

RUBIDOUX COMMUNITY SERVICES DISTRICT  
(951) 684-7580

3590 RUBIDOUX BLVD  
JURUPA VALLEY, CA 92509

P. O. BOX 3098  
JURUPA VALLEY, CA 92519

**RUBIDOUX COMMUNITY SERVICES DISTRICT  
CONTRACT DOCUMENTS FOR  
LELAND J. THOMPSON WATER TREATMENT PLANT  
FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE**

**BID OPENING: FRIDAY, DECEMBER 15, 2023 AT 2:00 PM**

**Prepared By**

KRIEGER & STEWART, INCORPORATED  
Office: 3602 University Ave, Riverside, CA 92501  
Mail/Ship: 3890 Orange St #1509, Riverside, CA 92502  
(951) 684-6900

SIGNATURE \_\_\_\_\_

*Brandon C. Valdez*

DATE 11/22/2023



587-19.65  
BCV/blt

## **TABLE OF CONTENTS**



## TABLE OF CONTENTS

PAGE

### NOTICE INVITING BIDS

### BIDDING DOCUMENTS

Instructions to Bidders	BD-1
Responsible Bidders	BD-1
Completion of Bid Proposal and Supporting Documents	BD-1
Omissions and Discrepancies	BD-2
Signature and Seal	BD-2
Bid Proposal Guarantee	BD-2
Packaging and Delivery of Bid Proposal And Guarantee	BD-2
Withdrawal of Bid Proposal	BD-3
Modification of Bid Proposal	BD-3
Opening and Awarding of Bids	BD-3
Return of Proposal Guarantees	BD-3
Bond(s) and Certificates of Insurance Required of Successful Bidder	BD-3
Execution of the Contract	BD-4
Withheld Contract Funds	BD-4
Bidder's Proposal with Supporting Documents	BD-5
Proposal	BD-5
Statement of Experience	BD-6
Supplemental Instructions to Bidders	BD-13
Bid Schedule	BD-14
Contract Completion Schedule	BD-16
Certified Data	BD-17
Certified Worker Craft and Classification	BD-18
Certification of Bidder's Work Site Inspection	BD-19
Statement on Bonds and Insurance	BD-20
Certification of Bidding Documents	BD-21
Non-Collusion Declaration	BD-22
Public Works Contractor Registration Certification	BD-23
Iran Contracting Act Certification	BD-24
Executive Order N-6-22 Certification	BD-25
Bid Bond	BD-26
Notary Acknowledgment	

### CONTRACT DOCUMENTS

Contract	Contract-1
Performance Bond	Performance Bond-1
Payment Bond	Payment Bond-1
Certificate of Insurance	Insurance Certificate-1
Contract Insurance Endorsement	Insurance Endorsement-1
Escrow Agreement for Security Deposits in Lieu of Payment Retention	Escrow Agreement-1
Payment Request Form	Payment Request-1
Conditional Release for Undisputed Amounts Paid	Conditional Release-1
Contract Change Order	Contract Change Order-1
Daily Extra Work Report	Daily Extra Work-1

### CONTRACT APPENDIX

Definitions	CA-1
Authority of Owner	CA-1
Contract Document Priority	CA-2
Contractor Responsibility	CA-2
Contractor's Liability	CA-6

**TABLE OF CONTENTS**  
**(Continued)**

	<b>PAGE</b>
Safety	CA-8
Trespass	CA-8
Bonds, Insurance, and Endorsements	CA-8
Agents of Owner Not Personally Liable	CA-10
Subcontracts	CA-10
Assignment Forbidden	CA-11
Lines, Grades, and Measurements	CA-11
No Discrimination	CA-11
Legal Day's Work	CA-11
Prevailing Rates of Wages	CA-12
Mandatory Certification of Contractor and Employment of Apprentices	CA-13
Payment of Wages	CA-13
Overtime - No Extra Compensation	CA-13
Time and Order of Performance	CA-13
Delays	CA-14
Liquidated Damages	CA-15
Changes in Work	CA-15
Extra Work	CA-15
Protests	CA-18
Inspection and Testing	CA-18
Examination of the Work	CA-19
Defective Materials	CA-19
Unpaid Claims	CA-19
Partial Estimates and Payments	CA-19
Withheld Contract Funds	CA-20
Final Estimate and Payment	CA-21
Sales and Use Taxes	CA-21
Payment Only in Accordance with Contract	CA-21
Monies to be Retained	CA-21
Recovery of Damages	CA-22
Acceptance of the Work Not a Waiver	CA-22
Maintenance and Guarantee	CA-22
Suspension of Contract	CA-22
Additional Surety	CA-23
Termination of Contract	CA-23
Right to Occupy Completed Portions of Work	CA-24
Anti Trust Claims and Third Party Claims	CA-24
Dispute Resolution	CA-24
 <b>SPECIAL REQUIREMENTS</b>	
The Work	SR-1
Mandatory Pre-Bid Job Walk	SR-1
Contract Drawings	SR-1
Notice of Award and Authorization to Proceed	SR-2
Insurance	SR-2
Pre-Construction and Progress Meetings	SR-2
Continuous Plant Operation; Contractor's Cooperation and Coordination; and Sequence of Work	SR-2
Pre-Construction Audio Video Recording	SR-3
Existing Conditions and Examination Of Contract Documents	SR-3
Materials to be Furnished by Contractor	SR-4
Geologic Conditions at Work Site	SR-4
Working Days and Working Hours	SR-5
Weather Days Allowances	SR-5

**TABLE OF CONTENTS**  
**(Continued)**

	<b>PAGE</b>
Permits, Certificates, Laws, Ordinances, Rights-of-Way, and Easements	SR-5
Trench and Excavation Protection	SR-8
Data to be Submitted by Contractor	SR-9
Construction Water	SR-10
Construction Staking by Owner and Contractor	SR-10
Survey Monuments and Benchmarks	SR-10
Payment for Contract Work, Schedule of Values, and Payment Requests	SR-10
Inspector's Working Hours and Overtime Costs	SR-11
Compliance with Contract Documents	SR-11
Preservation of Paved Surfaces, Restoration of Work Site, and Disposal of Spoil and Waste Materials	SR-12
Earthwork and Soils Engineering Services by Owner and Contractor	SR-12
Excavation Dewatering	SR-12
Contractor's Project Superintendent and Field Supervisors	SR-13
Project Schedule	SR-13
Early Completion and Overhead	SR-13
Specified Manufacturers and Model Numbers	SR-13
Safety Requirements of Equipment Furnished by Contractor	SR-14
Construction Power	SR-14
Storage of Materials and Equipment, Site and Adjacent Property Security, And Backfill of Excavations	SR-14
Sanitation	SR-14
Site Cleanup	SR-14
Records of Construction	SR-15
Confined Spaces	SR-15
Construction Mitigation Measures	SR-15
Noise Control and Mitigation	SR-16
Use of Construction Methods Employing Vibrating Equipment	SR-17
Right to Operate Unsatisfactory Facilities	SR-18
Warranty/Guarantee	SR-18
Abbreviations	SR-18
National Standards	SR-19
Traffic Control	SR-19
Reference Documents	SR-19

**BASIC AND TECHNICAL SPECIFICATIONS**

<u>Section No.</u>	<u>Title</u>
VIII-1	General Requirements
01026	Schedule of Values
01185	Work Restrictions and Sequence of Work
01300	Contractor Submittals and Requests Technical Specifications
01381	Preconstruction Audio Video Recording
02300	Earthwork, Trenching, Bedding, and Backfill
02700	Basic Paving Specifications
03100	Basic Concrete Formwork Specifications
03200	Basic Concrete Reinforcement Specifications
03300	Basic Concrete Specifications
05100	Structural Steel and Miscellaneous Metal Work Technical Specifications
09900	Basic Coating and Painting Specifications for Water and Wastewater Facilities
15070	Process Piping and Appurtenances Technical Specifications
15100	Process Valves Technical Specifications

