 2

SCALE 1/2" = 1'-0"

SPS 13 CONSTRUCTION ITEMS:

1. 8" FLANGE COUPLING ADAPTER, RESTRAINED
2. 8" FLGxPE TYPE 316 SS PIPE
3. 4" FLGxGR DI (CLASS 350) PIPE SPOOL, LENGTH AS REQUIRED, SEE NOTE 1
4. PRE-CAST EMERGENCY OVERFLOW STORAGE TANK WITH PVC T-LOCK LINING PER PROJECT SPECIFICATIONS (27'x12' INSIDE DIMENSION)
5. WALL PENETRATION PER DETAIL 5 / M-10
6. 36" DIAMETER MANHOLE LOCKING COVER (AT GRADE)
7. 8" FLEXIBLE EXPANSION JOINT
8. 8" FLG GATE VALVE
9. GRAVITY RETAINING WALL PER CITY OF SAN DIEGO STD DWG NO. C-9, TYPE "B"
10. 4" FLG GATE VALVE WITH HAND WHEEL OPERATOR
11. 8" FLG TYPE 316 SS PIPE
12. 8" FLG FLAP GATE
13. VALVE EXTENSION SUPPORT BRACKET. ANCHOR PER MANUFACTURER RECOMMENDATIONS
14. VALVE CAN SIMILAR TO STD DWG SDW-152 & SDW-153. GATE WELL LID SHALL HAVE "SEWER" ON IT.
15. 4" FLG COUPLING ADAPTER

EMERGENCY OVERFLOW STORAGE TANK DATA:

EMERGENCY HOLDING TANK FLOW IN
- MIN FLOW: 0.8 GPM
- AVERAGE FLOW: 3.4 GPM
- PEAK FLOW: 110 GPM

EMERGENCY HOLDING CAPACITY (TO ELEV 17.5)
- TANK: 11,800 GALLONS

TOTAL EMERGENCY HOLDING CAPACITY (TO SPILL ELEV 19.2)
- TANK: 15,330 GALLONS
- PIPING: 480 GALLONS
- MANHOLES: 870 GALLONS
- WET WELL: 2,510 GALLONS
- TOTAL: 19,190 GALLONS

HOLDING TIME BEFORE SPILL OCCURS
- LOW FLOW: 16.7 DAYS
- AVERAGE FLOW: 3.9 DAYS
- PEAK FLOW: 2.9 HOURS

NOTES:

1. OVERFLOW ELEVATION IS THE SEWER MANHOLE JUST TO THE EAST OF THE EXISTING COMFORT STATION.
2. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL SECTION

M-2

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR
SPS 13 AND EMERGENCY
OVERFLOW STORAGE TANK
MECHANICAL SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 32 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER — DEBBIE VAN MARTIN, PRINT DCE NAME — DATE 06/23/2017 — RCE # 62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE
1870444, 6250407
1874444, 6250407 CCS83 COORDINATE

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

38545-32-D

CONSULTANT

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401 B Street, Suite 1600
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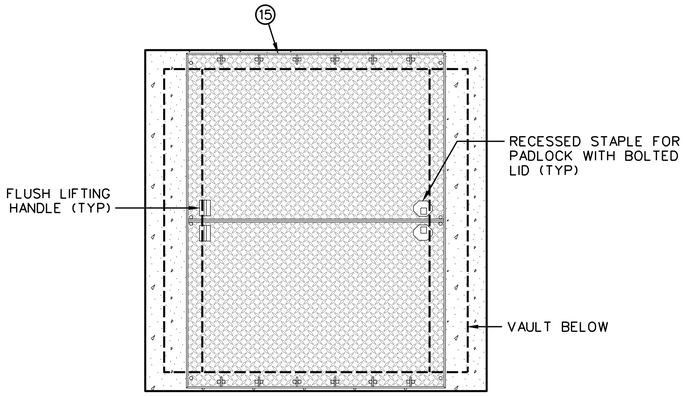
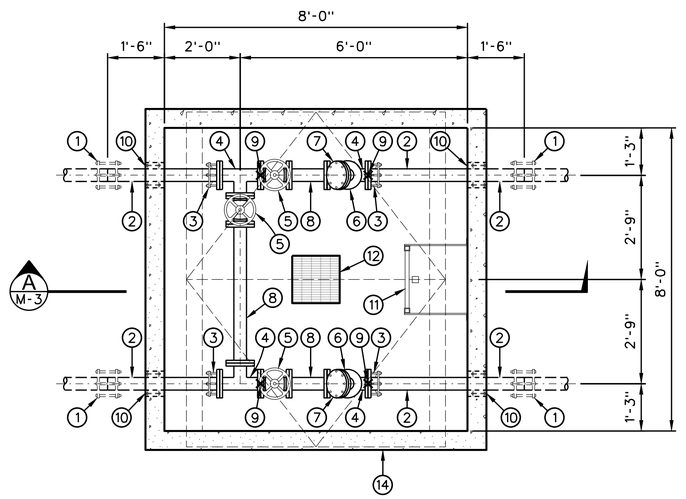
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 — Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17



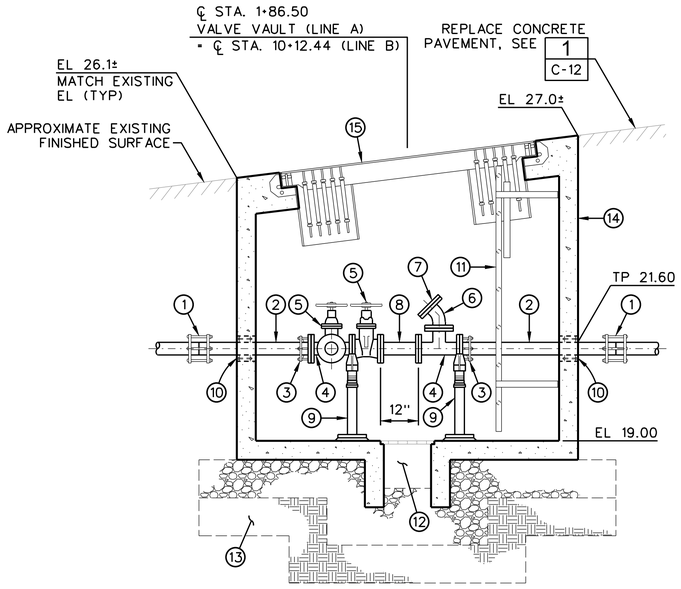
TOP SLAB PLAN



SPS 13 VALVE VAULT - MECHANICAL PLAN 1 / M-3

2 0 2

SCALE 1/2" = 1'-0"



SPS 13 VALVE VAULT - SECTION A / M-3

SPS 13 VALVE VAULT CONSTRUCTION ITEMS:

1. 4" SLEEVE COUPLING WITH RESTRAINT
2. 4" PE DI SPOOL (LENGTH AS REQUIRED)
3. 4" FLG COUPLING ADAPTER, RESTRAINED
4. 4" FLG DI TEE
5. 4" FLG GATE VALVE WITH HAND WHEEL OPERATOR
6. 4" FLG DI 45° BEND
7. 4" DI BLIND FLANGE
8. 4" FLG DI SPOOL (LENGTH AS REQUIRED)
9. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
10. WALL PENETRATION PER 5 / M-10
11. LADDER AND LADDER-UP SAFETY DEVICE
12. 15"x15"x15" SUMP WITH REMOVABLE FIBERGLASS GRATE PER 2 / M-10
13. STRUCTURE FOUNDATION PER 6 / M-10
14. 8'-0"x8'-0" PRE-CAST CONCRETE VALVE VAULT
15. 6'-0"x8'-0" DOUBLE-LEAF HATCH

NOTES:

1. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL PLAN AND SECTION

M-3

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 13 VALVE VAULT
MECHANICAL PLAN AND SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 33 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

230-1689, 234-1689 CCS27 COORDINATE
1870444, 6250407
1874444, 6250407 CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-33-D

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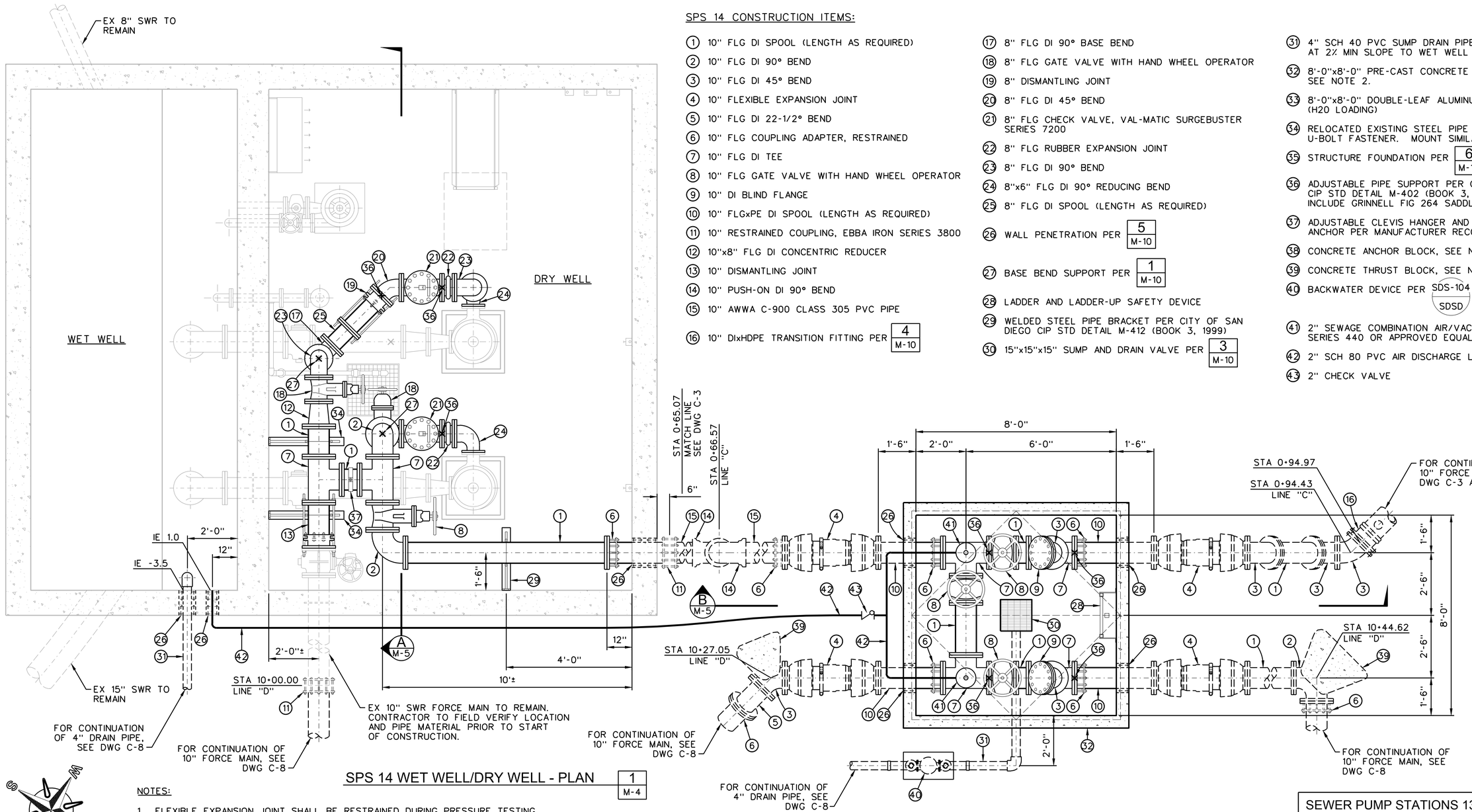
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17



SPS 14 WET WELL/DRY WELL - PLAN (1 / M-4)

SCALE 1/2" = 1'-0"

SPS 14 CONSTRUCTION ITEMS:

1. 10" FLG DI SPOOL (LENGTH AS REQUIRED)
2. 10" FLG DI 90° BEND
3. 10" FLG DI 45° BEND
4. 10" FLEXIBLE EXPANSION JOINT
5. 10" FLG DI 22-1/2° BEND
6. 10" FLG COUPLING ADAPTER, RESTRAINED
7. 10" FLG DI TEE
8. 10" FLG GATE VALVE WITH HAND WHEEL OPERATOR
9. 10" DI BLIND FLANGE
10. 10" FLGxPE DI SPOOL (LENGTH AS REQUIRED)
11. 10" RESTRAINED COUPLING, EBBA IRON SERIES 3800
12. 10"x8" FLG DI CONCENTRIC REDUCER
13. 10" DISMANTLING JOINT
14. 10" PUSH-ON DI 90° BEND
15. 10" AWWA C-900 CLASS 305 PVC PIPE
16. 10" DIxHDPE TRANSITION FITTING PER 4 / M-10
17. 8" FLG DI 90° BASE BEND
18. 8" FLG GATE VALVE WITH HAND WHEEL OPERATOR
19. 8" DISMANTLING JOINT
20. 8" FLG DI 45° BEND
21. 8" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200
22. 8" FLG RUBBER EXPANSION JOINT
23. 8" FLG DI 90° BEND
24. 8"x6" FLG DI 90° REDUCING BEND
25. 8" FLG DI SPOOL (LENGTH AS REQUIRED)
26. WALL PENETRATION PER 5 / M-10
27. BASE BEND SUPPORT PER 1 / M-10
28. LADDER AND LADDER-UP SAFETY DEVICE
29. WELDED STEEL PIPE BRACKET PER CITY OF SAN DIEGO CIP STD DETAIL M-412 (BOOK 3, 1999)
30. 15"x15"x15" SUMP AND DRAIN VALVE PER 3 / M-10
31. 4" SCH 40 PVC SUMP DRAIN PIPE AND FITTINGS AT 2% MIN SLOPE TO WET WELL
32. 8'-0"x8'-0" PRE-CAST CONCRETE VALVE VAULT. SEE NOTE 2.
33. 8'-0"x8'-0" DOUBLE-LEAF ALUMINUM HATCH (H20 LOADING)
34. RELOCATED EXISTING STEEL PIPE BRACKET AND U-BOLT FASTENER. MOUNT SIMILAR TO EXISTING.
35. STRUCTURE FOUNDATION PER 6 / M-10
36. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
37. ADJUSTABLE CLEVIS HANGER AND THREADED ROD. ANCHOR PER MANUFACTURER RECOMMENDATIONS.
38. CONCRETE ANCHOR BLOCK, SEE NOTE 1 ON DWG C-3
39. CONCRETE THRUST BLOCK, SEE NOTE 1 ON DWG C-3
40. BACKWATER DEVICE PER SDS-104 / SDSD
41. 2" SEWAGE COMBINATION AIR/VAC VALVE, APCO SERIES 440 OR APPROVED EQUAL
42. 2" SCH 80 PVC AIR DISCHARGE LINE. SEE NOTE 3.
43. 2" CHECK VALVE

NOTES:

1. FLEXIBLE EXPANSION JOINT SHALL BE RESTRAINED DURING PRESSURE TESTING.
2. PRECAST VALVE VAULT MANUFACTURER TO DESIGN VAULT TO WITHSTAND UPLIFT/BUOYANCY DUE TO HIGH GROUNDWATER.
3. ROUTE AIR DISCHARGE LINE FROM AVV OUTLET TO WET WELL. INSTALL MIN 3' DEEP.
4. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL PLAN

M-4

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 14
MECHANICAL PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 34 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBJECT TO BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