**TABLE OF CONTENTS**  
**(Continued)**

**PAGE**

**STANDARD DRAWINGS**

Pipeline Trench	G20
Butterfly Valve Installation	W1030
Normally Closed Valve Box Installation	W1040
Welded Steel Pipe Cut-to-Fit and Joint Repair Detail	W1220

**APPENDICES**

Appendix A	List of Approved Manufactured Materials
Appendix B	Geotechnical Investigation Report prepared by Converse Consultants, dated May 22, 2020
Appendix C	Record Drawings for Wells No. 17 and No. 18 Iron and Manganese Removal Facility prepared by Krieger & Stewart, dated May 21, 2013
Appendix D	Record Drawings for PFAS Treatment Project at Mn Plant #2 (Leland Thompson Water Treatment Facility) prepared by Hazen & Sawyer, dated October 10, 2020

**NOTICE INVITING BIDS**

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CALIFORNIA

**NOTICE INVITING BIDS**

FOR  
LELAND J. THOMPSON WATER TREATMENT PLANT  
FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE

Prospective bidders are hereby notified that the RUBIDOUX COMMUNITY SERVICES DISTRICT (Owner) will receive sealed bid proposals for **LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE**. Such proposals will be received until **Friday, December 15, 2023 at 2:00 p.m.** at Owner's office, at which time said bids will be publicly opened and read.

The Work generally consists of providing all equipment, labor, and materials necessary to: construct steel piping and appurtenances and modify existing piping and valve systems at an existing water filtration facility.

A **mandatory pre-bid job walk** will be held on **Tuesday, December 5, 2023** commencing at **11:00 a.m.** at the Project Site (5245 34th Street, Jurupa Valley, CA 92509). All bidders must have an employee of their firm sign-in and attend the mandatory pre-bid job walk. Failure to do so shall deem their bid non-responsive.

All questions must be submitted in writing by **5:00 p.m. on Friday, December 8, 2023** to Brandon Valadez at Krieger & Stewart, Incorporated, [bvaladez@kriegerandstewart.com](mailto:bvaladez@kriegerandstewart.com), with a copy to Barbara Tidwell at [btidwell@kriegerandstewart.com](mailto:btidwell@kriegerandstewart.com). **NO QUESTIONS WILL BE ADDRESSED AFTER THIS TIME.**

Prospective bidders shall be licensed Contractors in the State of California having at least 5 years' experience and being qualified to perform the Work specified in the Contract Documents (i.e. site piping work at water or wastewater facilities). Pursuant to Public Contract Code section 3300, bidders (Contractors) shall possess active and current Contractor's License, Class A, which shall be maintained through the course of the Work.

Bidders may examine the Contract Documents online at the District's website at <https://www.rcsd.org/capital-improvement-projects>. **Prospective bidders must be included on the official planholder's list for the project to receive addenda and be eligible to bid this project.** To be added to the planholder's list, send an email to Barbara Tidwell at [btidwell@kriegerandstewart.com](mailto:btidwell@kriegerandstewart.com) to register the name of the company as an interested bidder for the project. It is the responsibility of each prospective bidder to review and verify the completeness of the documents before submitting a bid, and to check for any applicable addenda or updates. Incomplete bids and bids that do not include signed copies of all issued addenda may be subject to disqualification.

Owner reserves the right to reject any and all proposals, to waive any irregularity, or to award a Contract to other than the lowest bidder. If Owner elects to award a contract for the Work, the award will be made within 60 days from the date of the bid opening. Bids shall be valid for said 60 day period.

Each bid proposal must be accompanied by cash, a certified or cashier's check, or bid bond issued by a surety admitted in and regulated by the State of California and further, if the work or project is financed in whole or in part with federal grant or loan funds, listed in the Treasury Department's most current Circular 570 (bid bond shall be submitted on the form included in the Contract Documents or on an equivalent form approved by Owner) for an amount not less than ten percent (10%) of the maximum amount bid. Said check or bond shall be made payable to RUBIDOUX COMMUNITY SERVICES DISTRICT and, when delivered with a bid proposal, shall constitute a guarantee that bidder will, if an award is made to them in accordance with the terms of said bidder's proposal: execute the Contract in the Owner's standard form, together with Labor Code certification thereon; furnish Contract Performance and Payment Bonds with a corporate surety or sureties satisfactory to the Owner, or equivalent substitution in lieu of bonds, each for not less than 100 percent of the bid price; furnish Certificates of Insurance evidencing that all insurance coverage required by the Contract has been secured.

Owner has obtained from the Director of the State of California Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work. Said rates are on file at the Owner's office and they will be made available to any interested party upon request. Said rates can also be obtained from the State of California website ([www.dir.ca.gov/dlsr/pwd](http://www.dir.ca.gov/dlsr/pwd)). Each Contractor to whom a Contract is awarded must pay the prevailing rates and post copies thereof at the job site.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal for, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. No bid will be accepted nor any contract entered into without proof of Bidder's and subbidders' current Public Works Contractor Registration with the Department of Industrial Relations. If awarded the Contract, Bidder and subbidders of every tier shall maintain active Public Works Contractor Registration with the Department of Industrial Relations for the duration of the project. It shall be bidder's sole responsibility to evaluate and include in their bid the cost of complying with all labor compliance requirements.

Bidder is advised that Contractor may, at his sole and expense, substitute securities equivalent to any monies withheld by the Owner to insure performance under the Contract. Such securities shall be deposited with the Owner or with a State or Federally Chartered Bank as escrow agent who shall pay such monies to the Contractor upon satisfactory completion of the Contract. The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon. Securities eligible for substitution shall include those listed in Public Contract Code section 22300. Alternatively, the Contractor may request to have earned retentions paid directly to the escrow agent in accordance with Public Contract Code section 22300.

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CALIFORNIA

Dated: November 16, 2023  
Authorization Date

By: Ted Beckwith  
Director of Engineering

**BIDDING DOCUMENTS**



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CALIFORNIA

**BIDDING DOCUMENTS**

FOR LELAND J. THOMPSON WATER TREATMENT PLANT  
FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE

**A. INSTRUCTIONS TO BIDDERS**

**1. Responsible Bidders**

Bidders are advised that in selecting the Contractor, Owner reserves the right to consider the financial responsibility and general competency of each Bidder, his trustworthiness, quality, fitness, capacity, and experience to satisfactorily perform the public works contract, as well as his reputation within the industry. Owner expects each Bidder to fully and truthfully disclose all information required of the Bidder by the Bidding Documents. Each Bidder must be properly licensed and must sign and submit with his bid proposal the Bidder's Statement of Experience, Bidding Sheets, and Certified Data Sheet. Please note that similar information is required in said Bidder's Statement of Experience with respect to any proposed subcontractors (Not required for materials only proposal).

**2. Completion of Bid Proposal and Supporting Documents**

Bidder shall submit his bid proposal on the forms contained within these Bidding Documents (Bid Proposal Packet) provided with the Contract Documents issued by Owner or Owner's representative directly to Bidder. Owner will not accept bid proposals submitted on forms other than those contained within said Bid Proposal Packet included in the Contract Documents. Any addenda or bulletins issued prior to the bid shall be incorporated into the bid proposal and shall be evidenced by Bidder's inclusion of the signed acknowledgement of receipt for each addendum or bulletin with Bidder's submitted bid proposal.

Bidder shall complete the attached bid proposal and supporting documents including any addenda or bulletins issued before receipt of bids and public opening of same together with Statement of Experience (not required for materials only proposal), Bid Schedule, Certified Data, Certified Worker Craft and Classification, Certification of Bidder's Work Site Inspection, Statement on Bonds and Insurance, Certification of Bidding Documents, Non-Collusion Declaration, Public Works Contractor Registration Certification, Iran Contracting Act Certification, Executive Order N-6-22 Certification, and Bid Proposal Guarantee.

Pursuant to Labor Code sections 1725.5 and 1771.1, no bid will be accepted nor any contract entered into without proof of Bidder's and subbidders' current registration with the Department of Industrial Relations. Bidder shall sign and submit with its bid the Public Works Contractor Registration Certification on the form provided, attesting to the facts contained therein. Failure to submit this form may render the bid non-responsive. Each Bidder shall provide the Public Works Contractor Registration Number for each listed subbidder in the space provided in the listing of subbidders.

**Bidder shall complete each blank on each page. Each entry within the Bid Schedule(s) shall be printed by hand in blue or black ink, and each entry on remaining forms shall be completed by hand or typewritten; forms shall be signed in accordance with Item A.4 herein. The completed forms shall be without alterations, erasures, or interlineations. Bidder shall correct errors by striking or lining out mistakes and entering and initialing corrections immediately thereabove. Unless otherwise provided in the Supplemental Instructions to Bidders, Owner will not consider any bid proposal which does not include bids on all bid items set forth in the Bid Schedule(s). Owner will not consider alternative proposals unless they are called for by these instructions or the supplemental instructions appearing in the Bidding Documents themselves.**

Owner may, at its sole discretion, reject any bid to which the Bidder has added conditions, limitations, provisions, or any alterations or interlineations. Owner may also, at its discretion, reject any bid for which the Bidder has failed to supply all requested information or has misrepresented any such information or any matter whatever. Pursuant to Business and Professions Code Section 7028.15, Owner will consider non-responsive and reject any bid submitted by a Contractor not licensed as required by law.

**3. Omissions and Discrepancies**

Should a Bidder find purported discrepancies in, or omissions from the Special Requirements, Basic Specifications, Construction and Standard Drawings, or other documents bound herein, or should Bidder be in doubt as to their meaning, Bidder shall **immediately** notify Owner in writing. Owner may then send written instructions or notification to all Bidders.

**4. Signature and Seal**

If the bid proposal is made by an individual, it shall be signed and his full name and his address shall be given; if it is made by a partnership, it shall be signed with the partnership name by one of the partners, who shall sign his own name and, in addition, the name and address of each partner shall be given; if it is made by a corporation, the name of the corporation shall be signed by its duly authorized officer, or officers, attested by the corporation seal, and the names and titles of all current officers of the corporation shall be given.

**5. Bid Proposal Guarantee**

Each bid proposal shall be accompanied by cash, a certified or cashier's check, or bid bond issued by a surety or sureties admitted in and regulated by the State of California and further, if the Work or project is financed in whole or in part with federal grant or loan funds, listed in the Treasury Department's most current Circular 570 (bid bond shall be submitted on the form attached herein or on an equivalent form approved by Owner), or equivalent substitution in lieu of a bond as authorized by Civil Procedure Code Section 995.710, for an amount not less than 10% of the maximum amount bid.

Said check, bond, or substitute shall be made payable to the Owner and shall be given as a guarantee that the Bidder will enter into the Contract described in the Notice Inviting Bids herein if awarded the Work. By submitting a bid proposal, each Bidder agrees that its failure to enter the Contract if awarded the Work would result in damage to the Owner and that it would be impracticable or extremely difficult to ascertain the actual amount of that damage. For this reason, each Bidder agrees that the Owner may retain the bid proposal guarantee as liquidated damages if the Bidder is awarded the Work but fails to or refuses to timely enter the Contract.

**6. Packaging and Delivery of Bid Proposal and Guarantee**

Once the bid proposal and supporting documents herein have been completed and signed as set forth above, they shall be placed, along with the bid proposal guarantee and any proposed sketches and brochures required by these instructions, in an envelope, sealed and addressed, and delivered or mailed, postage prepaid, to:

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

**Street Address**  
**3590 Rubidoux Boulevard**  
**Jurupa Valley, CA 92509**

**Mailing Address**  
**P.O. Box 3098**  
**Riverside, CA 92519-3098**

Said envelope shall also contain the following in the lower left-hand corner thereof:

Bid Proposal of \_\_\_\_\_ (Bidder's Name)

for \_\_\_\_\_ (Project Name Appearing on Cover Sheet)

No consideration shall be given by the Owner to bid proposals received after the date and time set by the Notice Inviting Bids herein for the opening of bids.

**7. Withdrawal of Bid Proposal**

Any Bidder may, without prejudice, withdraw his bid proposal at any time prior to the date and time set by the Notice Inviting Bids herein for the opening of bids; provided that any request to withdraw is made in writing and duly executed by the Bidder or the Bidder's duly authorized representative and delivered to the Owner at the address set forth in Instruction 6 herein. A bid proposal shall be deemed withdrawn once it has been delivered by the Owner to the Bidder requesting withdrawal, either by personal delivery or deposit in the United States mail, addressed to the address originally given by the Bidder. After withdrawal, the Owner will not recognize modifications of bid proposals attempted by methods other than as set forth in Instruction 8 herein.

**8. Modification of Bid Proposal**

Any Bidder who may wish to modify the bid proposal previously submitted by him may do so only by (a) following the withdrawal procedure set forth in Instruction 7 hereof prior to the date and time set by the Notice Inviting Bids herein for the opening of bids, and (b) submitting a substituted bid proposal which conforms to the requirements set forth in Instruction 1, 2, 4, 5, and 6 hereof. A bid proposal shall be deemed withdrawn once it has been delivered by the Owner to the one requesting withdrawal, either by personal delivery or deposit in the United States mail, addressed to the address originally given by the Bidder. After withdrawal, the Owner will not recognize modifications of bid proposals attempted by methods other than as set forth in this Instruction 8.

**9. Opening and Awarding of Bids**

All bid proposals shall be publicly opened and read at the time and place set forth in the Notice Inviting Bids herein. Bidders and their authorized representatives are invited to be present. The award, if made, will be made within 60 days of the opening. The Owner's policy is to award to the lowest responsible Bidder submitting a responsive bid who can comply with the projected delivery and/or completion schedules. However, the Owner reserves the right to reject any and all bids, to waive any irregularity, or to award the subject Contract to other than the lowest Bidder. Owner may, at its sole discretion, disregard any added conditions, limitations, provisions, or any interlineations or alterations. Notice of Award shall be made to a successful Bidder in writing and mailed to the address as set forth on the signature page of the Bidding Documents.

In the event there are unit price bid items in a bidding schedule and the "amount" indicated for a unit price bid item does not equal the product of the unit price and quantity, the unit price shall govern and the amount will be corrected accordingly. However, if the amount set forth as a unit price is ambiguous, illegible or uncertain for any cause, or is omitted, or is the same amount as the entry in the item cost column, then the amount set forth in the item cost column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price. In the event there is more than one bid item in a bidding schedule and the total indicated for the schedule does not agree with the sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the schedule will be corrected accordingly. Where applicable, in case of discrepancy between the written price and the numerical price, the written price shall prevail.

**10. Return of Proposal Guarantees**

Bid proposal guarantees will be returned to unsuccessful bidders within 60 days from the date that the Contract is awarded to the successful bidder.

**11. Bond(s) and Certificates Required of Successful Bidder**

The successful Bidder shall, upon receipt of notice of acceptance of his bid, promptly secure with a responsible corporate surety or sureties admitted in and regulated by the State of California and, if the Work or project is financed in whole or in part with federal grant or loan funds, listed in the Treasury Department's most current Circular 570, a contract performance bond in an amount of not

less than 100% of the total bid price, conditioned upon faithful performance by said Bidder of all requirements under the Contract.

In addition, the successful Bidder shall promptly secure with a responsible corporate surety or sureties admitted in and regulated by the State of California and, if the Work or project is financed in whole or in part with federal grant or loan funds, listed in the Treasury Department's most current Circular 570, a payment bond (not required for materials only proposal) in an amount of not less than 100% of the total bid price, conditioned upon payment in full of the claims of all persons performing labor upon or furnishing materials to be used in or furnishing appliances or power contributing to the Work to be performed under the Contract.

Owner may request the successful Bidder submit a certified copy of the certificate of authority of the surety insurer issued by the California Insurance Commissioner and to submit copies of the surety insurer's most recent quarterly and annual statements filed with the Department of Insurance pursuant to California Insurance Code, Section 900, et seq.