218-1689 CCS27 COORDINATE
1858444, 6250407 CCS83 COORDINATE

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

38545-34-D

CONSULTANT

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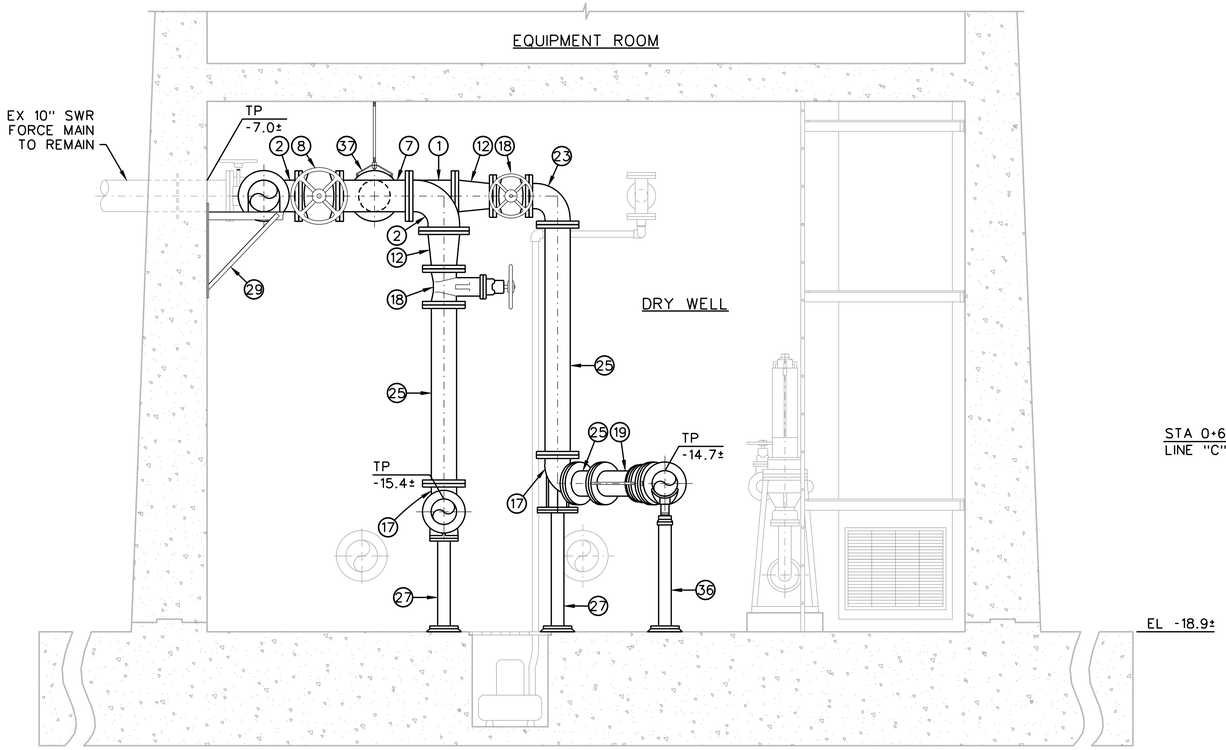
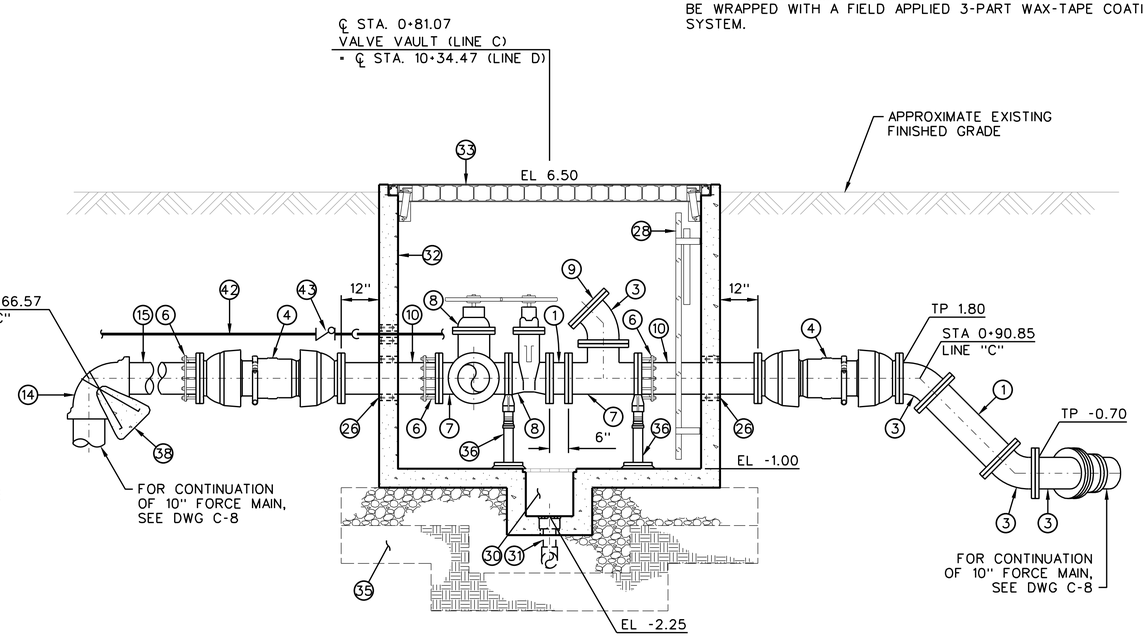
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — STATE OF CALIFORNIA — CIVIL — 5/4/17



SPS 14 DRY WELL - SECTION (A / M-5)

SCALE 1/2" = 1'-0"



SPS 14 VALVE VAULT - SECTION (B / M-5)

SCALE 1/2" = 1'-0"

NOTES:

1. FLEXIBLE EXPANSION JOINT SHALL BE RESTRAINED DURING PRESSURE TESTING.
2. PRECAST VALVE VAULT MANUFACTURER TO DESIGN VAULT TO WITHSTAND UPLIFT/BUOYANCY DUE TO HIGH GROUNDWATER.
3. ROUTE AIR DISCHARGE LINE FROM AVV OUTLET TO WET WELL. INSTALL MIN 3' DEEP.
4. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

SPS 14 CONSTRUCTION ITEMS:

1. 10" FLG DI SPOOL (LENGTH AS REQUIRED)
2. 10" FLG DI 90° BEND
3. 10" FLG DI 45° BEND
4. 10" FLEXIBLE EXPANSION JOINT
5. 10" FLG DI 22-1/2° BEND
6. 10" FLG COUPLING ADAPTER, RESTRAINED
7. 10" FLG DI TEE
8. 10" FLG GATE VALVE WITH HAND WHEEL OPERATOR
9. 10" DI BLIND FLANGE
10. 10" FLGxPE DI SPOOL (LENGTH AS REQUIRED)
11. 10" RESTRAINED COUPLING, EBBA IRON SERIES 3800
12. 10"x8" FLG DI CONCENTRIC REDUCER
13. 10" DISMANTLING JOINT
14. 10" PUSH-ON DI 90° BEND
15. 10" AWWA C-900 CLASS 305 PVC PIPE
16. 10" DIxHDPE TRANSITION FITTING PER 4 / M-10
17. 8" FLG DI 90° BASE BEND
18. 8" FLG GATE VALVE WITH HAND WHEEL OPERATOR
19. 8" DISMANTLING JOINT
20. 8" FLG DI 45° BEND
21. 8" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200
22. 8" FLG RUBBER EXPANSION JOINT
23. 8" FLG DI 90° BEND
24. 8"x6" FLG DI 90° REDUCING BEND
25. 8" FLG DI SPOOL (LENGTH AS REQUIRED)
26. WALL PENETRATION PER 5 / M-10
27. BASE BEND SUPPORT PER 1 / M-10
28. LADDER AND LADDER-UP SAFETY DEVICE
29. WELDED STEEL PIPE BRACKET PER CITY OF SAN DIEGO CIP STD DETAIL M-412 (BOOK 3, 1999)
30. 15"x15"x15" SUMP AND DRAIN VALVE PER 3 / M-10
31. 4" SCH 40 PVC SUMP DRAIN PIPE AND FITTINGS AT 2% MIN SLOPE TO WET WELL
32. 8'-0"x8'-0" PRE-CAST CONCRETE VALVE VAULT
33. 8'-0"x8'-0" DOUBLE-LEAF ALUMINUM HATCH (H20 LOADING)
34. RELOCATED EXISTING STEEL PIPE BRACKET AND U-BOLT FASTENER. MOUNT SIMILAR TO EXISTING.
35. STRUCTURE FOUNDATION PER 6 / M-10
36. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
37. ADJUSTABLE CLEVIS HANGER AND THREADED ROD. ANCHOR PER MANUFACTURER RECOMMENDATIONS.
38. CONCRETE ANCHOR BLOCK, SEE NOTE 1 ON DWG C-3
39. CONCRETE THRUST BLOCK, SEE NOTE 1 ON DWG C-3
40. BACKWATER DEVICE PER SDS-104 / SDSD
41. 2" SEWAGE AIR/VAC VALVE, APCO SERIES 440 OR APPROVED EQUAL
42. 2" SCH 80 PVC AIR DISCHARGE LINE. SEE NOTE 3.
43. 2" CHECK VALVE

MECHANICAL SECTIONS

M-5

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 14
MECHANICAL SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 35 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN — RCE # C62882
PRINT DCE NAME

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

218-1689 CCS27 COORDINATE
1858444, 6250407 CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-35-D

CONSULTANT

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401 B Street, Suite 1600
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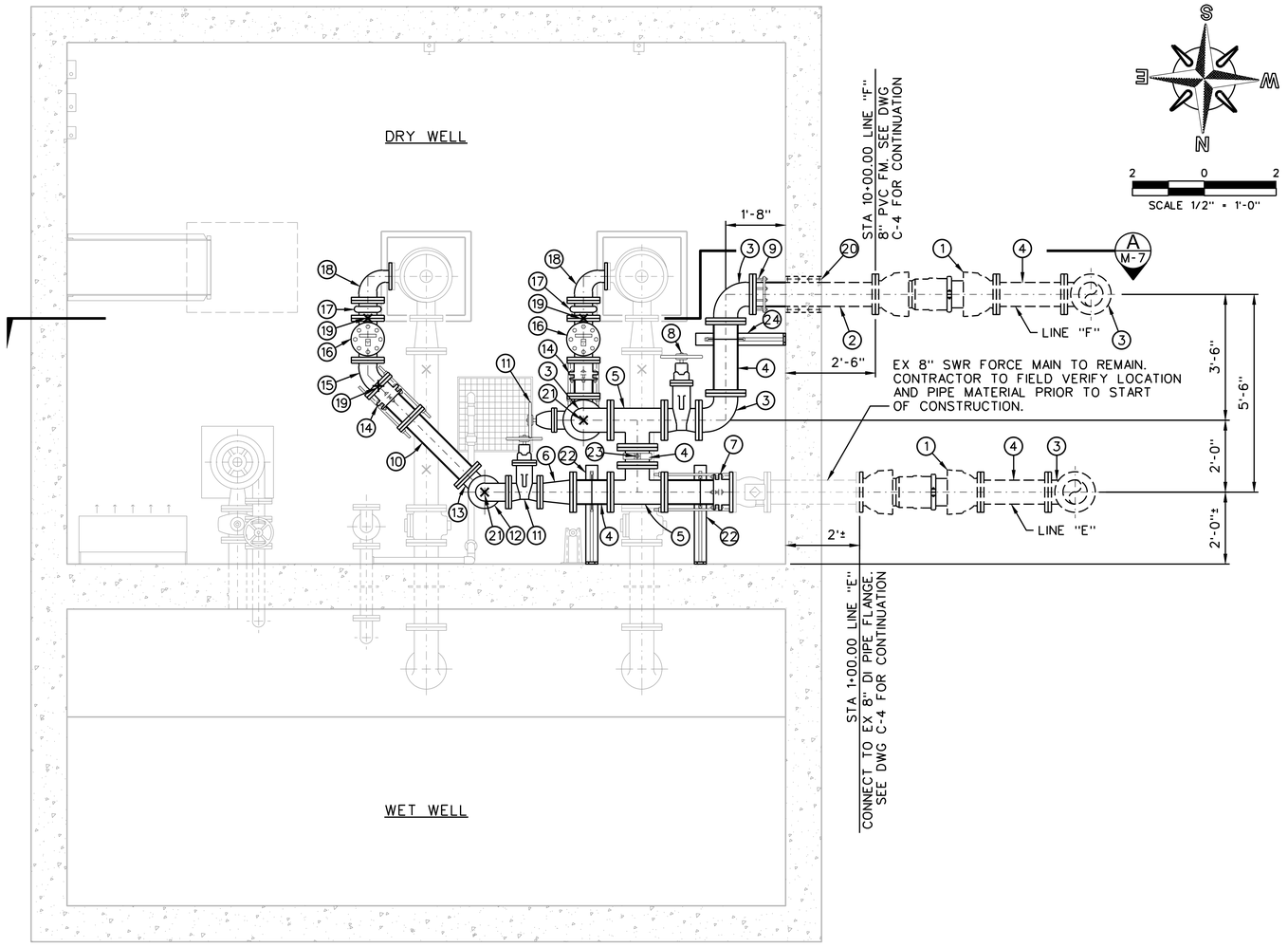
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17



SPS 16 WET WELL/DRY WELL - PLAN 1 / M-6

SPS 16 CONSTRUCTION ITEMS:

1. 8" FLEXIBLE EXPANSION JOINT
2. 8" FLGxPE DI SPOOL (LENGTH AS REQUIRED)
3. 8" FLG DI 90° BEND
4. 8" FLG DI SPOOL (LENGTH AS REQUIRED)
5. 8" FLG DI TEE
6. 8"x6" FLG DI CONCENTRIC REDUCER
7. 8" DISMANTLING JOINT
8. 8" FLG GATE VALVE WITH HANDWHEEL OPERATOR
9. 8" RESTRAINED COUPLING ADAPTER
10. 6" FLG DI SPOOL (LENGTH AS REQUIRED)
11. 6" FLG GATE VALVE WITH HAND WHEEL OPERATOR
12. 6" FLG DI 90° BEND
13. 6" FLG DI 90° BASE BEND
14. 6" DISMANTLING JOINT
15. 6" FLG DI 45° BEND
16. 6" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200
17. 6" FLG RUBBER EXPANSION JOINT
18. 6"x4" FLG DI 90° REDUCING BEND
19. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
20. WALL PENETRATION PER 5 / M-10
21. BASE BEND SUPPORT PER 1 / M-10
22. RELOCATED EXISTING STEEL PIPE BRACKET AND U-BOLT FASTENER. MOUNT SIMILAR TO EXISTING.
23. ADJUSTABLE CLEVIS HANGER AND THREADED ROD. ANCHOR PER MANUFACTURER RECOMMENDATIONS.
24. WELDED STEEL PIPE BRACKET PER CITY OF SAN DIEGO CIP STD DETAIL M-412 (BOOK 3, 1999)

NOTES:

1. FLEXIBLE EXPANSION JOINT SHALL BE RESTRAINED DURING PRESSURE TESTING.
2. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
3. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL PLANS

M-6

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 16
MECHANICAL PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 36 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER — DATE 06/23/2017
DEBBIE VAN MARTIN (PRINT DCE NAME) — RCE # 62882

SUBMITTED BY RYAN GREEK, PROJECT MANAGER
CHECKED BY LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

222-1689 CCS27 COORDINATE
1862444, 6250407 CCS83 COORDINATE
38545-36-D

CONSULTANT

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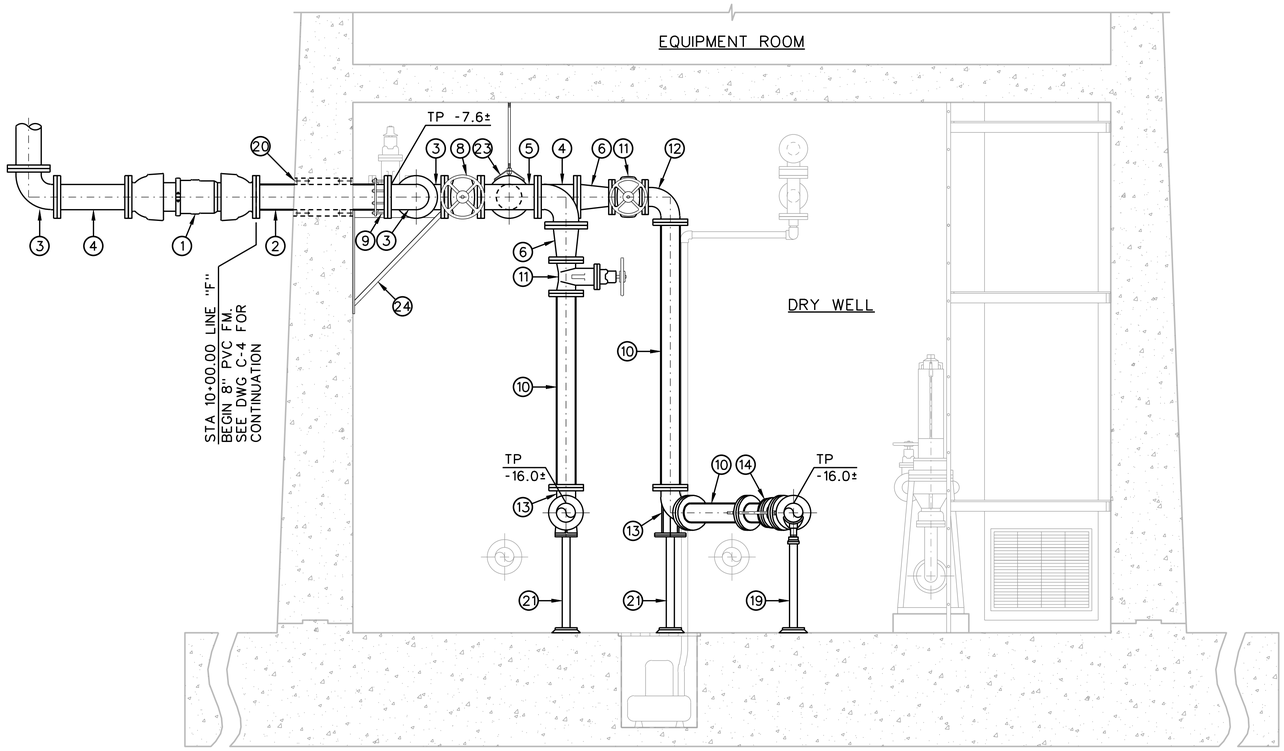
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED



SPS 16 DRY WELL - SECTION (A / M-7)

2 0 2

SCALE 1/2" = 1'-0"

SPS 16 CONSTRUCTION ITEMS:

1. 8" FLEXIBLE EXPANSION JOINT
2. 8" FLGxPE DI SPOOL (LENGTH AS REQUIRED)
3. 8" FLG DI 90° BEND
4. 8" FLG DI SPOOL (LENGTH AS REQUIRED)
5. 8" FLG DI TEE
6. 8"x6" FLG DI CONCENTRIC REDUCER
7. 8" DISMANTLING JOINT
8. 8" FLG GATE VALVE WITH HANDWHEEL OPERATOR
9. 8" RESTRAINED COUPLING ADAPTER
10. 6" FLG DI SPOOL (LENGTH AS REQUIRED)
11. 6" FLG GATE VALVE WITH HAND WHEEL OPERATOR
12. 6" FLG DI 90° BEND
13. 6" FLG DI 90° BASE BEND
14. 6" DISMANTLING JOINT
15. 6" FLG DI 45° BEND
16. 6" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200
17. 6" FLG RUBBER EXPANSION JOINT
18. 6"x4" FLG DI 90° REDUCING BEND
19. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
20. WALL PENETRATION PER 5 / M-10
21. BASE BEND SUPPORT PER 1 / M-10
22. RELOCATED EXISTING STEEL PIPE BRACKET AND U-BOLT FASTENER. MOUNT SIMILAR TO EXISTING.
23. ADJUSTABLE CLEVIS HANGER AND THREADED ROD. ANCHOR PER MANUFACTURER RECOMMENDATIONS.
24. WELDED STEEL PIPE BRACKET PER CITY OF SAN DIEGO CIP STD DETAIL M-412 (BOOK 3, 1999)

NOTES:

1. FLEXIBLE EXPANSION JOINT SHALL BE RESTRAINED DURING PRESSURE TESTING.
2. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
3. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL SECTION

M-7

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 16
MECHANICAL SECTION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 37 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) 06/23/2017 (DATE) C62882 (RCE #)

SUBMITTED BY RYAN GREEK, PROJECT MANAGER
CHECKED BY LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

222-1689 CCS27 COORDINATE
1862444, 6250407 CCS83 COORDINATE

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

38545-37-D

CONSULTANT

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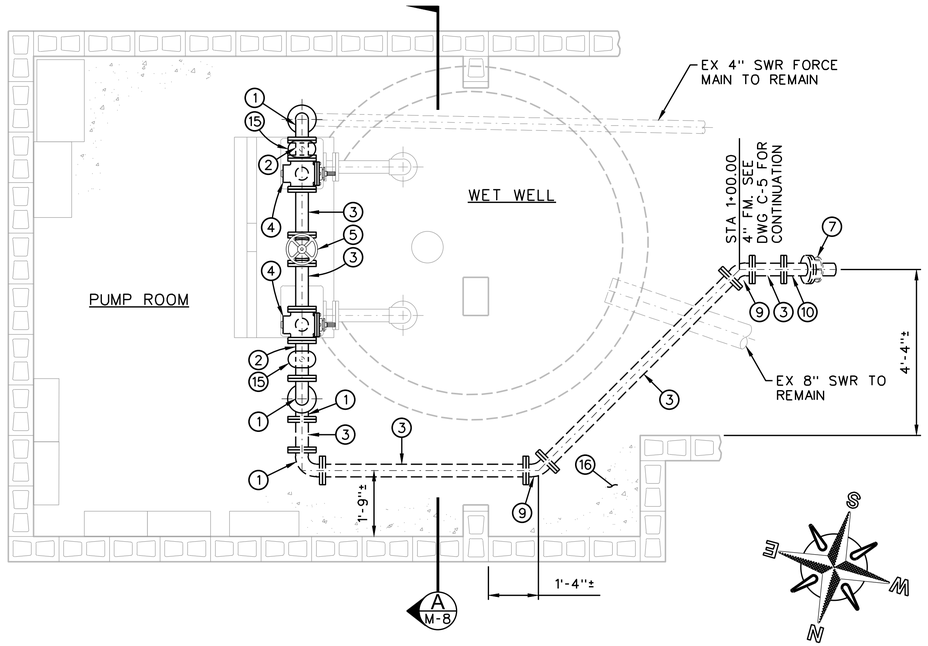
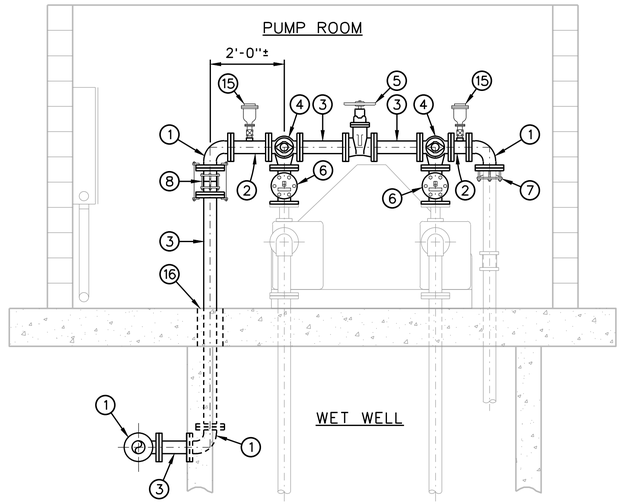
REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17



SPS 25A - PLAN 1 / M-8

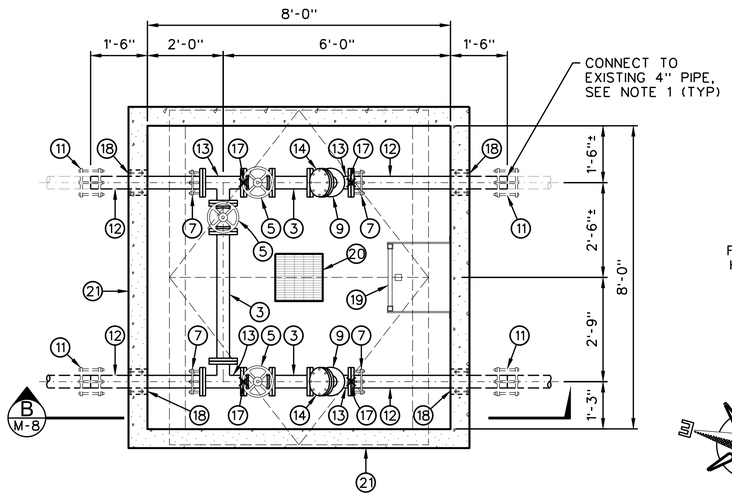
2 0 2
SCALE 1/2" = 1'-0"



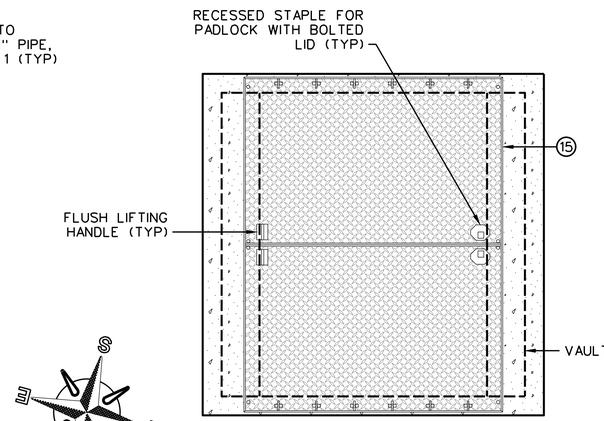
SPS 25A - SECTION A / M-8

SPS 25A CONSTRUCTION ITEMS:

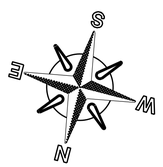
1. 4" FLG DI 90° BEND
2. 4" FLG DI SPOOL WITH 1-1/2" THREADED COUPLING (LENGTH AS REQUIRED)
3. 4" FLG DI SPOOL (LENGTH AS REQUIRED)
4. 4" FLG 3-WAY PLUG VALVE
5. 4" FLG GATE VALVE WITH HAND WHEEL OPERATOR
6. 4" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200, SEE NOTE 1.
7. 4" FLG COUPLING ADAPTER, RESTRAINED. SEE NOTE 1.
8. 4" FLEXIBLE COUPLING WITH RESTRAINT HARNESS
9. 4" FLG DI 45° BEND
10. 4" FLG DI 22-1/2° BEND
11. 4" SLEEVE COUPLING WITH RESTRAINT
12. 4" PE DI SPOOL (LENGTH AS REQUIRED)
13. 4" FLG DI TEE
14. 4" DI BLIND FLANGE
15. 1/2" AIR RELEASE VALVE (SEWAGE)
16. REMOVE AND REPLACE CONCRETE SLAB IN KIND. DOWEL IN REBAR WITH A MINIMUM OF 6" EMBEDMENT INTO EXISTING CONCRETE
17. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
18. WALL PENETRATION PER 5 / M-10
19. LADDER AND LADDER-UP SAFETY DEVICE
20. 15"x15"x15" SUMP PER 2 / M-10
21. 8'-0"x8'-0" PRE-CAST CONCRETE VALVE VAULT
22. 6'-0"x8'-0" DOUBLE-LEAF HATCH
23. STRUCTURE FOUNDATION PER 6 / M-10



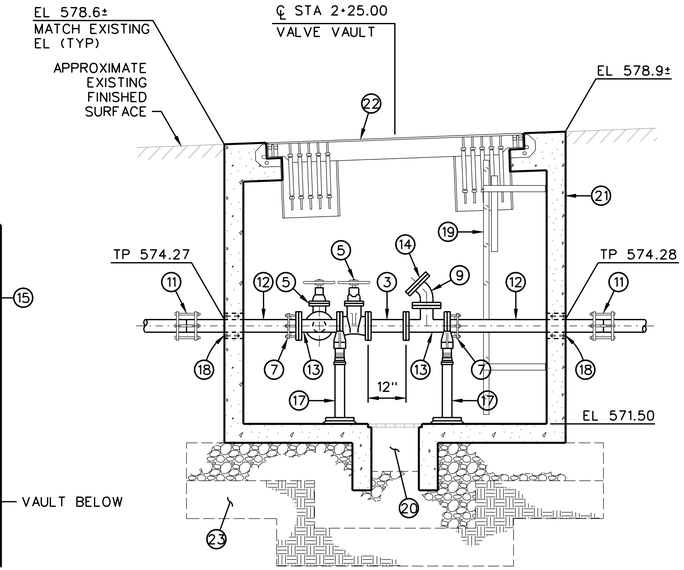
SPS 25A VALVE VAULT - MECHANICAL PLAN 2 / M-8



TOP SLAB PLAN



2 0 2
SCALE 1/2" = 1'-0"



SPS 25A VALVE VAULT - SECTION B / M-8

NOTES:

1. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
2. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

MECHANICAL PLANS AND SECTIONS

M-8

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 25A
MECHANICAL PLANS AND SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 38 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

242-1689 CCS27 COORDINATE
1882444, 6250407 CCS83 COORDINATE
38545-38-D

CONSULTANT

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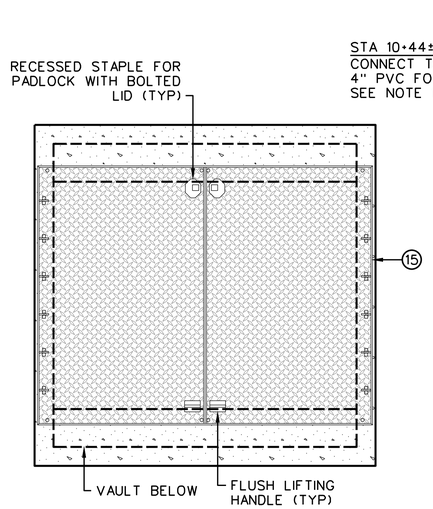
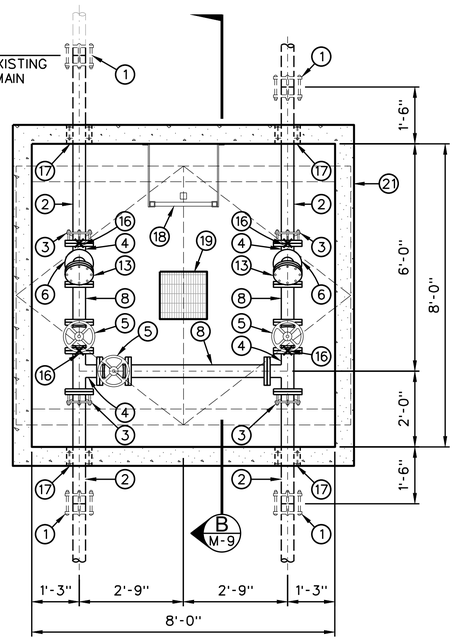
www.psomas.com

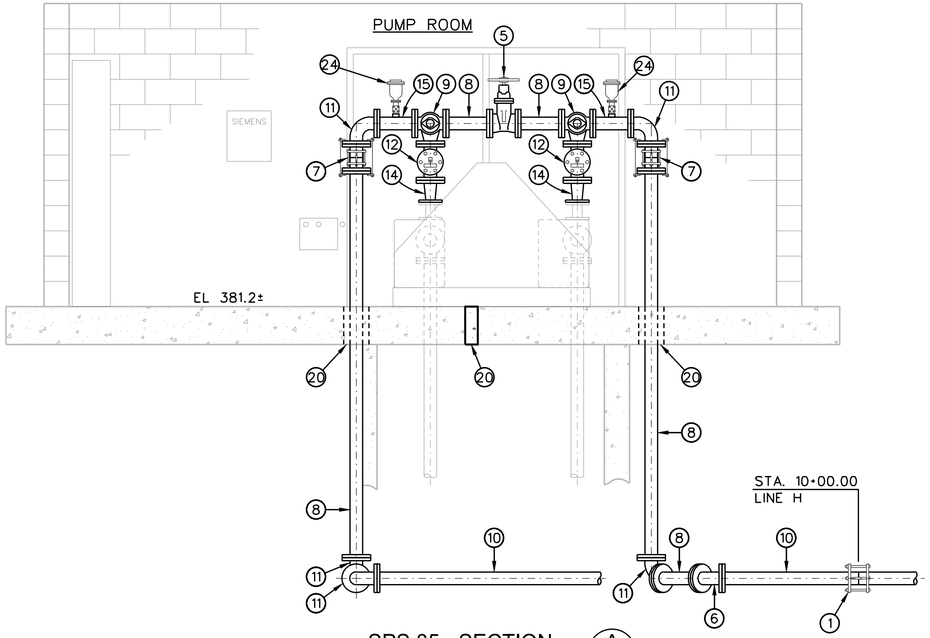
REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA
5/4/17

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

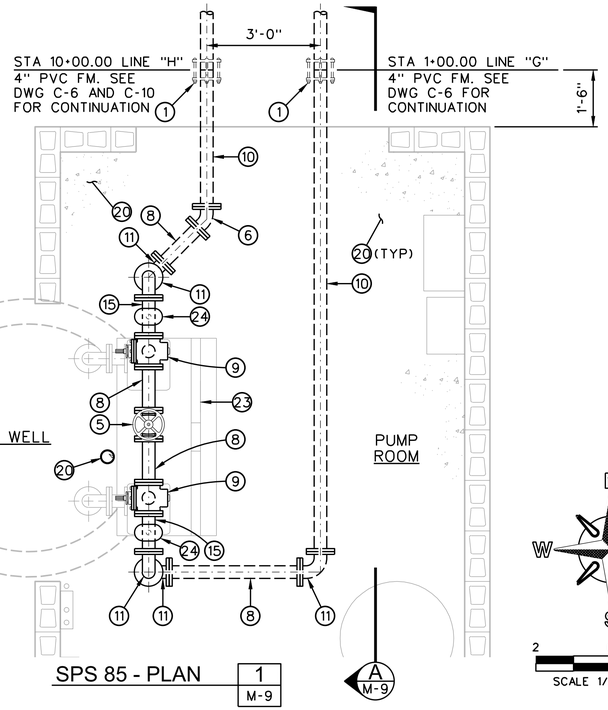


TOP SLAB PLAN

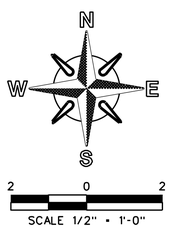


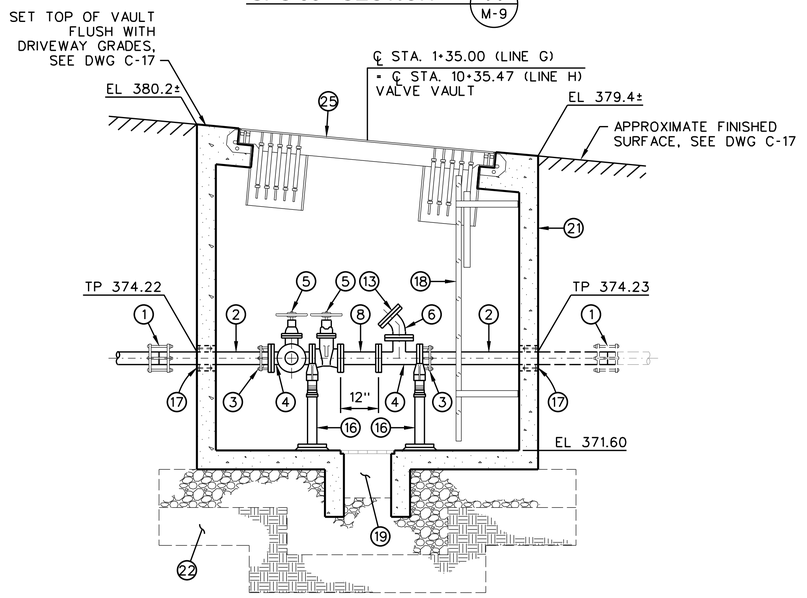


SPS 85 - SECTION A M-9



SPS 85 - PLAN 1 M-9





SPS 85 - SECTION B M-9

SPS 85 CONSTRUCTION ITEMS:

1. 4" SLEEVE COUPLING WITH RESTRAINT
2. 4" PE DI SPOOL (LENGTH AS REQUIRED)
3. 4" FLG COUPLING ADAPTER, RESTRAINED
4. 4" FLG DI TEE
5. 4" FLG GATE VALVE WITH HAND WHEEL OPERATOR
6. 4" FLG DI 45° BEND
7. 4" FLEXIBLE COUPLING WITH RESTRAINT HARNESS
8. 4" FLG DI SPOOL (LENGTH AS REQUIRED)
9. 4" FLG 3-WAY PLUG VALVE
10. 4" FLGxPE DI SPOOL (LENGTH AS REQUIRED)
11. 4" FLG DI 90° BEND
12. 4" FLG CHECK VALVE, VAL-MATIC SURGEBUSTER SERIES 7200
13. 4" DI BLIND FLANGE
14. 4"x3" FLG DI CONCENTRIC REDUCER. SEE NOTE 1.
15. 4" FLG DI SPOOL WITH 1-1/2" THREADED COUPLING (LENGTH AS REQUIRED)
16. ADJUSTABLE PIPE SUPPORT PER CITY OF SAN DIEGO CIP STD DETAIL M-402 (BOOK 3, 1999) MODIFIED TO INCLUDE GRINNELL FIG 264 SADDLE
17. WALL PENETRATION PER 5 / M-10
18. LADDER AND LADDER-UP SAFETY DEVICE
19. 15"x15"x15" SUMP PER 2 / M-10
20. REPLACE CONCRETE SLAB IN KIND. DOWEL IN REBAR WITH A MINIMUM OF 6" EMBEDMENT INTO EXISTING CONCRETE
21. 8'-0"x8'-0" PRE-CAST CONCRETE VALVE VAULT
22. STRUCTURE FOUNDATION PER 6 / M-10
23. REMOVE AND REPLACE PUMP SHIELD AS NECESSARY FOR CONSTRUCTION
24. 1/2" AIR RELEASE VALVE (SEWAGE)
25. 6'-0"x8'-0" DOUBLE-LEAF HATCH
26. FILL HOLE IN MANHOLE WALL WITH NON-SHRINK GROUT

NOTES:

1. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL FIELD VERIFY LOCATION, SIZE AND MATERIAL OF ALL CONNECTIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ENGINEER'S IMMEDIATE ATTENTION (TYP).
2. ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE LINED AND COATED WITH 24 MILS MDFT OF FUSION BONDED EPOXY. IN ADDITION, ALL BURIED DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH A FIELD APPLIED 3-PART WAX-TAPE COATING SYSTEM.