The successful Bidder shall also furnish Certificates of Insurance as evidence of coverage in accordance with the Contract Appendix.

All bonds shall be subject to the approval of the Owner, and shall be submitted on the forms provided in the Contract section of the Contract Documents. All Certificates of Insurance shall be subject to the approval of the Owner and shall be submitted on the forms provided in the Contract section of the Contract Documents.

## **12. Execution of the Contract**

The Bidder to whom award is made shall execute a written contract with the Owner on the form of Contract provided herein (which shall incorporate by reference the Proposal, addenda or bulletins issued before receipt of bids and public opening of same, Bidder's Statement of Experience (not required for materials only proposal), Bidding Sheet, Certified Data Sheet, Special Requirements, Basic Specifications, and Construction and Standard Drawings), together with the Labor Code Certification (not required for materials only proposal) therein, and furnish good and approved bond(s) and Certificates of Insurance as required in the preceding paragraph within 10 days from the date of mailing the Notice from the Owner to the Bidder, as set forth above, of the acceptance of his proposal.

No bid proposal shall be considered binding upon the Owner until the Contract has been executed. Failure or refusal by the successful Bidder to so enter into a Contract, as herein provided, or to conform to any of the stipulated requirements in connection therewith, shall be just cause for the annulment of the award and the retention by the Owner of the bid proposal guarantee. If the successful Bidder refuses or fails to execute the Contract, the Owner may award the Contract to the Bidder whose bid proposal is next most acceptable to said Owner; and such Bidder shall fulfill every stipulation embraced herein as if he were the party to whom the first award was made.

A corporation to which an award is made will be required, before the Contract is finally executed, to furnish evidence of its corporate existence and of the authority of the officer signing the Contract and bond for the corporation to so sign.

## **13. Withheld Contract Funds**

Bidder is advised that Contractor, at his request and expense and in accordance with Section 22300 of the California Public Contract Code, will be permitted to substitute securities equivalent to monies withheld by Owner to insure performance under the Contract. Alternatively, the Contractor may request to have earned retentions paid directly to the escrow agent in accordance with Public Contract Code Section 22300. Refer to Section 30 of the Contract Appendix and the Escrow Agreement for Security Deposits in Lieu of Payment Retention included within the Contract section of the Contract Documents.

**B. BIDDER'S PROPOSAL WITH SUPPORTING DOCUMENTS**

TO THE PRESIDENT OF THE TO THE PRESIDENT OF THE BOARD OF DIRECTORS, RUBIDOUX COMMUNITY SERVICES DISTRICT, JURUPA VALLEY, CALIFORNIA (Owner):

**1. Proposal**

The undersigned proposes to construct, furnish and install, or furnish only the components or items as set forth in the Bidding Documents for LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE.

In submitting this Proposal, the undersigned declares that he has read the Notice Inviting Bids, the Instructions to Bidders, the unexecuted Contract, and all other documents incorporated by reference, including the Special Requirements, the Basic Specifications, and the Construction and Standard Drawings and that he has inspected the Work site.

In exchange for consideration of this Proposal by the Owner, the Bidder agrees that if his bid is accepted by the Owner, the Bidder shall execute said Contract, construct, furnish and install, or furnish the items set forth in this Proposal and required by the Contract, Special Requirements, Basic Specifications, and Construction and Standard Drawings (all within the time provided), and shall accept as full payment the prices set forth in the Bid Schedule(s).

The Bidder further agrees that he shall execute such Contract within ten days from the date of mailing to him written notice of the Owner's acceptance of this proposal, that within the same time he shall furnish performance and payment bonds\*, along with required certificates of insurance, and that upon failure to do so within said time, the proposal guaranty shall become the property of the Owner as liquidated damages for such failure or refusal, and shall be deposited as moneys belonging to the Owner; provided that if said Bidder executes the Contract and furnishes the required performance and payment bonds\* and certificates of insurance within the time aforesaid, his proposal guaranty shall be returned to him within ten days thereafter.

In submitting a bid to a public body, the Bidder offers and agrees that if the bid is accepted, it will assign to the Owner all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the Bidder pursuant to the bid. Such assignment shall be made and become effective at the time the Owner tenders final payment to the Contractor, without further acknowledgment by the parties.

\*Payment bond not required for materials only proposal.

**2. Statement of Experience\***

a. Bidder

Each Bidder (Contractor) shall list, in addition to name and address, the type of work in which it is qualified, and its years of experience in that type of work. Bidder (Contractor) shall perform Work in excess of thirty percent (30%) of the total bid.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contractor License No.: \_\_\_\_\_ Class: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Years of Experience: \_\_\_\_\_

DIR Registration No.: \_\_\_\_\_ (also complete certification form herein)

b. Bidder Projects

Each Bidder (Contractor) shall furnish work record for Bidder (Contractor), listing at least four (4) projects similar to the type of work specified that the Bidder has completed within the past three (3) years. Responses shall be full and explicit.

1) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone & Email): \_\_\_\_\_

\_\_\_\_\_

2) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone & Email): \_\_\_\_\_

\_\_\_\_\_

\* Not required for materials only proposal

2. **Statement of Experience\*** (Continued)

b. Bidder Projects (Continued, attach additional sheets if necessary)

3) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone & Email): \_\_\_\_\_

\_\_\_\_\_

4) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone & Email): \_\_\_\_\_

\_\_\_\_\_

5) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone & Email): \_\_\_\_\_

\_\_\_\_\_

\* Not required for materials only proposal

2. **Statement of Experience\*** (Continued)

c. Bidder's Principals and Key Personnel (attach additional sheets if necessary)

If Bidder (Contractor) has less than 5 years' experience in the type of work specified, it shall list the work experience for principals and key personnel to demonstrate that Bidder (Contractor) has sufficient work experience to warrant consideration for award; Owner will determine whether Bidder (Contractor) has sufficient work experience to meet the 5 years' work experience requirement.

1) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

Capacity (Title): \_\_\_\_\_

2) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

Capacity (Title): \_\_\_\_\_

d. Has Bidder been involved in litigation with any owner of any project within the last 10 years? \_\_\_\_\_ . If so, please describe the project and the nature and results of any litigation including any lawsuits settled prior to trial. (Attach additional sheets if necessary.)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

e. Bidder is advised that it may be required to submit a signed financial statement, financial data, or other information and references sufficiently comprehensive to permit an appraisal of its current financial condition prior to award of Contract. Said statement, data, or information may be considered in selecting the successful Bidder.

\* Not required for materials only proposal





2. **Statement of Experience\*** (Continued)

g. List of Subbidders (copy and attach additional sheets if necessary)

Each Bidder (Contractor) shall list the name and address of each subbidder (subcontractor) who will perform work in excess of one-half of one percent (1/2%) of the total bid amount. Attach additional sheets if necessary. State the subbidders' names, addresses, contractor license information, DIR public works contractor registration number, and the portion of Work to be performed by each. Only one subbidder shall be listed for each specific portion of the Work. Subbidders' experience shall be included in Section B.2.h herein.

If Bidder fails to specify a subbidder for a portion of Work to be performed in excess of one-half of one percent of the Contractor's total bid amount, the Contractor agrees, pursuant to Section 4106 of the California Public Contract Code, that the Contractor is fully qualified to perform that portion, and will perform such portion of the Work.

1) Subbidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contractor License No.: \_\_\_\_\_ Class: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

DIR Registration No.: \_\_\_\_\_

2) Subbidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contractor License No.: \_\_\_\_\_ Class: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

DIR Registration No.: \_\_\_\_\_

3) Subbidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contractor License No.: \_\_\_\_\_ Class: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

DIR Registration No.: \_\_\_\_\_

4) Subbidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Contractor License No.: \_\_\_\_\_ Class: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

DIR Registration No.: \_\_\_\_\_

\* Not required for materials only proposal

h. Subbidder Experience (copy and attach for each subbidder, two pages)

Subbidder Name: \_\_\_\_\_

1) Subbidder Projects:

Bidder (Contractor) shall furnish work record for subbidder (subcontractor) listing at least two (2) projects each that the subbidders have completed within the past three (3) years. Responses shall be full and explicit.

a) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone, & Email): \_\_\_\_\_

\_\_\_\_\_

b) Project Name: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Type of Work: \_\_\_\_\_

Owner (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Engineer (Name, Address, & Phone): \_\_\_\_\_

\_\_\_\_\_

Person in Charge of Project (Name, Phone, & Email): \_\_\_\_\_

\_\_\_\_\_

\* Not required for materials only proposal

2. **Statement of Experience\*** (Continued)

h. Subbidder Experience (Continued, copy and attach for each subbidder)

Subbidder Name: \_\_\_\_\_

2) Subbidder's Principals and Key Personnel (use reverse side or attach additional sheets if necessary)

If any subbidder (subcontractor) has less than 5 years' experience in the type of work indicated, it shall list the work experience for principals and key personnel to demonstrate that subbidder (subcontractor) has sufficient work experience to warrant consideration for award; Owner will determine whether subbidder (subcontractor) has sufficient work experience to meet the 5 years' work experience requirement.

a) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

Capacity (Title): \_\_\_\_\_

b) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Type of Work: \_\_\_\_\_ Years of Experience: \_\_\_\_\_

Capacity (Title): \_\_\_\_\_

3) Has subbidder been involved in litigation with any owner of any project within the last 10 years? \_\_\_\_\_ . If so, please describe the project and the nature and results of any litigation including any lawsuits settled prior to trial. (Attach additional sheets if necessary.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\* Not required for materials only proposal

### **3. Supplemental Instructions to Bidders**

- a. Bidder shall submit a proposal for each bid and subbid item. If award is made, Owner will award the Work to a single Bidder; however, Owner reserves the right to withhold award on certain bid or subbid items.
- b. All Work under these Contract Documents shall be completed in accordance with the Contract Completion Schedule.
- c. Bidder shall be licensed in accordance with the California Contractors State License Law of the Business and Professions Code and shall have a minimum of 5 years' experience in the type of work specified. Subbidders, if any, shall also be licensed in accordance with the same law and shall also have a minimum of 5 years' experience in the type of work specified.
- d. Bidder shall visit and inspect Work site and complete Certification of Bidder's Work Site Inspection to verify same.

**4. Bid Schedule**

The undersigned hereby proposes to furnish all labor, materials, equipment and methods necessary for constructing all Work specified, all in strict accordance with these Contract Documents, at the bid prices and the Completion Date set forth hereafter. The undersigned also acknowledges that all bid prices include sales tax and all other applicable taxes and fees. The costs for any work shown or required in the Contract Documents, but not specifically identified as a bid line item are to be included in the related bid line items and no additional compensation shall be due to Contractor for the performance of the Work. The estimated quantities for unit price items are for purposes of comparing bids only and Owner makes no representation that the actual quantities of Work performed will not vary from the estimates. Final payment shall be determined by Owner from measured quantities of Work performed based upon the unit price.

**BID SCHEDULE  
LELAND J. THOMPSON WATER TREATMENT PLANT  
FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE**

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
101	Furnish contract bonds, project insurance, project permits, and project management.	N/A	L.S.	N/A	\$ _____
102	Mobilization of equipment, materials, and labor.	N/A	L.S.	N/A	\$ _____
103	Furnish trench protection in accordance with Cal/OSHA Standards for all trenches greater than 5' deep.	N/A	L.S.	N/A	\$ _____
104	Furnish, install, and maintain traffic control, including approved traffic control plans, all signs, delineators, arrowboards, flagmen, and all related work, all in accordance with the Contract Documents.	N/A	L.S.	N/A	\$ _____
105	Furnish and install aboveground and belowground backwash supply pipeline, valves, fittings, connections, and appurtenances, including modifications to existing piping, valves, and appurtenances, and all related work.	N/A	L.S.	\$ _____	\$ _____
106	Furnish and install aboveground and belowground high pressure relief/raw water bypass piping, valves, fittings, connections, and appurtenances, including modifications to existing piping, valves, and appurtenances, and all related work.	N/A	L.S.	\$ _____	\$ _____
107	Modify existing high pressure relief/raw water bypass valve, including the addition of anti-cavitation trim and orifice plate, and all related work.	N/A	L.S.	\$ _____	\$ _____

**BID SCHEDULE**  
**LELAND J. THOMPSON WATER TREATMENT PLANT**  
**FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE**

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT
108	Construct pavement repair/ replacement.	N/A	L.S.	\$ _____	\$ _____
109	Provide testing and disinfection of all pipeline facilities.	N/A	L.S.	N/A	\$ _____
110	Furnish and install connection to existing 16" waterline, including 16" ductile iron pipe and fittings, per Detail 1, Sheet 3 and Notes on Sheet 2.	N/A	L.S.	N/A	\$ _____

TOTAL BID (Sum of Bid Items 101 through 110):

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
 (words) (figures)

Bidder hereby acknowledges that all bid prices include any amounts payable by Owner for taxes which may result from this proposal.

**Bidder's Authorized Representative**

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Name (Print)

\_\_\_\_\_  
 Title (Print)

**5. Contract Completion Schedule**

a. Contract Completion Schedule

Contractor will be advised of award, if made, immediately following Owner's regular scheduled Board meeting (telephone conversation with letter confirmation). Contract Work shall be complete within 180 calendar days after date of Notice to Proceed.

b. Liquidated Damages

Contractor is advised that "Liquidated Damages" of \$500.00 per calendar day may be assessed for each calendar day that the Work remains incomplete following the date established by the Contract Completion Schedule, as adjusted for due cause by Change Order.



**6. Certified Data**

In the blanks provided, fill in the required Certified Data relating to the Bidder's Proposal.

- a. Manufacturer of Carbon Steel Pipe and Fittings

---

- b. Manufacturer of Butterfly Valves

---

**7. Certified Worker Craft and Classification**

Bidder hereby states that the bid proposal has been based on the worker craft and classification set forth below and the Work will be performed by personnel within these classifications unless Bidder specifically requests change in writing and Owner approves same in writing.

Work*	Craft	Classification
<b>Examples:</b>		
Steel Tank Work	Operating Engineer	Group B-Crane Operator
Electrical Work	Electrician	Cable Splicer
Plant Work	Roofer	Helper
a. _____	_____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
f. _____	_____	_____
g. _____	_____	_____
h. _____	_____	_____
i. _____	_____	_____
j. _____	_____	_____
k. _____	_____	_____
l. _____	_____	_____
m. _____	_____	_____

\* Designate Type of Work, i.e. Earthwork, Concrete Work, Electrical Work, Mechanical Work, Pump Work, Plant Work, Tank Work, Fencing, Painting, Piping

**8. Certification of Bidder's Work Site Inspection**

I certify that I have visited and inspected the Work sites on the following dates:

<u>Site</u>	<u>Date Visited</u>
Leland J. Thompson Water Treatment Plant	_____

I also certify that I am familiar with local conditions which may affect the performance of the Work and propose to perform the Work generally as follows:

---

---

---

---

---

---

---

**Bidder's Authorized Representative**

---

Signature

---

Name (Print)

---

Title (Print)

**9. Statement on Bonds and Insurance**

a. Names and addresses of all members of partnership or names and titles of all corporate officers:

---

---

---

---

---

---

---

---

---

---

b. The Bidder declares that the surety or sureties named below have agreed to furnish bonds in the aggregate amounts set forth in the Instructions to Bidders, in the event the Contract is awarded on the basis of this proposal.

Name(s) and address(es) of surety or sureties agreeing to furnish bond

---

---

---

---

---

---

---

---

---

---

c. The Bidder declares that the insurers named below have reviewed the insurance requirements set forth in the Contract Appendix (Section 8. Insurance) and have agreed to furnish all insurance specified.

Name(s) and address(es) of insurers agreeing to insurance coverage

---

---

---

---

---

---

---

---

---

---

**10. Certification of Bidding Documents**

The Bidder hereby declares and certifies under penalty of perjury that the foregoing statements and all of Bidder's Proposal and Supporting Documents herewith submitted are accurate and correct.

BIDDER

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Email: \_\_\_\_\_

Telephone \_\_\_\_\_

By: \_\_\_\_\_

(Authorized Representative, Written Signature)

Corporation organized

under the laws of the

State of: \_\_\_\_\_

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title: \_\_\_\_\_

[Individual, Partner, Corporate Officer (Title)]

Federal Tax Identification Number or Social Security Number: \_\_\_\_\_

**CALIFORNIA CONTRACTOR'S LICENSE:**

Class \_\_\_\_\_

(Class A is required)

(Corporate Seal)

Number \_\_\_\_\_

Expiration Date \_\_\_\_\_

**NOTARY**

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 \_\_\_\_\_ )

COUNTY OF \_\_\_\_\_ )

On \_\_\_\_\_, 20\_\_\_\_, before me, \_\_\_\_\_, personally appeared \_\_\_\_\_, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary

(Notary Seal)

NOTE: If Notary elects to attach an acknowledgment form, Notary shall use the Notary Acknowledgment form attached at the end of this section (Bidding Documents), or, alternatively, Notary may use a California All-Purpose Acknowledgment form, provided Notary completes the entire form, both the required and optional portions.

**11. Non-Collusion Declaration  
(TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID)**

The undersigned declares:

I am the \_\_\_\_\_ of \_\_\_\_\_, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. 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. All statements contained in the bid are true. 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, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on \_\_\_\_\_ [date], at \_\_\_\_\_ [city], \_\_\_\_\_ [state].

**BIDDER**

Name: \_\_\_\_\_

By: \_\_\_\_\_  
(Authorized Representative, Written Signature)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title: \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

**12. Public Works Contractor Registration Certification**

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal for, or enter into a Contract to perform public work must be registered with the Department of Industrial Relations. See <http://www.dir.ca.gov/Public-Works/PublicWorks.html> for additional information.

No bid will be accepted nor any contract entered into without proof of the Bidder's and subbidders' current Public Works Contractor Registration with the Department of Industrial Relations.

Bidder hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and that Bidder and all listed subbidders (subcontractors) are currently registered with the Department of Industrial Relations.<sup>1</sup>

Name of Bidder: \_\_\_\_\_

DIR Registration Number: \_\_\_\_\_

DIR Registration Expiration: \_\_\_\_\_

Small Project Exemption:  Yes or  No

Bidder further acknowledges:

1. Bidder shall maintain its current DIR registration for the duration of the project.
2. Bidder shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its contract with subcontractors and ensure that all subcontractors maintain DIR registration status for the duration of the project.
3. Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Signature: \_\_\_\_\_

Name and Title: \_\_\_\_\_

Dated: \_\_\_\_\_

---

<sup>1</sup> If the project is exempt from the contractor registration requirements pursuant to the small project exemption under Labor Code Sections 1725.5 and 1771.1, please mark "Yes" in response to "Small Project Exemption."

**13. Iran Contracting Act Certification  
(Public Contract Code Section 2200 *et seq.*)**

As required by California Public Contract Code Section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 *et seq.*) is true and correct:

- The Contractor is not:
  - (i) identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or
  - (ii) a financial institution that extends, for 45 days or more, credit in the amount of \$20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.
- Owner has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, Owner will be unable to obtain the goods and/or services to be provided pursuant to the Contract.
- The amount of the Contract payable to the Contractor for the Project does not exceed \$1,000,000.

Signed \_\_\_\_\_

Title \_\_\_\_\_

Firm \_\_\_\_\_

Date \_\_\_\_\_

**NOTE:** In accordance with Public Contract Code Section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of \$250,000 or twice the Contract amount, termination of the Contract and/or ineligibility to bid on contracts for three years.



**14. Executive Order N-6-22 Certification**

Executive Order N-6-22 issued by Governor Gavin Newsom on March 4, 2022, directs all agencies and departments that are subject to the Governor’s authority to (a) terminate any contracts with any individuals or entities that are determined to be a target of economic sanctions against Russia and Russian entities and individuals; and (b) refrain from entering into any new contracts with such individuals or entities while the aforementioned sanctions are in effect.

Executive Order N-6-22 also requires that any contractor that: (1) currently has a contract with the Owner funded through grant funds provided by the State of California; and/or (2) submits a bid or proposal or otherwise proposes to or enter into or renew a contract with the Owner with State of California grant funds, certify that the person is not the target of any economic sanctions against Russia and Russian entities and individuals.

The contractor hereby certifies, SUBJECT TO PENALTY OF PERJURY, that a) the contractor is not a target of any economic sanctions against Russian and Russian entities and individuals as described in Executive Order N-6-22 and b) the person signing below is duly authorized to legally bind the contractor. This certification is made under the laws of the State of California.

Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

Contractor: \_\_\_\_\_

Date: \_\_\_\_\_

**15. Bid Bond**

KNOW ALL MEN BY THESE PRESENTS, that we (Contractor), \_\_\_\_\_ as Bidder and Principal, and \_\_\_\_\_ as Surety, are held firmly bound unto the RUBIDOUX COMMUNITY SERVICES DISTRICT, situated in Riverside County, California, hereinafter called the Owner, in the penal sum of \_\_\_\_\_ dollars, \$ \_\_\_\_\_, for the payment of which sum, well and truly to be made, we bind ourselves, and our successors and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is that whereas Bidder has submitted the accompanying bid dated \_\_\_\_\_, 20\_\_\_\_, for LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE for Owner.

NOW THEREFORE, (1) if the Bidder shall not withdraw said bid within sixty days after the opening of the same, and (2) shall within ten days after the award of the Contract furnish the required certificates of insurance and enter into a written contract with the Owner in accordance with the bid as accepted, and (3) if the Bidder shall give the required bonds with good and sufficient sureties for the faithful performance and proper fulfillment of said Contract and for the protection of laborers and material men, or (4) in the event of the withdrawal of said bid within the periods specified, or the failure to enter into said Contract, if the Bidder shall within thirty days after request by the Owner pay the Owner the difference between the amount specified in said bid and the amount for which the Owner may procure the required Work or supplies, if the latter amount be in excess of the former, then the above obligations shall be void and of no effect, otherwise they remain in full force and effect.

In the event suit is brought upon this bond by the Owner and judgment is recovered, the Surety shall pay all costs incurred by the Owner in such suit, including reasonable attorney's fee, to be fixed by the court.

For value received, the Surety hereby stipulates and agrees that the obligation of said Surety and its bond shall in no way be impaired or affected by any bid errors or by an extension of time within which the Owner may accept such bid, and said Surety hereby waives notice of any such extension.

IN WITNESS WHEREOF, Bidder and Surety have duly and fully executed this instrument this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

PRINCIPAL:

SURETY:

Name \_\_\_\_\_

Name \_\_\_\_\_

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Attest: (If Corporation)

Attest: (If Corporation)

By \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

(Corporate Seal)

(Corporate Seal)

**NOTE:** Both Principal and Surety signatures must be notarized. A copy of the power of attorney to local representatives of the bonding company must be attached hereto.

15. Bid Bond (Continued)

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.

NOTARY FOR PRINCIPAL

NOTARY FOR SURETY

STATE OF \_\_\_\_\_ )
COUNTY OF \_\_\_\_\_ )

STATE OF \_\_\_\_\_ )
COUNTY OF \_\_\_\_\_ )

On \_\_\_\_\_, 20\_\_\_\_, before me,
\_\_\_\_\_, personally
appeared \_\_\_\_\_,
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.

On \_\_\_\_\_, 20\_\_\_\_, before me,
\_\_\_\_\_, personally
appeared \_\_\_\_\_,
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.

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.