M-9

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 85
MECHANICAL PLAN AND SECTIONS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 39 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) 06/23/2017 DATE C62882 RCE #

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

318-1743 CCS27 COORDINATE
1958444, 6304407 CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545-39-D

CONSULTANT

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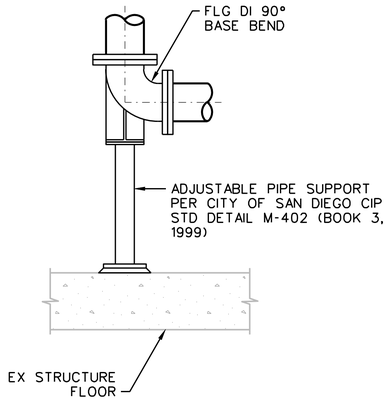
www.psomas.com

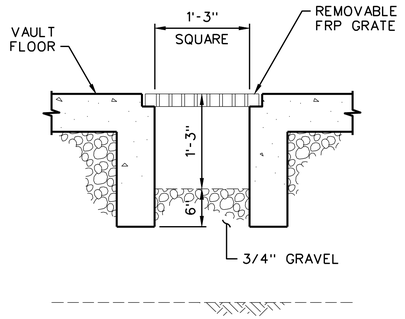
REGISTERED PROFESSIONAL ENGINEER SANDRA RUSSELL No. 44078 Exp. 6/30/17 CIVIL STATE OF CALIFORNIA
5/4/17

MECHANICAL PLAN AND SECTIONS



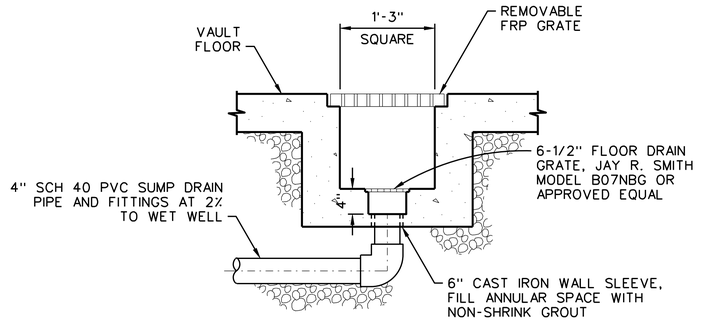
BASE BEND PIPE SUPPORT — 1 / M-10

NOT TO SCALE



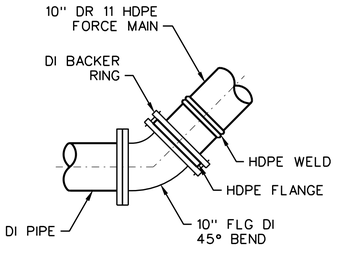
VALVE VAULT SUMP DRAIN — 2 / M-10

NOT TO SCALE



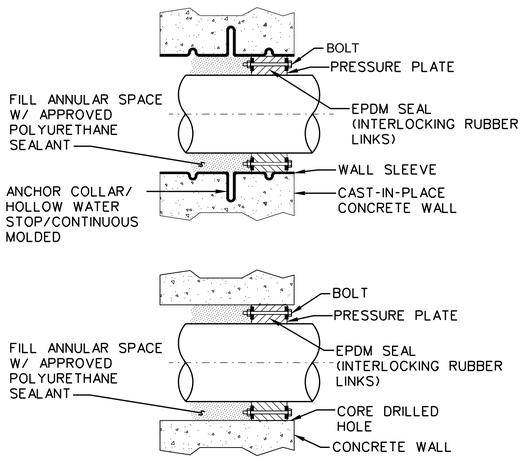
VALVE VAULT GRAVITY DRAIN — 3 / M-10

NOT TO SCALE



DIxHDPE ADAPTER FITTING — 4 / M-10

NOT TO SCALE

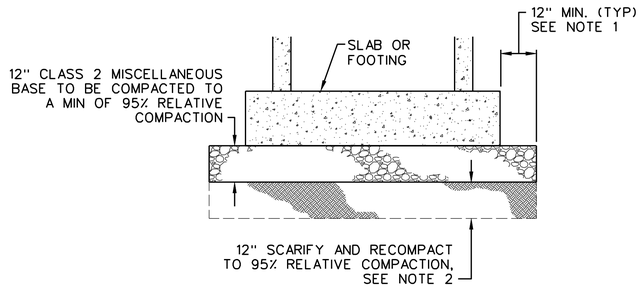


NOTES:

1. SEAL SHALL BE LINK SEAL MODULAR SEAL MODEL LS OR APPROVED EQUAL. ALL HARDWARE SHALL BE 316 SS.
2. SEAL SHALL BE CAPABLE OF HOLDING UP TO A 20 PSIG HYDROSTATIC PRESSURE WITHOUT LEAKING.

RUBBER SEAL WALL PENETRATION — 5 / M-10

NOT TO SCALE



NOTES:

1. THIS DETAIL IS TYPICAL FOR ALL BURIED STRUCTURES INCLUDING VAULTS, MANHOLES, ETC.
2. IF LOOSE OR SOFT SOILS ARE ENCOUNTERED AT BOTTOM OF EXCAVATION, THEY SHALL BE REMOVED AND REPLACED WITH 3/4" CRUSHED ROCK WRAPPED IN GEOTEXTILE FABRIC.

STRUCTURE FOUNDATION — 6 / M-10

NOT TO SCALE

MECHANICAL PLAN AND SECTIONS

M-10

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

MECHANICAL DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 40 OF 49 SHEETS

WATER WBS N/A
SEWER WBS B-00501

CONSULTANT

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REGISTERED PROFESSIONAL ENGINEER — SANDRA RUSSELL — No. 44078 Exp. 6/30/17 — CIVIL — STATE OF CALIFORNIA — 5/4/17

APPROVED FOR CITY ENGINEER DEBBIE VAN MARTIN (PRINT DCE NAME) — DATE 06/23/2017 — RCE # C62882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

SEE SHEETS — CCS27 COORDINATE
SEE SHEETS — CCS83 COORDINATE

CONTRACTOR ____ DATE STARTED ____
INSPECTOR ____ DATE COMPLETED ____

38545-40-D

ELECTRICAL SYMBOLS

GENERAL SYMBOLS:

- DASHED SYMBOL INDICATES FIXTURE, DEVICE, OR EQUIPMENT TO REMAIN.
- DASHED SYMBOL WITH HATCH INDICATES FIXTURE, DEVICE OR EQUIPMENT TO BE REMOVED
- DASHED SYMBOL WITH HATCH AND 'R' INDICATES FIXTURE, DEVICE OR EQUIPMENT TO BE RELOCATED.
- SYMBOL WITH 'R' INDICATES FIXTURE, DEVICE OR EQUIPMENT RELOCATED.
- XN — NEW WIRE INSTALLED IN EXISTING CONDUIT.
- XR — REMOVE EXISTING WIRE EXISTING CONDUIT TO REMAIN.
- (2) NOTE REFERENCE.
- 42,000 AVAILABLE SHORT CIRCUIT CURRENT, AMPS.
- 3 / E1 DETAIL NUMBER DESIGNATION. SHEET DETAIL APPEARS ON.
- A / E17 SECTION LETTER DESIGNATION. SHEET SECTION APPEARS ON.
- FENCING AND GATES.

BUILDING WIRING & RACEWAY SYSTEMS:

- WIRING OR CONDUIT CONCEALED IN WALL OR CEILING.
- WIRING OR CONDUIT EXPOSED.
- WIRING OR CONDUIT UNDERGROUND.
- CONDUIT TURNED UP.
- CONDUIT TURNED DOWN.
- G GROUNDING CONDUIT, OR WIRE.
- DISTRIBUTION PANEL OR SWITCHBOARD.
- SURFACE FLUSH PANELBOARD.
- INDICATED. LOCATE ABOVE ACCESSIBLE CEILINGS UON.
- LIGHT FIXTURE
- GFCI DUPLEX CONVENIENCE RECEPTACLE 20A, 125V. WALL MOUNTED DEVICE AT 18" AFF UON. GROUND FAULT CIRCUIT INTERUPTER, PERSONAL PROTECTION.

SINGLE LINE DIAGRAM:

- GROUNDING ELECTRODE.
- G GROUND BUS OR TERMINALS.
- N NEUTRAL BUS OR TERMINALS.
- LOW VOLTAGE CIRCUIT BREAKER.
- SPLICE.
- TRANSFORMER - SINGLE LINE DIAGRAM.
- CT: CURRENT TRANSFORMER BY SDG&E.
- M KILOWATT HOUR METER OR FLOW MONITOR.
- TERMINATION.
- F FUSED SAFETY DISCONNECT SWITCH.
- GROUND ROD IN FLUSH UNDERGROUND UTILITY PULL BOX.
- GROUND ROD.
- SOLID STATE MOTOR STARTER.
- AUTOMATIC TRANSFER SWITCH.
- GROUND ROD.
- 3 MOTOR, "3" INDICATES HORSEPOWER.

ABBREVIATIONS

A OR AMP	AMPERE AMPS INTERRUPTING CAPACITY	NG	NATURAL GAS
AIC	CAPACITY	SWBD	SWITCHBOARD
AL	ALUMINUM	SWGR	SWITCHGEAR
ATS	AUTOMATIC TRANSFER SWITCH	TBD	TO BE DETERMINED
C	CONDUIT	TRANSF.	TRANSFORMER
CB	CIRCUIT BREAKER	P	POLE
CKT	CIRCUIT	PH	PHASE
CU	COPPER	PL	PROPERTY LINE
DIST	DISTRIBUTION	PLC	PROGRAMMABLE LOGIC CONTROLLER
DWG	DRAWING	TYP.	TYPICAL
G	GROUND	UL	UNDERWRITERS LABORATORY
HH	HAND HOLE	UON	UNLESS OTHERWISE NOTED
HVFDS	HIGH VOLTAGE FUSED DISCONNECT	V	VOLT
HZ	HERTZ	VA	VOLT AMPERE
J-BOX OR JB	JUNCTION BOX	VT	VOLTAGE TRANSDUCER
		W	WATT OR WIRE
KAIC	THOUSAND AMPS INTURRUPTING CAPACITY	X OR (E) OR EXIST.	EXISTING (EQUIPMENT)
KVA	KILOVOLT AMP	XR	REMOVE EXISTING WIRE, EXISTING CONDUIT TO REMAIN.
KV	KILOVOLT		
KW	KILOWATT		
MAX	MAXIMUM	XN	NEW WIRE INSTALLED IN EXISTING CONDUIT.
MCP	MOTOR CONTROL PANEL		
MH	MANHOLE		
MSB	MAIN SWITCHBOARD		
NEMA	NATIONAL ELECTRICAL MANUFACTURER ASSOCIATION		

GENERAL NOTES - ELECTRICAL

1. THE FOLLOWING GENERAL NOTES APPLY TO ALL ELECTRICAL DRAWINGS.
2. INSTALLATION OF ELECTRICAL MATERIAL SHALL CONFORM WITH LOCAL REGULATIONS AND THE 2013 CALIFORNIA ELECTRICAL CODE (CEC) AND OTHER GOVERNING CODES AND ORDINANCES.
3. ALL ELECTRICAL EQUIPMENT SHALL BE NRTL LABELED.
4. THE CONTRACTOR SHALL VISIT THE SITE INCLUDING ALL AREAS INDICATED ON THE DRAWINGS. HE SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND BY SUBMITTING A BID ACCEPTS CONDITIONS UNDER WHICH HE SHALL BE REQUIRED TO PERFORM HIS WORK.
5. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF DRAWINGS AND SPECIFICATIONS. HE SHALL CHECK THE DRAWINGS OF THE OTHER TRADES AND SHALL CAREFULLY READ THE ENTIRE SPECIFICATIONS AND DETERMINE HIS RESPONSIBILITIES. FAILURE TO DO SO SHALL NOT RELEASE THE CONTRACTOR FROM DOING THE WORK IN COMPLETE ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.
6. THE CONTRACTOR SHALL COORDINATE HIS WORK TO COMPLY WITH CEC 702 - OPTIONAL STANDBY SYSTEMS.
7. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES AT THE SITE. ANY COST TO ROUTE CONDUIT OTHER THAN AS SHOWN ON THE PLANS SHALL BE INCURRED BY THE CONTRACTOR.
8. WHEREVER A DISCREPANCY IN QUANTITY OR SIZE OF CONDUIT, WIRE, EQUIPMENT DEVICES, CIRCUIT BREAKERS, TRANSFORMERS, GROUND FAULT PROTECTION SYSTEM, ETC. (ALL MATERIALS, ARISES ON THE DRAWINGS AND/OR SPECIFICATIONS), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON DRAWINGS AND/OR IN THE SPECIFICATIONS TO ENSURE COMPLETE AND OPERABLE SYSTEMS AS REQUIRED BY THE OWNER OR ENGINEER.
9. ALL CONDUIT SIZES ARE BASED ON COPPER CONDUCTORS WITH THHN/THWN INSULATION UNLESS OTHERWISE NOTED. ALL CONDUCTORS SHALL BE COPPER, #12 AWG MINIMUM CONDUCTOR INSULATION SHALL BE THHN THWN UNLESS OTHERWISE NOTED.
10. INSTALL ALL EQUIPMENT, LIGHTING FIXTURES, DEVICES, CONDUIT AND CONDUIT SUPPORTS TO MEET SEISMIC CATEGORY "D" REQUIREMENTS.

GENERAL NOTES - ELECTRICAL

11. ALL ELECTRICAL EQUIPMENT SHALL BE BRACED OR ANCHORED TO RESIST A HORIZONTAL FORCE ACTING IN ANY DIRECTION USING THE FOLLOWING CRITERIA:

FIXED EQUIPMENT ON GRADE	20% OF OPERATING WEIGHT
FIXED EQUIPMENT ON STRUCTURE	30% OF OPERATING WEIGHT
EMERGENCY POWER & COMMUNICATION EQUIPMENT ON GRADE EMERGENCY	50% OF OPERATING WEIGHT
POWER & COMMUNICATION EQUIPMENT ON STRUCTURE	75% OF OPERATING WEIGHT

FOR FLEXIBLY MOUNTED EQUIPMENT USE FOUR (4) TIMES THE ABOVE VALUES, AND FOR SIMULTANEOUS VERTICAL FORCE USE ONE-THIRD (1/3) TIMES THE HORIZONTAL FORCE. WHERE ANCHORAGE DETAILS ARE NOT SHOWN ON THE DRAWINGS THE FIELD INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT AND THE FIELD INSPECTOR.

12. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC ONLY. INSTALL ALL CONDUITS TO SUIT FIELD CONDITIONS.
13. PROVIDE PROPERLY SIZED LUGS AT ALL CIRCUIT BREAKER PANELS, FOR THE CONDUCTORS SHOWN TO CONNECT TO THESE LUGS.
14. INSTALL ALL EXTERIOR MOUNTED ELECTRICAL EQUIPMENT IN WEATHERPROOF, NEMA 3R ENCLOSURES.
15. SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR, SIZED PER CEC TABLE 250.122, SHALL BE PROVIDED, INSTALLED IN THE SAME CONDUIT AS THE CIRCUIT CONDUCTORS, FOR ALL FEEDER AND BRANCH CIRCUITS.
16. CONTRACTOR TO PROVIDE CONTROL WIRING AND CONDUIT TO GENERATOR. CONTRACTOR TO ENSURE ATS WILL PROVIDE START/STOP SIGNAL TO GENERATOR.
17. PROVIDE PVC COATED RIGID STEEL CONDUIT FOR ALL EXPOSED CONDUIT.
18. INTERRUPTION OF EXISTING ELECTRIC SERVICE: DO NOT INTERRUPT ELECTRIC SERVICE TO FACILITIES OCCUPIED BY OWNER OR OTHER UNLESS PERMITTED UNDER TO FOLLOWING CONDITIONS AND THEN ONLY AFTER ARRANGING TO PROVIDE TEMPORARY ELECTRIC SERVICE ACCORDING TO REQUIREMENTS INDICATED:

A. NOTIFY OWNER NO FEWER THAN FOURTEEN DAYS IN ADVANCE OF PROPOSED INTERRUPTION OF ELECTRIC SERVICE.

B. NOTIFY OWNER, IN WRITING, FOURTEEN DAYS IN A ADVANCE OF THE REQUIRED OUTAGE IF THE SCHEDULE FOR PERFORMING WORK HAS CHANGED OR IF REVISIONS TO THE OUTAGE PLAN ARE REQUIRED.

C. SHUTDOWNS ARE TO OCCUR FROM 6 P.M. FRIDAY TO 6 P.M. SUNDAY, AND 6 P.M. TO 6 A.M. MONDAY THROUGH THURSDAY. MAXIMUM SHUTDOWN IS FOUR HOURS.

D. INDICATE METHOD OF PROVIDING TEMPORARY ELECTRIC SERVICE IF SERVICE CAN NOT BE RESTORED WITHIN DESIRED TIME.

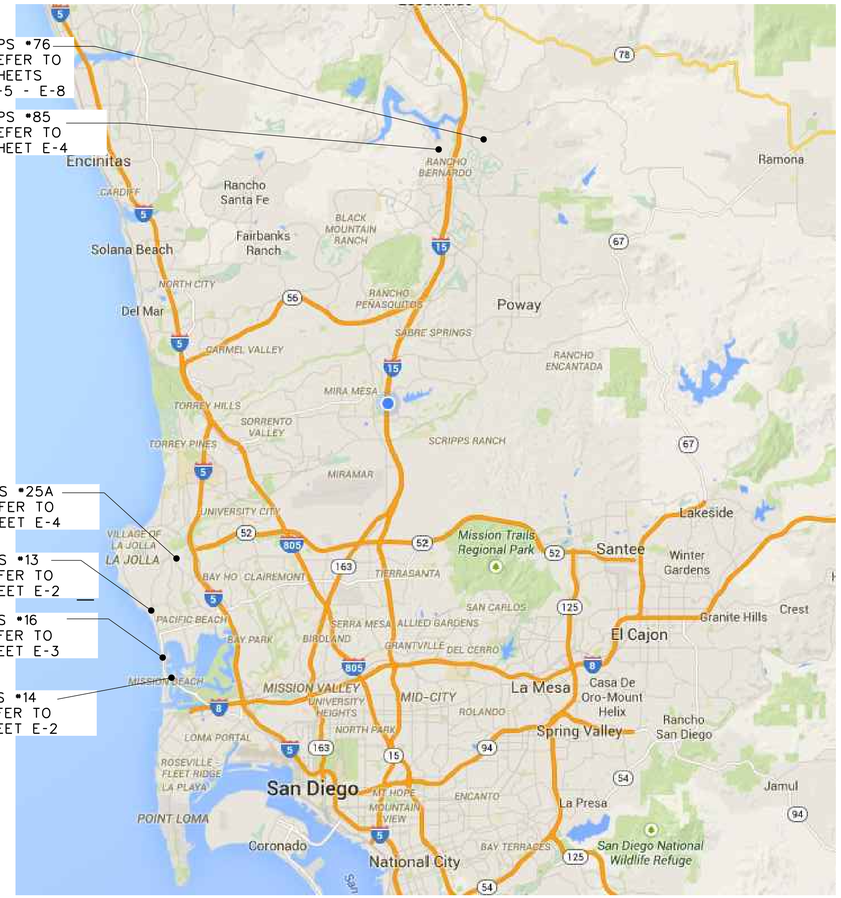
E. COMPLY WITH NFPA 70E.

19. PROVIDE ALL REQUIRED FLUIDS INCLUDING, BUT NOT LIMITED TO, FUEL, COOLANT, AND LUBRICANTS FOR GENERATOR OPERATION.
20. CONTRACTOR SHALL SECURE AND PAY FOR FIRE MARSHALL PERMITS AND FEES NECESSARY FOR THE EXECUTION AND COMPLETION OF ELECTRICAL WORK, INCLUDING ALL CHARGES BY THE LOCAL GOVERNMENT AGENCIES.

DISCONNECT AND OVERCURRENT DEVICES			
CIRCUIT BREAKER		SAFETY SWITCHES	
NUMBERS OF POLES	3	NUMBERS OF POLES	3
TRIP (AMPERES)	*	FUSE SIZE (AMPS)	*
FRAME (AMPERES)	100	RATING (AMPERES)	100
I.C. (1000 AMPS)	10	FUSE CLASS (UL)	RK5

* "NA" INDICATES NON-AUTOMATIC C/B
* "NF" INDICATES NON-FUSED SWITCH
* "50" INDICATES TRIP OR FUSE SIZE

ELECTRICAL SITE PLAN



1 / E1 STA. 13,14,16,25A, 85, and 76 - SITE PLAN

N W E S

0 10' 20' 40' 80'
SCALE: 1"=40'-0"

ELECTRICAL LEGENDS, GENERAL NOTES

E-1

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

ELECTRICAL LEGENDS, GENERAL NOTES

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 41 OF 49 SHEETS

WBS B-00501

CONSULTANT

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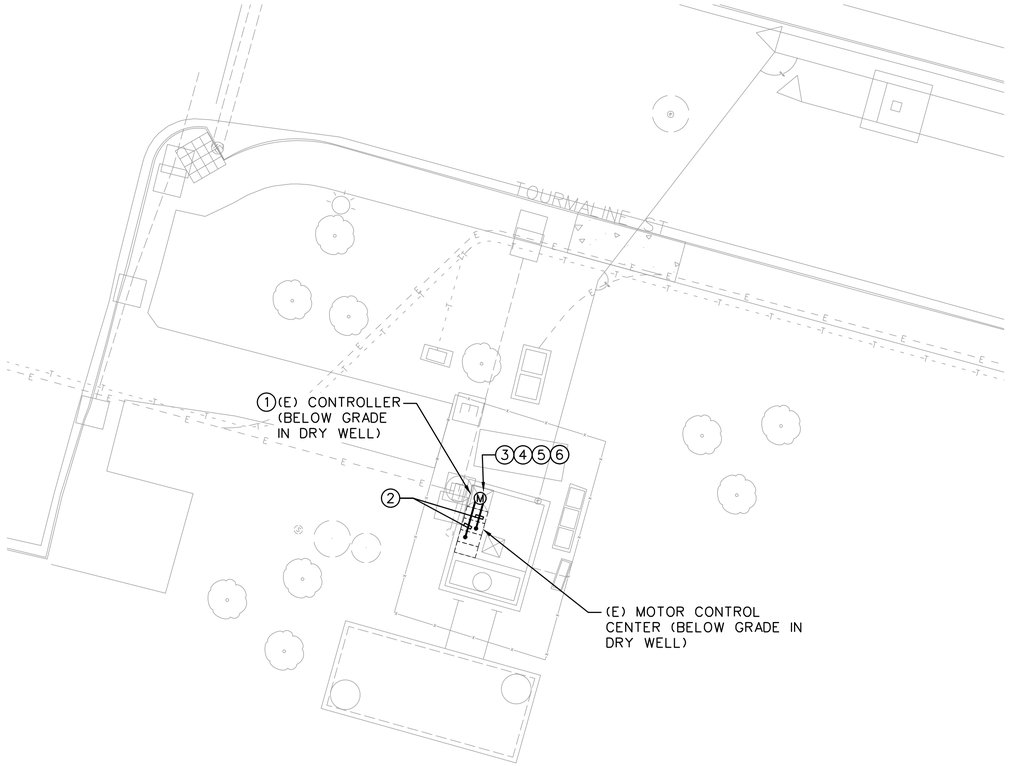
REGISTERED PROFESSIONAL ENGINEER ALAN J. BAUMAN No. 15283 Exp 09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 6/23/2017 — RCE 62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

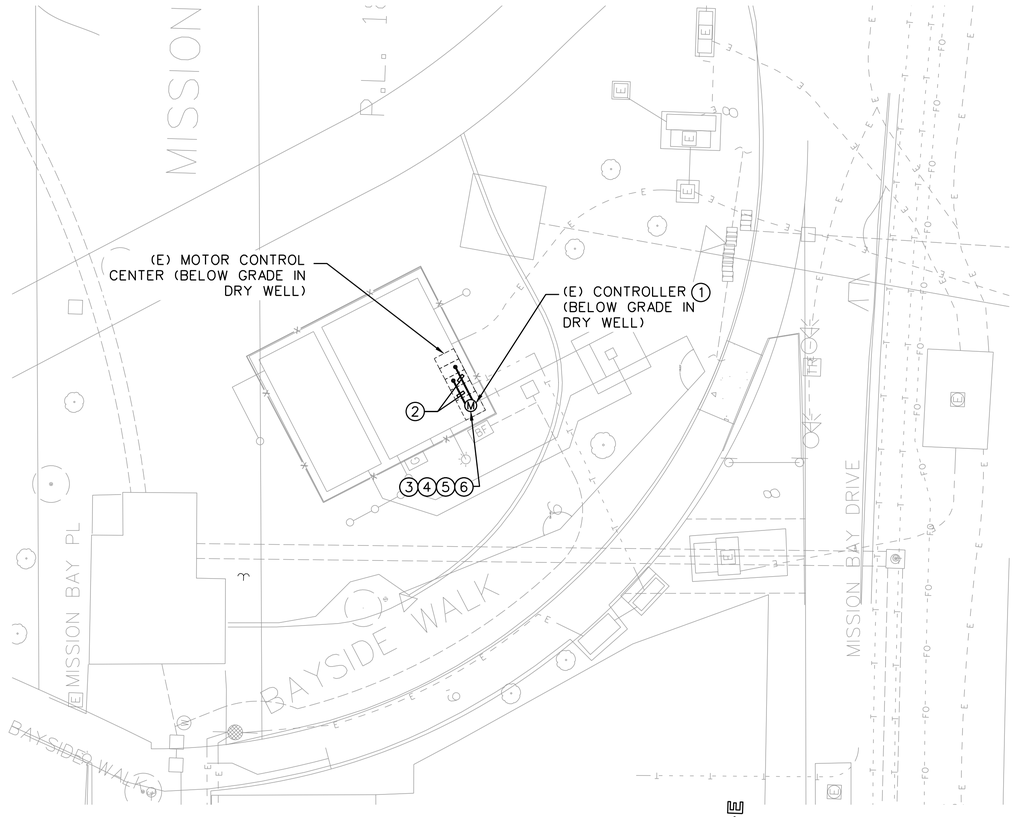
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE
38545- 41-D



1 E-2 SPS 13 ELECTRICAL PLAN
SCALE: 1" = 10'-0"

SCALE: 1"=10'-0"

230-1689, 234-1689
CCS27 COORDINATE
1870444, 6250407
1874444, 6250407
CCS83 COORDINATE



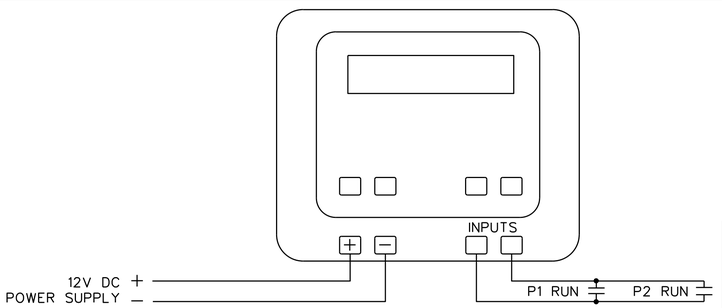
2 E-2 SPS 14 ELECTRICAL PLAN
SCALE: 1" = 10'-0"

SCALE: 1"=10'-0"

218-1689
CCS27 COORDINATE
1858444, 62550407
CCS83 COORDINATE

NOTES:

1. PROVIDE 1P, 20A CIRCUIT BREAKER FOR PUMP STATION MONITOR. PROVIDE 2•12 AND CONNECT TO PUMP STATION MONITOR. CIRCUIT BREAKER SHALL BE THE SAME MANUFACTURER AS EXISTING AND SHALL MATCH EQUIPMENT AIC RATING.
2. PROVIDE AND ROUTE 1"C FROM PUMP STATION MONITOR TO DEVICE THAT ACTIVATES PUMP SUCH AS, BUT NOT LIMITED TO, ELAPSED TIMER, INDICATOR LIGHTS, OR PUMP STARTER. PROVIDE CABLES PER PUMP STATION MONITOR MANUFACTURER'S RECOMMENDATION.
3. PUMP STATION MONITOR SHALL OPERATE ONCE IT SENSES ACTIVATION OF PUMP MOTOR. INSTALL PER MANUFACTURER'S RECOMMENDATION.
4. CUT A HOLE ON THE EXTERIOR DOOR OF THE CONTROL CABINET AND MOUNT PUMP STATION MONITOR PER MANUFACTURER'S RECOMMENDATION.
5. PROVIDE A MINIMUM OF 6 INCHES OF FREE SPACE BEHIND PANEL. IF SPACE IS NOT AVAILABLE, PROVIDE INSULATION BEHIND CONNECTORS.
6. PUMP STATION MONITOR (TELEDYNE/ISCO 4501) PROVIDED BY OTHERS. REFER TO 3/E-2 FOR TYPICAL WIRING DIAGRAM.



3 E-2 TELEDYNE ISCO 4501 CONNECTION DIAGRAM
SCALE : NO SCALE

E-2

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 13 AND 14 ELECTRICAL PLANS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 42 OF 49 SHEETS

WBS B-00501

CONSULTANT

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REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13265 Exp.09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

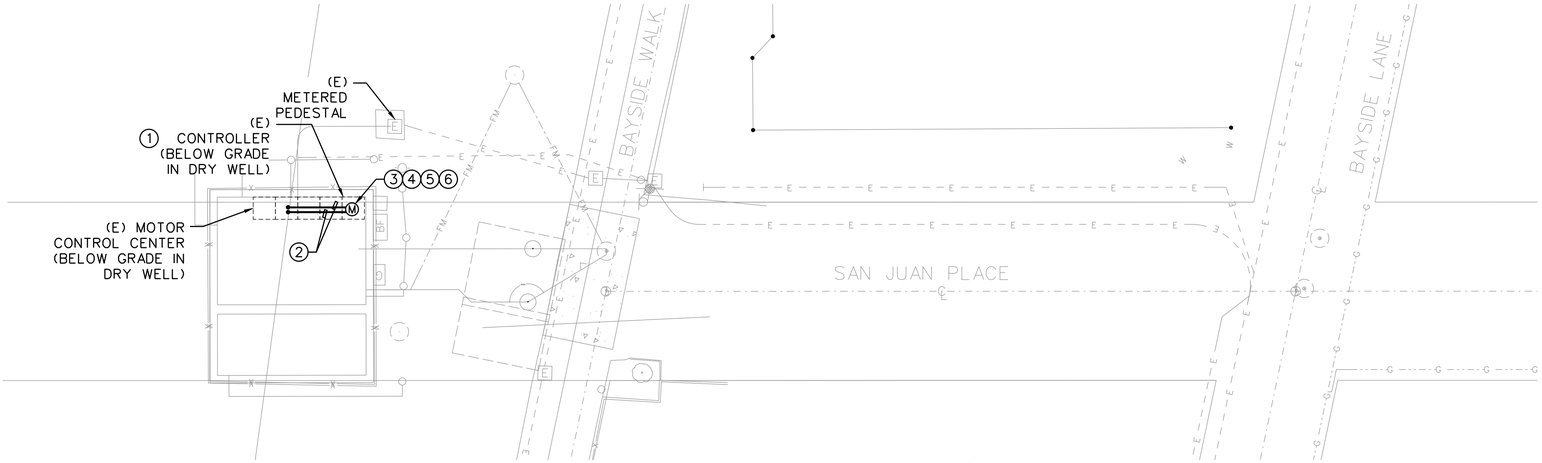
APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 06/23/2017 — RCE 62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

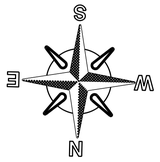
SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE
38545- 42 -D

SPS 13 AND 14 ELECTRICAL PLANS



1 E-3 SPS 16 ELECTRICAL PLAN

SCALE: 1" = 10'-0"



0 5' 10' 20'

SCALE: 1"=10'-0"

NOTES:

1. PROVIDE 1P, 20A CIRCUIT BREAKER FOR PUMP STATION MONITOR. PROVIDE 2#12 AND CONNECT TO PUMP STATION MONITOR. CIRCUIT BREAKER SHALL BE THE SAME MANUFACTURER AS EXISTING AND SHALL MATCH EQUIPMENT AIC RATING.
2. PROVIDE AND ROUTE 1"C FROM PUMP STATION MONITOR TO DEVICE THAT ACTIVATES PUMP SUCH AS, BUT NOT LIMITED TO, ELAPSED TIMER, INDICATOR LIGHTS, OR PUMP STARTER. PROVIDE CABLES PER PUMP STATION MONITOR MANUFACTURER'S RECOMMENDATION.
3. PUMP STATION MONITOR SHALL OPERATE ONCE IT SENSES ACTIVATION OF PUMP MOTOR. INSTALL PER MANUFACTURER'S RECOMMENDATION.
4. CUT A HOLE ON THE EXTERIOR DOOR OF THE CONTROL CABINET AND MOUNT PUMP STATION MONITOR PER MANUFACTURER'S RECOMMENDATION.
5. PROVIDE A MINIMUM OF 6 INCHES OF FREE SPACE BEHIND PANEL. IF SPACE IS NOT AVAILABLE, PROVIDE INSULATION BEHIND CONNECTORS.
6. PUMP STATION MONITOR (TELEDYNE/ISCO 4501) PROVIDED BY OTHERS. REFER TO 3/E-2 FOR TYPICAL WIRING DIAGRAM.