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary

\_\_\_\_\_  
Signature of Notary

(Notary Seal)

(Notary Seal)

NOTE: If Notary elects to attach an acknowledgment form, Notary shall use the Notary Acknowledgment form attached at the end of this section (Bidding Documents), or, alternatively, Notary may use a California All-Purpose Acknowledgment form, provided Notary completes the entire form, both the required and optional portions.

IMPORTANT: Surety companies executing Bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write Surety insurance defined in Section 105 of the California Insurance Code and, if the Work or project is financed, in whole or in part, with federal grant or loan funds, said Surety companies must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

Name and address of Surety \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Name and address of agent or representative
for service of process in California, if different
from above \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Telephone number of Surety and agent or representative
for service of process in California \_\_\_\_\_

**NOTARY ACKNOWLEDGMENT**

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 \_\_\_\_\_ }  
County of \_\_\_\_\_ } ss.

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

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

WITNESS my hand and official seal.

Signature \_\_\_\_\_ (seal)

**REQUIRED INFORMATION**

**Capacity Claimed by Signer**

**Description of Attached Document**

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

\_\_\_\_\_  
Document Title or Type

\_\_\_\_\_  
Number of Pages

\_\_\_\_\_  
Document Date

\_\_\_\_\_  
Signer(s) Other Than Above

**Signer is Representing:**

Name of Person(s) or Entity(ies)  
\_\_\_\_\_  
\_\_\_\_\_

## **CONTRACT**

**CONTRACT**

This Contract is made and entered into on \_\_\_\_\_, by and between the RUBIDOUX COMMUNITY SERVICES DISTRICT hereinafter called "Owner", and \_\_\_\_\_, hereinafter called "Contractor". This Contract is for that Work described in the Contract Documents entitled LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE.

**A. Recitals**

1. Contractor, in response to a Notice Inviting Bids issued by Owner, has submitted a bid proposal for the above entitled Work.
2. Owner has duly opened and considered said bid proposal, and has duly awarded said bid to Contractor in accordance with said Notice Inviting Bids, and has given written notice of said award to Contractor on \_\_\_\_\_.

Contractor has obtained and delivers concurrently herewith specified Performance and Payment Bonds and the Certificate of Insurance as required by the Contract Documents.

**B. Terms**

1. Incorporation of Documents

This Contract includes and hereby incorporates in full by this reference the Contract Documents for the above entitled Work.

The Contract Documents set forth herein consist of: Notice Inviting Bids, Bidding Documents, Bid Bond, this Contract including Contractor's Labor Certification and any Contract Change Orders, Performance and Payment Bonds, Certificates of Insurance, Contract Appendix, Special Requirements, Basic and Technical Specifications, Construction and Standard Drawings, and any addenda thereto.

2. Contractor's Basic Obligation

Contractor agrees to provide the Work specified in the following bid schedules and/or bid items:

\_\_\_\_\_

for \_\_\_\_\_ dollars (\$\_\_\_\_\_), said amount being subject to adjustment in accordance with the applicable terms of the Contract Documents.

Contractor agrees to perform said Work, at said Contract amount, in accordance with the following Contract Completion Schedule:

\_\_\_\_\_

Contractor agrees that if the aforesaid Contract Completion Schedule is not met, liquidated damages will apply as provided by the Contract Documents, in the following amounts and under the following conditions:

\_\_\_\_\_

3. Owner's Basic Obligation

Owner agrees to engage and does hereby engage said Contractor as an independent contractor to furnish all materials and to perform all Work according to the terms and conditions herein contained for the sum aforesaid and hereby contracts to pay said sum at the time, in the manner, and in accordance with the conditions set forth in the Contract Documents.

4. Contractor's Labor Certification

Contractor states that it is aware of the provisions of Section 3700 of the Labor Code, which require every employer to be insured against liability for worker's compensation or to undertake self insurance in accordance with provisions of that Code, and Contractor agrees to comply with such provisions before commencing the performance of the Work of this Contract.

5. Litigation or Enforcement Action Costs Arising from Contractor's Operations

If the Owner and/or its Officials, Officers, Employees, Agents, Consultants, and Engineers are named, or are required to testify or contribute time and expense in any other way, in any suit or enforcement action of any kind brought to recover alleged damages or remedy alleged violations resulting from the acts or omissions (including negligent acts or omissions) in connection with, or accidents arising from, the acts, operations, and responsibilities of the Contractor, its Subcontractors, or others associated with or working under Contractor, in direct or indirect relation to the performance of the Work, the Owner and/or its Directors, Officers, Employees, Agents, Consultants, and Engineers shall be held financially harmless and they shall be legally defended (with counsel acceptable to the named party) by the Contractor from any claims for damages and they shall be reimbursed for any reasonable costs incurred by them for lost time, expert assistance, and incidental expenses in connection with their need to defend themselves against such claims, or to contribute time and expense in any other such way, whether or not the suit or enforcement action proceeds to final judgment. This section shall apply and be enforceable for the full time of any applicable statute of limitations.

6. Successors

The parties do for themselves, their heirs, executors, administrators, successors, and assigns agree to the full performance of all of the provisions herein contained. Contractor may not, either voluntarily or by action of law, assign any obligation assumed by Contractor hereunder without the prior written consent of Owner.

IN WITNESS WHEREOF, the parties hereto have caused this contract to be executed the day and year first above written.

\_\_\_\_\_  
(Contractor)

By: \_\_\_\_\_  
(Authorized Representative, Written Signature)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title: \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

ATTEST: (If Corporation)

By \_\_\_\_\_

Title \_\_\_\_\_

Corporate Seal

RUBIDOUX COMMUNITY SERVICES DISTRICT

By: \_\_\_\_\_

Title: \_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Clerk/Secretary

APPROVED AS TO FORM AND EXECUTION

\_\_\_\_\_  
Counsel for Owner

By \_\_\_\_\_

NOTARY (CONTRACTOR)

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 \_\_\_\_\_ )

COUNTY OF \_\_\_\_\_ )

On \_\_\_\_\_, 20\_\_\_\_, before me, \_\_\_\_\_, personally \_\_\_\_\_ appeared \_\_\_\_\_, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

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

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary

(Notary Seal)

NOTE: If Notary elects to attach an acknowledgment form, Notary shall use the Notary Acknowledgment form attached at the end of the prior section (Bidding Documents) or, alternatively, Notary may use a California All-Purpose Acknowledgment form, provided Notary completes the entire form, both the required and optional portions.



**PERFORMANCE BOND**  
(California Public Work)  
REQUIRED FORM

Bond Number \_\_\_\_\_

Rate of Premium (\$/1,000) \_\_\_\_\_

Amount of Premium \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, RUBIDOUX COMMUNITY SERVICES DISTRICT (also herein "Obligee") has awarded to \_\_\_\_\_ (hereinafter designated "Contractor" and "Principal"), a contract for the Work described as follows: LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE, County of Riverside, California (hereinafter referred to as the "Public Work"); and

WHEREAS, the Work to be performed by the Contractor is more particularly set forth in that certain contract for the said Public Work dated \_\_\_\_\_, (hereinafter referred to as the "Public Work Contract"), which Public Work Contract is incorporated herein by this reference; and

WHEREAS, the Contractor is required by said Public Work Contract to perform the terms thereof and to provide a bond both for the performance and guaranty thereof,

NOW, THEREFORE, we \_\_\_\_\_, the undersigned Contractor, as Principal, and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the RUBIDOUX COMMUNITY SERVICES DISTRICT in the sum of \_\_\_\_\_ dollars, \$\_\_\_\_\_, said sum being not less than 100% of the total amount payable by the said Obligee under the terms of the said Public Work Contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Public Work Contract and any alteration thereof made as therein provided, on his or their part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill the one-year guarantee of all materials and workmanship; and indemnify and save harmless the Obligee, its officers, employees, and agents, as stipulated in the said Public Work Contract, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. In the event legal action is required to enforce the provisions of this agreement, the prevailing party shall be entitled to recover reasonable attorney's fees in addition to court costs, necessary disbursements, and other damages.