SPS 16 ELECTRICAL PLAN

E-3

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 16 ELECTRICAL PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 43 OF 49 SHEETS

WBS B-00501

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REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13293 EXP 09-30-18 ELECTRICAL STATE OF CALIFORNIA

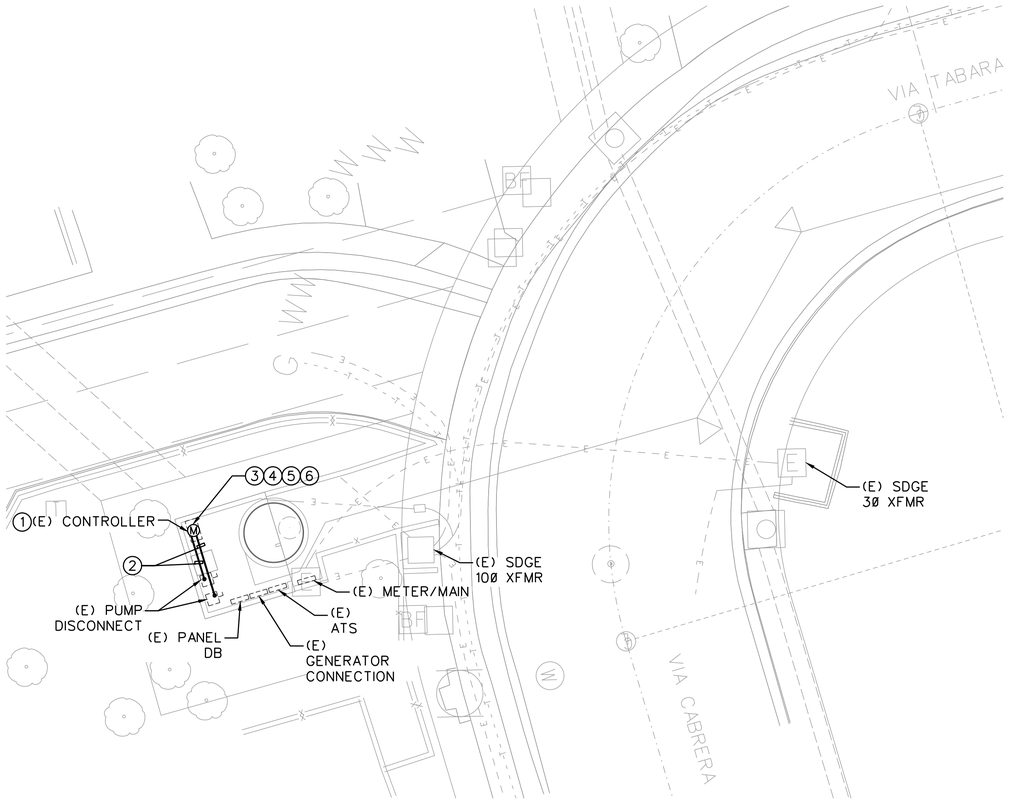
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 6/23/2017 — RCE 62882

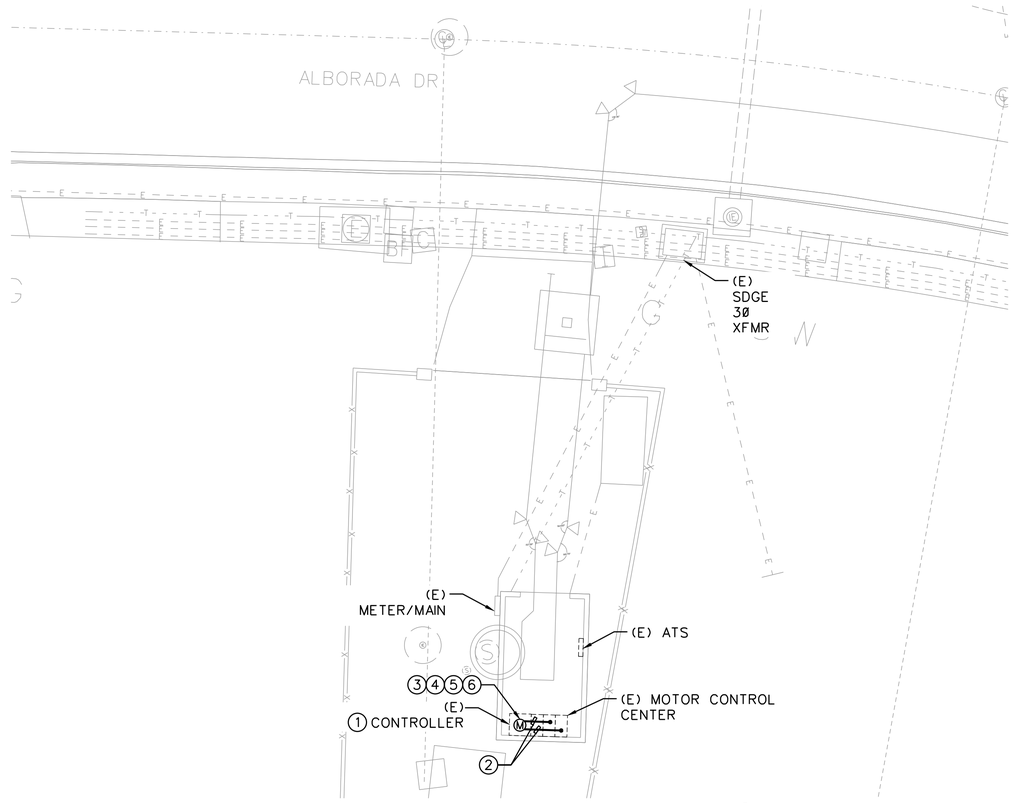
DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
222-1689 CCS27 COORDINATE
1862444, 6250407 CCS83 COORDINATE
38545-43-D



1 E-4 SPS 25A ELECTRICAL PLAN
SCALE: 1" = 10'-0"



2 E-4 SPS 85 ELECTRICAL PLAN
SCALE: 1" = 10'-0"

NOTES:

1. PROVIDE 1P, 20A CIRCUIT BREAKER FOR PUMP STATION MONITOR. PROVIDE 2•12 AND CONNECT TO PUMP STATION MONITOR. CIRCUIT BREAKER SHALL BE THE SAME MANUFACTURER AS EXISTING AND SHALL MATCH EQUIPMENT AIC RATING.
2. PROVIDE AND ROUTE 1"C FROM PUMP STATION MONITOR TO DEVICE THAT ACTIVATES PUMP SUCH AS, BUT NOT LIMITED TO, ELAPSED TIMER, INDICATOR LIGHTS, OR PUMP STARTER. PROVIDE CABLES PER PUMP STATION MONITOR MANUFACTURER'S RECOMMENDATION.
3. PUMP STATION MONITOR SHALL OPERATE ONCE IT SENSES ACTIVATION OF PUMP MOTOR. INSTALL PER MANUFACTURER'S RECOMMENDATION.
4. CUT A HOLE ON THE EXTERIOR DOOR OF THE CONTROL CABINET AND MOUNT PUMP STATION MONITOR PER MANUFACTURER'S RECOMMENDATION.
5. PROVIDE A MINIMUM OF 6 INCHES OF FREE SPACE BEHIND PANEL. IF SPACE IS NOT AVAILABLE, PROVIDE INSULATION BEHIND CONNECTORS.
6. PUMP STATION MONITOR (TELEDYNE/ISCO 4501) PROVIDED BY OTHERS. REFER TO 3/E-2 FOR TYPICAL WIRING DIAGRAM.

SPS 25A AND 85 ELECTRICAL PLANS

E-4

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 25A AND 85 ELECTRICAL PLANS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 44 OF 49 SHEETS

WBS B-00501

CONSULTANT

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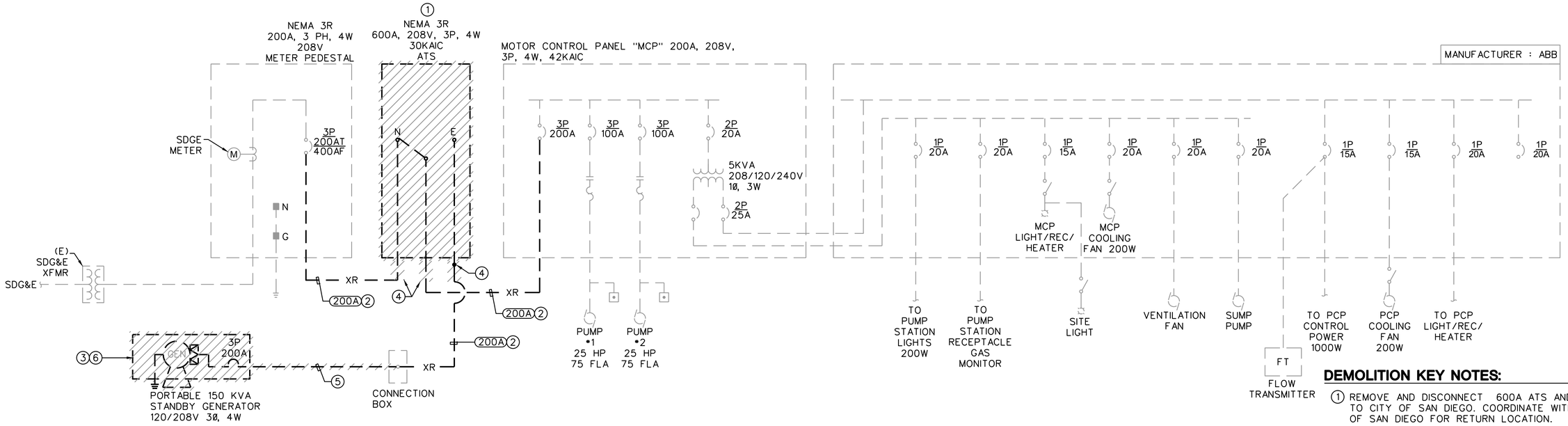
REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 12553 Exp 09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 06/23/2017 — RCE 62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
242-1689, 318-1743 CCS27 COORDINATE
1882444, 6250407 1958444, 6304407 CCS83 COORDINATE
38545-44-D



1 E-5 SINGLE LINE DIAGRAM - DEMOLITION

SCALE: NO SCALE

FEEDER SCHEDULE

NOTES FOR SCHEDULE:

1. ALL CONDUCTORS SHALL BE COPPER TYPE WITH (DUAL RATED) THHN/THWN INSULATION.
2. 60 DEG. C. TERMINATION FOR CONDUCTORS #2 AWG AND SMALLER. 75 DEG. C. TERMINATION FOR #1 ATG AND LARGER.
3. EG = EQUIPMENT GROUND CONDUCTOR. (N) = NEUTRAL CONDUCTOR.
4. ONE CONDUIT PER FEEDER UNLESS OTHERWISE NOTED BY (NUMBER OF SETS).
5. CONDUIT SIZES SHOWN ARE MINIMUM. PROVIDE LARGER CONDUIT WHERE INDICATED ON PLANS OR DUCTBANK SCHEDULE.

ID. NO.	QTY. IF NOT ONE	CONDUIT SIZE				CONDUCTORS IN EACH CONDUIT
		METAL		PLASTIC		
		INCHES	mm	INCHES	mm	
200A		2-1/2"	63 mm	2-1/2"	63 mm	3 #3/0 + 1 #6EG

DEMOLITION KEY NOTES:

1. REMOVE AND DISCONNECT 600A ATS AND RETURN TO CITY OF SAN DIEGO. COORDINATE WITH CITY OF SAN DIEGO FOR RETURN LOCATION.
2. DEMOLISH CABLES IN EXISTING CONDUIT. CONDUIT TO BE REUSED.
3. DEMOLISH PORTABLE GENERATOR AND ASSOCIATED CONDUIT AND CABLES.
4. DISCONNECT CONDUIT AND CABLE TO ATS.
5. DEMOLISH PORTABLE GENERATOR CABLES.
6. CONTRACTOR SHALL PROVIDE ALL PROVISIONS FOR REMOVAL OF GENERATOR.

E-5

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 76 SINGLE LINE DIAGRAM - DEMOLITION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 45 OF 49 SHEETS

WBS B-00501

CONSULTANT

BSE ENGINEERING, INC.
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REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13265 Exp 09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 6/23/2017 — RCE 52882

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

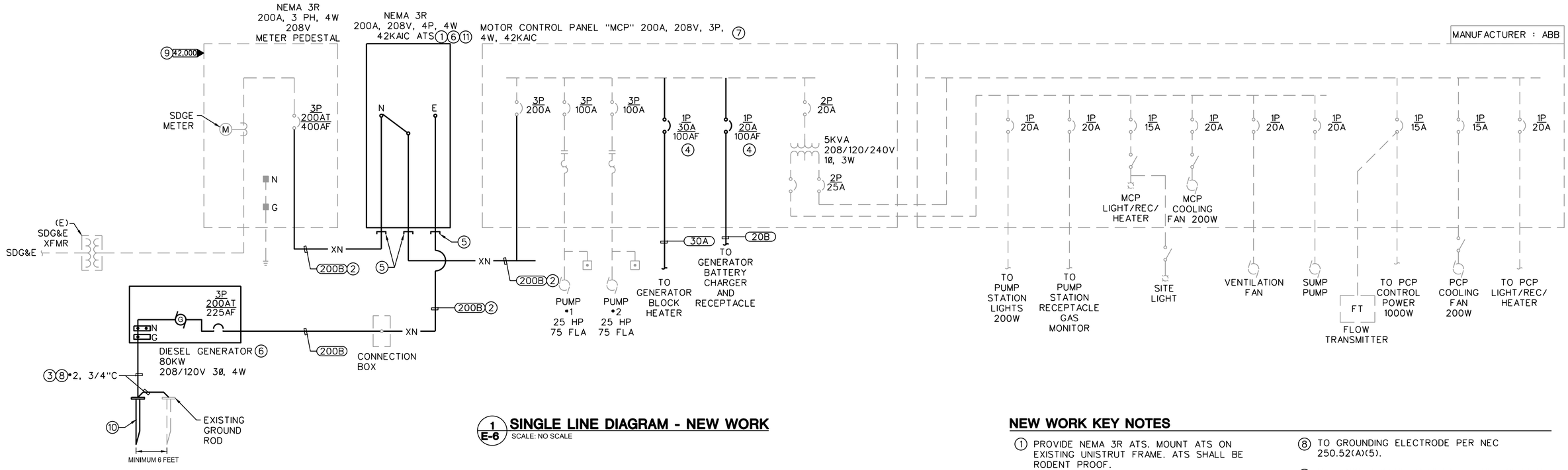
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

38545- 45-D

GENERAL NOTES:

1. CONTRACTOR TO CONTACT THE FIRE MARSHALL FOR ADDITIONAL REQUIREMENTS FOR INSTALLATION OF FUEL TANK. CONTRACTOR TO COMPLY WITH ALL REQUIREMENTS FROM THE FIRE MARSHALL. CONTACT DEPUTY DAVID WILLIAMSON.



1 / E-6 SINGLE LINE DIAGRAM - NEW WORK
SCALE: NO SCALE

NEW WORK KEY NOTES

1. PROVIDE NEMA 3R ATS. MOUNT ATS ON EXISTING UNISTRUT FRAME. ATS SHALL BE RODENT PROOF.
2. PROVIDE CABLES IN EXISTING CONDUIT.
3. CONNECT •2G TO GROUNDING ROD.
4. PROVIDE CIRCUIT BREAKER WITH SIZE SHOWN. CIRCUIT BREAKER SHALL BE THE SAME MANUFACTURER AS EXISTING AND SHALL HAVE A MINIMUM AIC RATING OF EQUIPMENT'S AIC RATING.
5. INTERCEPT CONDUIT. PROVIDE CONDUIT AND CABLE, AS REQUIRED TO FEED ATS.
6. PROVIDE NAME PLATE PER 2/E-9.
7. PROVIDE CAUTION SIGN PER 3/E-9.
8. TO GROUNDING ELECTRODE PER NEC 250.52(A)(5).
9. UTILITY'S MAXIMUM AVAILABLE FAULT CURRENT.
10. PROVIDE 3/4" X 10' COPPER CLAD STEEL GROUND ROD PER 1/E-9.
11. PROVIDE CONTROL CABLES FOR CONTROL CIRCUIT TO GENERATOR USING EXISTING CONDUIT.

FEEDER SCHEDULE

NOTES FOR SCHEDULE:
1. ALL CONDUCTORS SHALL BE COPPER TYPE WITH (DUAL RATED) THHN/THWN INSULATION.
2. 60 DEG. C. TERMINATION FOR CONDUCTORS #2 AWG AND SMALLER. 75 DEG. C. TERMINATION FOR #1 AWG AND LARGER.
3. EG = EQUIPMENT GROUND CONDUCTOR. (N) = NEUTRAL CONDUCTOR.
4. ONE CONDUIT PER FEEDER UNLESS OTHERWISE NOTED BY (NUMBER OF SETS).
5. CONDUIT SIZES SHOWN ARE MINIMUM. PROVIDE LARGER CONDUIT WHERE INDICATED ON PLANS OR DUCTBANK SCHEDULE.

ID. NO.	QTY. IF NOT ONE	CONDUIT SIZE				CONDUCTORS IN EACH CONDUIT
		METAL		PLASTIC		
		INCHES	mm	INCHES	mm	
20B		3/4"	21 mm	1"	27mm	2 #12 + 1 #12EG
30A		3/4"	21 mm	1"	27 mm	2 #10 + 1 #10EG
200B		2-1/2"	63 mm	2-1/2"	63 mm	4 #3/0 + 1 #6EG

LOAD CALCULATION

MCP (200A)		
PUMP NO.1	26.9 KW	74.9 AMPS @ 208V
PUMP NO.2	26.9 KW	74.9 AMPS @ 208V
5 KVA TRANSFORMER	5.0 KW	13.9 AMPS @ 208V
25% OF LARGEST MOTOR	6.7 KW	18.7 AMPS @ 208V
ADDITIONAL LOAD		
GENERATOR BLOCK HEATER	2.5 KW	20.8 AMPS @ 208V, 1PH
GENERATOR BATTERY CHARGER/REC	0.8 KW	6.5 AMPS @ 208V, 1PH
TOTAL	68.9 KW	191.4 AMPS @ 208V

CONCLUSION: PANEL, FEEDER AND OVERCURRENT PROTECTION ADEQUATE FOR ADDITIONAL LOAD

SPS 76 SINGLE LINE DIAGRAM - NEW WORK

E-6

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 76 SINGLE LINE DIAGRAM - NEW WORK

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 46 OF 49 SHEETS

WBS B-00501

CONSULTANT

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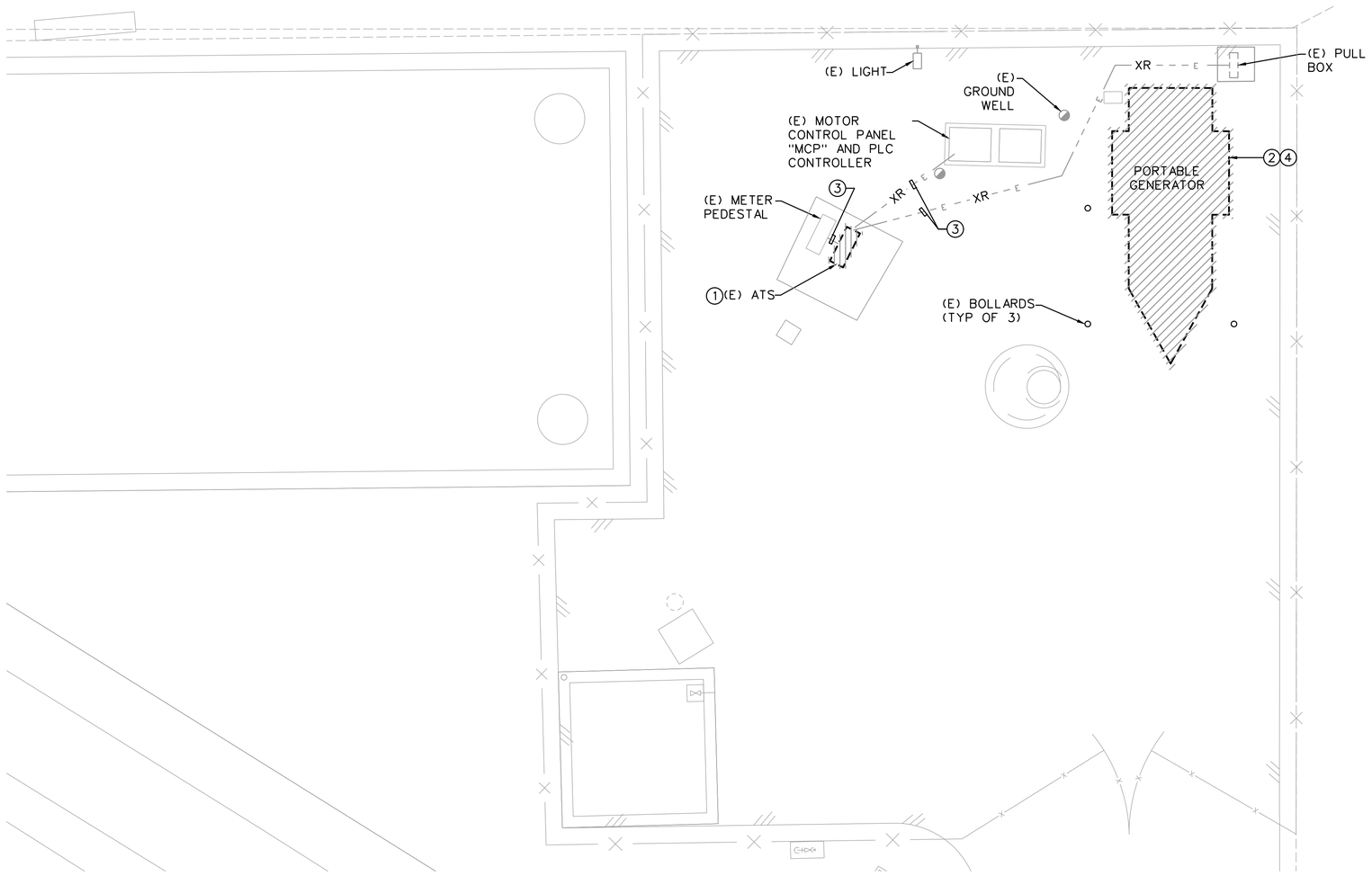
REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13353 Exp 06-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 06/23/2017 — RCE 62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE
38545- 46 -D



NOTES:

1. REMOVE AUTOMATIC TRANSFER SWITCH AND RETURN TO CITY OF SAN DIEGO.
2. DEMOLISH EXISTING PORTABLE GENERATOR AND ASSOCIATED CONDUIT AND CABLES.
3. REMOVE CABLES IN EXISTING CONDUIT. CONDUIT TO BE REUSED.
4. CONTRACTOR SHALL PROVIDE ALL PROVISIONS FOR REMOVAL OF GENERATOR.

1/E-7 SPS 76 ENLARGED ELECTRICAL PLAN - DEMOLITION
SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'
SCALE: 1/4"=1'-0"

E-7

SPS 76 ENLARGED ELECTRICAL PLAN - DEMOLITION

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 76 ENLARGED ELECTRICAL PLAN - DEMOLITION

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 47 OF 49 SHEETS

WBS B-00501

CONSULTANT
BSE ENGINEERING, INC.
10680 TREENA ST., SUITE 100
SAN DIEGO, CA 92131
TEL: 858.279.2000
FAX: 858.279.2626

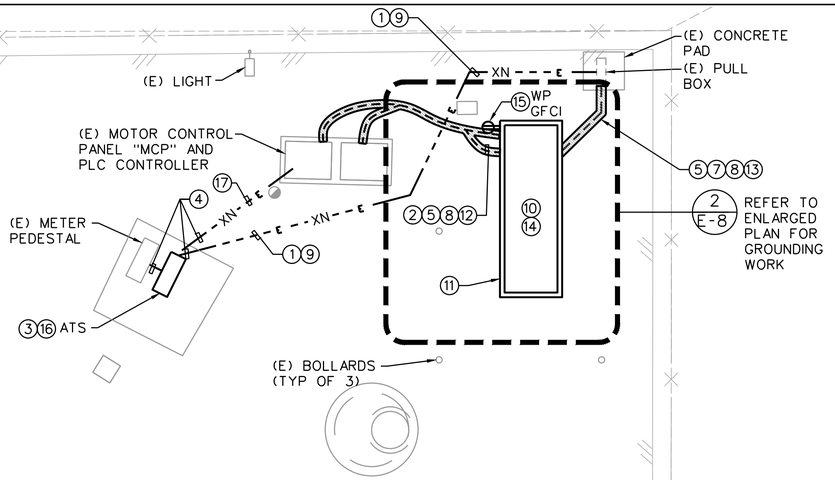
REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 12883 Exp 09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 6/23/2017 — RCE 52882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

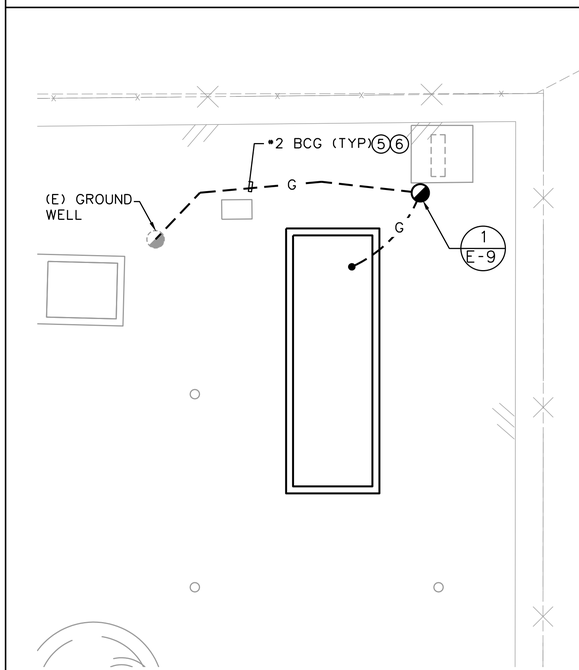
CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
322-1749 CCS27 COORDINATE
1662444, 6310407 CCS83 COORDINATE
38545- 47 -D



1 E-8 SPS 76 ENLARGED ELECTRICAL PLAN - NEW WORK

SCALE: 1/4" = 1'-0"



2 E-8 ELECTRICAL PLAN - GROUNDING

SCALE: 3/8" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR TO CONTACT THE FIRE MARSHALL FOR ADDITIONAL REQUIREMENTS FOR INSTALLATION OF FUEL TANK. CONTRACTOR TO COMPLY WITH ALL REQUIREMENTS FROM THE FIRE MARSHALL. CONTACT DEPUTY DAVID WILLIAMSON.

NOTES:

1. PROVIDE CABLES, PER SINGLE LINE DIAGRAM, FROM AUTOMATIC TRANSFER SWITCH TO GENERATOR PULL BOX USING EXISTING CONDUIT.
2. TRENCH AND PROVIDE 2•12, 2•10, •10G, 1"C FOR BRANCH CIRCUIT WIRING FOR GENERATOR BLOCK HEATER, GENERATOR BATTERY CHARGER, AND CONVENIENCE RECEPTACLE.
3. PROVIDE NEMA 3R ATS. MOUNT ATS ON EXISTING UNISTRUTS. REVISE AND PROVIDE UNISTRUT, AS REQUIRED, TO MOUNT ATS.
4. INTERCEPT CONDUIT AND CABLE. PROVIDE CONDUIT AND CABLE, AS REQUIRED, TO FEED ATS.
5. SAWCUT ASPHALT FOR CONDUIT ROUTING AND GENERATOR INSTALLATION. PATCH AND REPAIR TRENCHED AREAS TO MATCH EXISTING.
6. ROUTE GROUNDING ELECTRODE CONDUCTORS UNDERGROUND.
7. TRENCH AND PROVIDE CONTROL CIRCUIT IN 1"C TO GENERATOR.
8. REFER TO 4/E-9 FOR TRENCH DETAIL.
9. PROVIDE CONTROL CIRCUIT TO GENERATOR IN EXISTING CONDUIT.
10. GENERATOR PAD AND AREA BASED ON KOHLER MODEL •80REOZJF. REFER TO 6/E-9 FOR CALCULATIONS.
11. PROVIDE RAISED CONCRETE PAD FOR GENERATOR. REFER TO CIVIL DRAWINGS.
12. TRENCH AND PROVIDE 8•14 IN 1"C FOR GENERATOR RUNNING, FUEL LEAK DETECTION, AND FUEL LOW LEVEL DETECTION. REFER TO 5/E-9 FOR WIRING DIAGRAM.
13. TRENCH AND PROVIDE CONDUIT AND CABLE, PER SINGLE LINE DIAGRAM, FROM AUTOMATIC TRANSFER SWITCH TO GENERATOR.
14. PROVIDE CONCRETE PAD AND GENERATOR WITH NEMA 3R AND RODENT PROOF ENCLOSURE. PLUG AND COVER ALL OPENINGS INCLUDING USED CONDUIT.
15. PROVIDE WP GFCI RECEPTACLE. MOUNT ADJACENT TO GENERATOR ON UNISTRUTS. PROVIDE UNISTRUT AS REQUIRED.
16. PLUG AND COVER ALL OPENINGS INCLUDING CONDUIT, ATS SHALL BE RODENT PROOF.
17. PROVIDE CABLES, PER SINGLE LINE DIAGRAM, FROM AUTOMATIC TRANSFER SWITCH TO PANEL MCP AND PLC CONTROLLER.

SCALE: 3/8"=1'-0"

SCALE: 1/4"=1'-0"

E-8

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

SPS 76 ENLARGED ELECTRICAL PLAN - NEW WORK

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 48 OF 49 SHEETS

WBS B-00501

CONSULTANT

BSE ENGINEERING, INC.
10680 TREENA ST., SUITE 100
SAN DIEGO, CA 92131
TEL: 858.279.2000
FAX: 858.279.2626

REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13353 Exp 08-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED
FOR CITY ENGINEER
DEBBIE VAN MARTIN
PRINT NAME
DATE 06/23/2017
RCE 62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

SUBMITTED BY
RYAN GREEK
PROJECT MANAGER

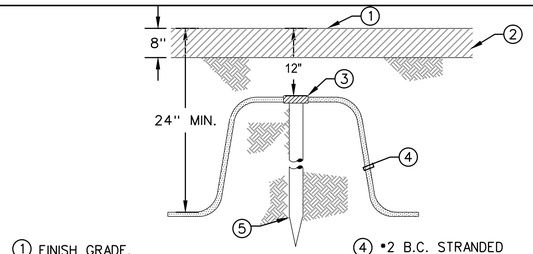
CHECKED BY
LUIS CHAVEZ
PROJECT ENGINEER

322-1749
CCS27 COORDINATE

1662444, 6310407
CCS83 COORDINATE

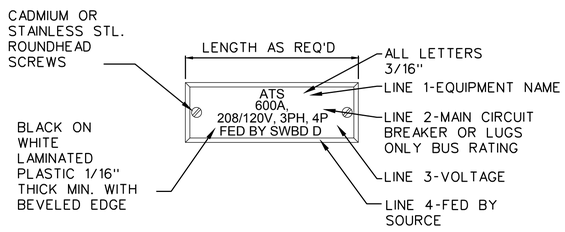
38545-48-D

SPS 76 ENLARGED ELECTRICAL PLAN - NEW WORK

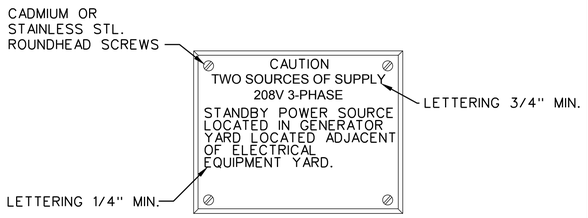


1. FINISH GRADE.
2. EXISTING PAVEMENT.
3. CONNECT GROUND ROD TO GROUND GRID WITH EXOTHERMIC WELD.
4. #2 B.C. STRANDED GROUND WIRE.
5. 3/4" DIA. X 10' LONG COPPER CLAD STEEL GROUND ROD.

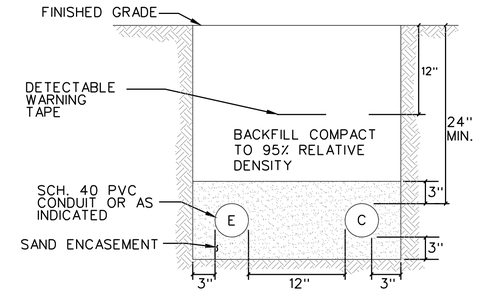
1 E-9 GROUND ROD INSTALLATION DETAIL
SCALE: NO SCALE



2 E-9 NAMEPLATE DETAIL
SCALE: NO SCALE

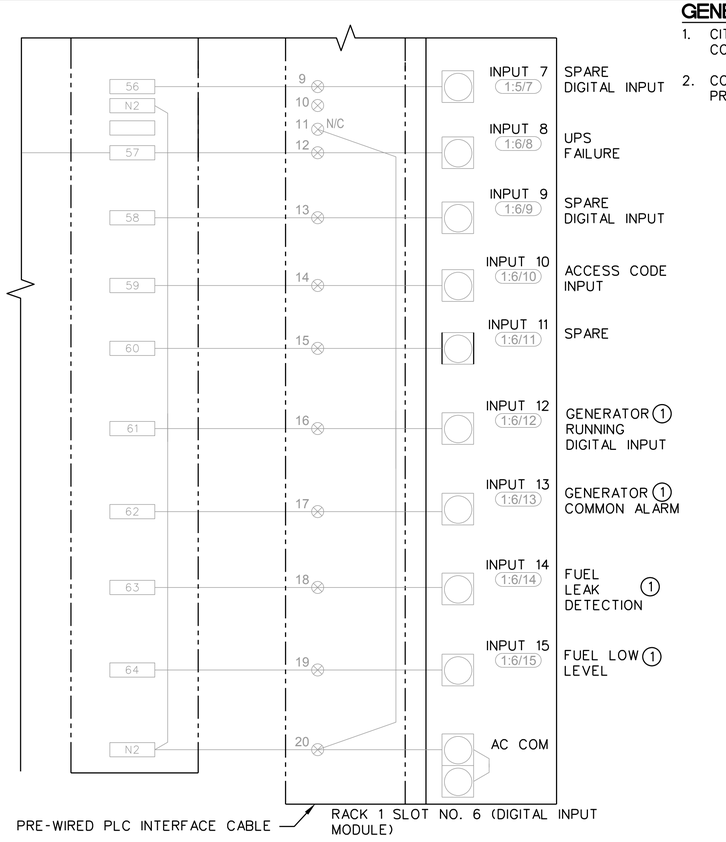


3 E-9 CAUTION SIGN DETAIL
SCALE: NO SCALE



NOTE: MAINTAIN MINIMUM OF 12" SEPARATION BETWEEN POWER AND COMMUNICATION CONDUITS.

4 E-9 TRENCH DETAIL - SAND ENCASED
SCALE: NO SCALE



(1) PROVIDE 8•14 IN 1"C TO GENERATOR FOR GENERATOR RUNNING, GENERATOR COMMON ALARM, FUEL LEAK DETECTION, AND FUEL LOW LEVEL. COORDINATE WITH MANUFACTURER FOR RECOMMENDATION.

5 E-9 PLC LOGIC CONTROLLER - WIRING DIAGRAM
SCALE: NO SCALE

GENERAL NOTES:

1. CITY OF SAN DIEGO SHALL BE RESPONSIBLE FOR PROGRAMMING PLC AND PROGRAMMING AT COMMUNICATION CENTER FOR ADDITIONAL REMOTE MONITORING OF GENERATOR SET.
2. CONTRACTOR TO NOTIFY CITY PERSONNEL 2 DAYS PRIOR TO WHEN PLC IS READY FOR PROGRAMMING AND TESTING.

KOHLER. POWER SYSTEMS

Generator Set Sizing

Project 14288 SPS 76

Date 01 / 20 / 2015

Generator Set

Model No. 80REOZJF **Gensets** 1
Engine John Deere 4045HF285H
Alternator 4R9X

Performance Summary

LN/LL Voltage	120/208 volts	**Phase(s)**	3 phase
Frequency	60 hertz	**Altitude**	1000 feet
Fuel Type	Diesel	**Ambient Temp.**	104° F

Genset Rating @ 130C	83 kW
Genset Derated Rating	81.76 kW
Total Running Power	46.39 kW
Percent of Available kW Used	56.74 %
Alternator Starting kVA	206.43 kVA @ 25.0 % dip
Peak Starting kVA	141.57 kVA
Maximum Voltage Dip	19.96%
Maximum Frequency Dip	6.21% (20% Allowed)
Voltage THD	0.1 %

Load Profile

Step #1 -- Load Step #1	Qty	Run kW	Run kVA	Run pF	Start kW	Start kVA	Volt Dip %	Freq Dip %	Harmonic (L-N) Dip %
New Pump #1 Motor, Horsepower: 25, 3 Phase, Code F, Loaded Motor, Starting Method: Across the Line	1	21.00	24.50	0.86	55.65	132.50			

6 E-9 GENERATOR SET SIZING
SCALE: NO SCALE

Pump Station Lights Lighting, Fluorescent, High Efficiency Magnetic	1	0.20	0.20	1.00	0.20	0.20			
Pump Station Recept / Gas Monitor Misc. Linear Load, 3 Phase	1	0.18	0.18	1.00	0.18	0.18			
	1	0.38	0.38	1.00	0.38	0.38			
MCP / Light / Rec / Heater Misc. Linear Load, 3 Phase									
MCP Cooling Fan Motor, RunningKW: .2, 3 Phase, Code M, Loaded Motor, Starting Method: Across the Line	1	0.20	0.35	0.58	0.60	0.88			
MCP Ventilation Fan Motor, RunningKW: .200, 3 Phase, Code M, Loaded Motor, Starting Method: Across the Line	1	0.20	0.35	0.58	0.60	0.88			
New Flow Tranmitter / PCP Control Power Misc. Linear Load, 3 Phase	1	0.15	0.15	1.00	0.15	0.15			
PCP Cooling Fan Motor, RunningKW: .2, 3 Phase, Code M, Loaded Motor, Starting Method: Across the Line	1	0.20	0.35	0.58	0.60	0.88			
PCP KUght / Rec/ Heater Misc. Linear Load, 3 Phase	1	1.88	1.88	1.00	1.88	1.88			
Step Totals:		24.39	27.86	0.88	60.24	136.23	18.83	5.84	0.1/0.1/0.1
Cum. Totals:		24.39	27.86	0.88					

Step #2 -- Load Step #2									
New Pump #2 Motor, Horsepower: 25, 3 Phase, Code F, Loaded Motor, Starting Method: Across the Line	1	21.00	24.50	0.86	55.65	132.50			
Sump Pump Motor, Horsepower: 1.0, 3 Phase, Code L, Loaded Motor, Starting Method: Across the Line	1	1.00	1.60	0.62	6.46	9.50			
Step Totals:		22.00	26.01	0.85	62.11	141.56	19.96	6.21	0.1/0.1/0.1
Cum. Totals:		46.39	53.87	0.86					
Grand Totals:		**46.39**	**53.87**	**0.86**			**19.96%**	**6.21%**	**0.1**

Frequency Dip information is based on estimated data.

ELECTRICAL DETAILS

E-9

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS

ELECTRICAL DETAILS

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 49 OF 49 SHEETS

WBS B-00501

CONSULTANT

BSE ENGINEERING, INC.
10680 TREENA ST., SUITE 100
SAN DIEGO, CA 92131
TEL: 858.279.2000
FAX: 858.279.2626

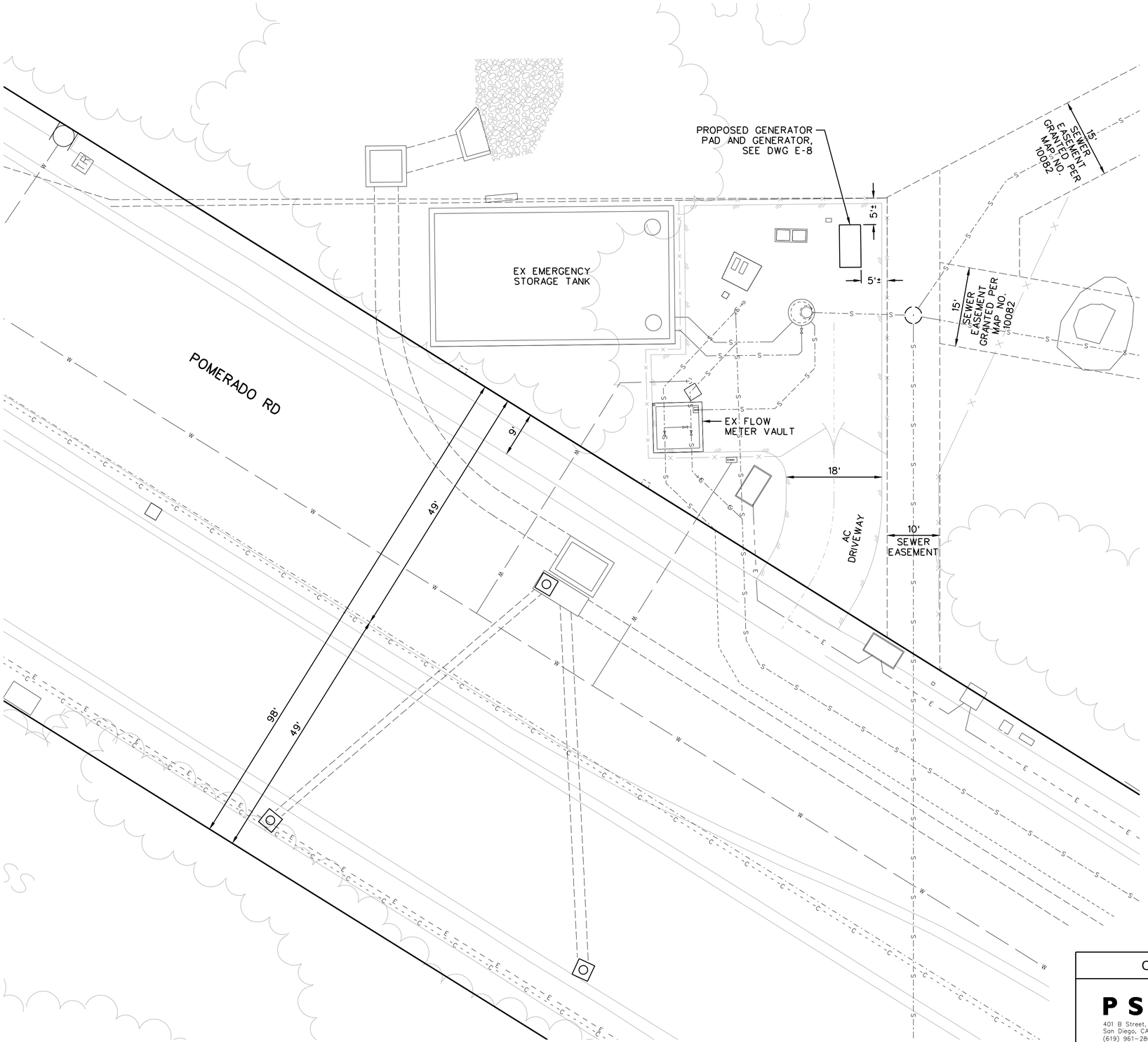
REGISTERED PROFESSIONAL ENGINEER ALAN J. BROWN No. 13393 Exp 09-30-18 ELECTRICAL STATE OF CALIFORNIA
4/10/17

APPROVED: FOR CITY ENGINEER DEBBIE VAN MARTIN PRINT NAME — DATE 6/23/2017 — RCE 52882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	GS/EB			

CONTRACTOR _____ DATE STARTED _____
INSPECTOR _____ DATE COMPLETED _____

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER
SEE SHEETS, CCS27 COORDINATE
SEE SHEETS, CCS83 COORDINATE
38545-49-D



LEGAL DESCRIPTION:

LOT 16
RHO SAN BERNARDO
MAP 10082
APN •760-170-16

SITE ADDRESS:

18695 POMERADO ROAD
SAN DIEGO, CA 92128

OWNERSHIP INFORMATION:

CITY OF SAN DIEGO
9192 TOPAZ WAY
SAN DIEGO, CA 92123
(858) 292-6300

SPS 76

0 10 20 30
SCALE 1"=10'

SPS 76 ENLARGED SITE PLAN

G-6

SEWER PUMP STATIONS 13, 14, 16, 25A & 85
DUAL FORCE MAINS & SPS 76 GENERATOR

SPS 76
ENLARGED SITE PLAN

CONSULTANT

PSOMAS
401 B Street, Suite 1600
San Diego, CA 92101
(619) 961-2800 (619) 961-2392 fax
www.psomas.com

REGISTERED PROFESSIONAL ENGINEER
SANDRA RUSSELL
No. 44078
Exp. 6/30/17
CIVIL
STATE OF CALIFORNIA
6/28/17

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 50 OF 50 SHEETS

APPROVED FOR CITY ENGINEER: DEBBIE VAN MARTIN — DATE: 7/18/17 — RCE #: C62882

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	PSO			

CONTRACTOR
INSPECTOR
DATE STARTED
DATE COMPLETED

WATER WBS N/A
SEWER WBS B-00501

SUBMITTED BY: RYAN GREEK, PROJECT MANAGER
CHECKED BY: LUIS CHAVEZ, PROJECT ENGINEER

322-1749 CCS27 COORDINATE
1662444,6310407 CCS83 COORDINATE
38545-50-D

A ADD NEW SHEET

ADDENDUM A

City of San Diego

CITY CONTACT: Rosa Riego, **Contract Specialist**, **Email**: RRiego@sandiego.gov
Phone No. (619) 533-3426, **Fax No**. (619) 533-3633

ADDENDUM A

e - Bidding **FOR**

SEWER PUMP STATIONS 13, 14, 16, 25A & 85 DUAL FORCE MAINS 7 SPS 76 GENERATOR

BID NO.:	**K-18-1433-DBB-3**
SAP NO. (WBS/IO/CC).:	**B-00501, B-14168**
CLIENT DEPARTMENT:	**2000**
COUNCIL DISTRICT:	**1, 2, 5**
PROJECT TYPE:	**BP**

BID DUE DATE:

2:00 PM
AUGUST 22, 2017
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

THE SUBMITTAL DATE FOR THIS PROJECT HAS BEEN **EXTENDED AS STATED ON THE COVER PAGE.**

James Nagelvoort, Director
Public Works Department

Dated: *August 4, 2017*
San Diego, California

JN / RWB / cc

Bid Results

Bidder Details

Vendor Name Orion Construction Corporation
Address 2185 La Mirada Drive
Vista, CA 92081
United States

Respondee Rob Wilson
Respondee Title Vice President
Phone 760-597-9660 Ext.
Email rob.wilson@orionconstruction.com
Vendor Type CADIR,Local
License # 549309
CADIR

Bid Detail

Bid Format Electronic
Submitted August 22, 2017 1:48:34 PM (Pacific)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 111700
Ranking 0

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Contractor's Certification of Pending Actions	Contractor's Certification of Pending Actions.pdf	Contractors Certification of Pending Action
Bid Bond	Bid Bond.pdf	Bid Bond

Line Items

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment	Reference
	Main Bid						
1	General Construction - Sewer Pump Station Number 13 Force Main						
	237110	LS	1	$829,800.00	$829,800.00		01025
2	General Construction - Sewer Pump Station Number 14 Force Main						
	237110	LS	1	$688,400.00	$688,400.00		01025
3	General Construction - Sewer Pump Station Number 16 Force Main						
	237110	LS	1	$357,100.00	$357,100.00		01025
4	General Construction - Sewer Pump Station Number 25A Force Main						
	237110	LS	1	$440,100.00	$440,100.00		01025
5	General Construction - Sewer Pump Station Number 85 Force Main						
	237110	LS	1	$508,000.00	$508,000.00		01025

Bid Results

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment	Reference
6	General Construction - Sewer Pump Station Number 76						
	237110	LS	1	$146,000.00	$146,000.00		01025
7	Sheeting, Shoring and Bracing						
	237110	LS	1	$16,400.00	$16,400.00		01025
8	Final Approval of Operation and Maintenance Manuals (or Owner's Manuals) and Master Record Documents (Stipulated Lump Sum)						
	237110	LS	1	$6,400.00	$6,400.00		01025
9	WPCP Development						
	541330	LS	1	$3,300.00	$3,300.00		7-8.6.4.2
10	WPCP Implementation						
	237110	LS	1	$100,500.00	$100,500.00		7-8.6.4.2
11	Bonds (Payment and Performance)						
	524126	LS	1	$33,000.00	$33,000.00		2-4.1
12	Field Orders (EOC Type II)						
	237110	AL	1	$225,000.00	$225,000.00		9-3.5
13	Dewatering Permit and Discharge Fees (EOC Type I)						
	237110	AL	1	$20,000.00	$20,000.00		7-8.6.6.9
				Subtotal	**$3,374,000.00**		
				Total	**$3,374,000.00**		

Subcontractors

Name & Address	Description	License Num	CADIR	Amount	Type
Piperin Corporation 1185 Park Center Drive Suite S Vista, CA 92081 United States	Portions of Sewer Pipeline and Pump Station Construction at SPS 25A and SPS 85	964028	1000000485	$619,000.00	ELBE,PQUAL,CADIR
MIRAMAR GENERAL ENGINEERING 5595 Magnatron Blvd. Suite P San Diego, CA 92111 United States	Site Concrete	1009541	1000033057	$95,000.00	ELBE,PQUAL
old castle precast inc 2020 goetz rd perris, CA 92570 United States	Manholes at SPS 13, 14, and 16	891107	1000005884	$40,000.00	
National Electric Works, Inc. 4440 Rainer Ave., Ste. 101 San Diego , CA 92120 United States	Electrical	591191	1000003595	$44,000.00	MBE
Riverside Directional Drilling 8179 Angel Lane Riverside, CA 92508 United States	Horizontal Directional Drill	838671	1000016778	$10,500.00	
Zamborelli Enterprises Inc 640 Coast Highway #3A Laguna Beach, CA 92651 United States	Drilled Shaft at SPS 13	830680	1000030603	$50,000.00	
G. Scott Asphalt, Inc. 358 Trousdale Drive Chula Vista, CA 91910 United States	Slurry Seal	751836	1000004252	$37,000.00	

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
MC Painting 2525 Ramona Dr. Vista, CA 92084 United States	Manhole Rehabilitation and Painting	695478	1000026859	$29,000.00	