As a condition precedent to the satisfactory completion of the Public Work Contract, unless otherwise provided for in the Public Work Contract, the above obligation shall hold good for a period of one (1) year after the acceptance of the work by Obligee, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect Obligee from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit Obligee's rights or the Contractor or Surety's obligations under the Public Work Contract, law or equity, including, but not limited to, California Code of Civil Procedure Section 337.15.

Whenever Contractor shall be, and is declared by Obligee to be, in default under the Public Work Contract, the Surety shall remedy the default pursuant to the Public Work Contract, or shall promptly, at Obligee's option:

- i. Take over and complete the Project in accordance with all terms and conditions in the Public Work Contract; or

- ii. Obtain a bid or bids for completing the Public Work in accordance with all terms and conditions in the Public Work Contract and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder, the Surety and Obligee, and make available as work progresses sufficient funds to pay the cost of completion of the Public Work, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term “balance of the contract price” as used in this paragraph shall mean the total amount payable to Contractor by Obligee under the Public Work Contract and any modification thereto, less any amount previously paid by Obligee to the Contractor and any other set offs pursuant to the Public Work Contract.
  
- iii. Permit Obligee to complete the Public Work in any manner consistent with California law and make available as work progresses sufficient funds to pay the cost of completion of the Public Work, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term “balance of the contract price” as used in this paragraph shall mean the total amount payable to Contractor by Obligee under the Public Work Contract and any modification thereto, less any amount previously paid by Obligee to the Contractor and any other set offs pursuant to the Public Work Contract.

Surety expressly agrees that Obligee may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor.

Surety shall not utilize Contractor in completing the Public Work nor shall Surety accept a bid from Contractor for completion of the Public Work if Obligee, when declaring the Contractor in default, notifies Surety of Obligee’s objection to Contractor’s further participation in the completion of the Public Work.

The said Surety, for value received, hereby stipulates and agrees that no change, extensions of time, alteration or addition to the terms of the Public Work Contract or to the Work to be performed thereunder, or the specifications accompanying the same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the Work or to Specifications.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_.

PRINCIPAL:

SURETY:

Name \_\_\_\_\_

Name \_\_\_\_\_

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Attest: (If Corporation)

Attest: (If Corporation)

By \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

(Corporate Seal)

(Corporate Seal)

**Note:** Both Principal and Surety signatures must be notarized. A copy of the power of attorney to local representatives of the bonding company must be attached hereto.

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.

NOTARY FOR PRINCIPAL

NOTARY FOR SURETY

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ )

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ )

On \_\_\_\_\_, 20\_\_\_\_, before me, \_\_\_\_\_, personally appeared \_\_\_\_\_, 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.

On \_\_\_\_\_, 20\_\_\_\_, before me, \_\_\_\_\_, personally appeared \_\_\_\_\_, 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.

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.

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary

\_\_\_\_\_  
Signature of Notary

(Notary Seal)

(Notary Seal)

NOTE: If Notary elects to attach an acknowledgment form, Notary shall use the Notary Acknowledgment form attached at the end of the prior section (Bidding Documents) or, alternatively, Notary may use a California All-Purpose Acknowledgment form, provided Notary completes the entire form, both the required and optional portions.

IMPORTANT: Surety companies executing Bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write Surety insurance defined in Section 105 of the California Insurance Code and, if the work or project is financed, in whole or in part, with federal grant or loan funds, said Surety companies must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

Name and address of Surety \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name and address of agent or representative  
for service of process in California, if different  
from above \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone number of Surety and agent or representative  
for service of process in California \_\_\_\_\_

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the corporation named as principal to the within bond; that \_\_\_\_\_ who signed the said bond on behalf of the principal was then \_\_\_\_\_ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing Board.

\_\_\_\_\_  
Signature

(Corporate Seal)

**PAYMENT BOND**  
(California Public Work)  
REQUIRED FORM

Bond Number \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS:

THAT WHEREAS, RUBIDOUX COMMUNITY SERVICES DISTRICT (referred to hereinafter as "Obligee") has awarded to \_\_\_\_\_ (hereinafter designated "Contractor" and "Principal"), a contract dated \_\_\_\_\_, for the Work described as follows: LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE, County of Riverside, California (hereinafter referred to as the "Public Work Contract") and

WHEREAS, said Contractor is required to furnish a bond in connection with said Public Work Contract, providing that if said Contractor or any of his or its subcontractors shall fail to pay for any materials, provisions, provender, or other supplies, or terms used in, upon, for or about the performance of the Work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the provisions of Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the California Civil Code, with respect to such work or labor, that the Surety on this bond will pay the same together with a reasonable attorney's fee in case suit is brought on the bond.

NOW, THEREFORE, we \_\_\_\_\_, the undersigned Contractor, as Principal and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the RUBIDOUX COMMUNITY SERVICES DISTRICT and to any and all material men, persons, companies or corporations furnishing materials, provisions, provender and other supplies used in, upon, for or about the performance of the said Public Work, and all persons, companies or corporations renting or hiring teams, or implements or machinery, for or contributing to said Public Work to be done, and all persons performing work or labor upon the same and all persons supplying both work and materials as aforesaid excepting the said Contractor, the sum of \_\_\_\_\_ dollars, \$\_\_\_\_\_, said sum being not less than 100% of the total amount payable by said Obligee under the terms of the said Public Work Contract, for which payment well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the Principal, his or its subcontractors, heirs, executors, administrators, successors, or assigns, shall fail to pay for any materials, provisions, provender or other supplies or machinery used in, upon, for or about the performance of the Work contracted to be done, or for work or labor thereon of any kind, or fail to pay any of the persons named in California Civil Code Section 9100, or amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such claimant, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the contractor and his subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, and all other applicable laws of the State of California and rules and regulations of its agencies, then said Surety will pay the same in or to an amount not exceeding the sum specified herein.

In case legal action is required to enforce the provisions of this bond, the prevailing party shall be entitled to recover reasonable attorney's fees in addition to court costs, necessary disbursements and other consequential damages. In addition to the provisions hereinabove, it is agreed that this bond will inure to the benefit of any and all persons, companies and corporations entitled to file claims under Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the California Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or additions to the terms of the said Public Work Contract or to the Work to be performed thereunder or the specification accompanying the same shall in any wise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the Specifications.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_.

PRINCIPAL:

SURETY:

Name \_\_\_\_\_

Name \_\_\_\_\_

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

By \_\_\_\_\_  
(Authorized Representative, Written Signature)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

\_\_\_\_\_  
(Authorized Representative, Typed or Printed Name)

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Title \_\_\_\_\_  
[Individual, Partner, Corporate Officer (Title)]

Attest: (If Corporation)

Attest: (If Corporation)

By \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

(Corporate Seal)

(Corporate Seal)

**Note:** Both Principal and Surety signatures must be notarized. A copy of the power of attorney to local representatives of the bonding company must be attached hereto.

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.

NOTARY FOR PRINCIPAL

NOTARY FOR SURETY

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ )

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ )

On \_\_\_\_\_, 20\_\_\_\_, before me,  
\_\_\_\_\_, personally  
appeared \_\_\_\_\_,  
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.

On \_\_\_\_\_, 20\_\_\_\_, before me,  
\_\_\_\_\_, personally  
appeared \_\_\_\_\_,  
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.

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.

WITNESS my hand and official seal.

\_\_\_\_\_  
Signature of Notary

\_\_\_\_\_  
Signature of Notary

(Notary Seal)

(Notary Seal)

NOTE: If Notary elects to attach an acknowledgment form, Notary shall use the Notary Acknowledgment form attached at the end of the prior section (Bidding Documents), or, alternatively, Notary may use a California All-Purpose Acknowledgment form, provided Notary completes the entire form, both the required and optional portions.

IMPORTANT: Surety companies executing Bonds must possess a certificate of authority from the California Insurance Commissioner authorizing them to write Surety insurance defined in Section 105 of the California Insurance Code and, if the work or project is financed, in whole or in part, with federal grant or loan funds, said Surety companies must also appear on the Treasury Department's most current list (Circular 570 as amended).

Any claims under this bond may be addressed to:

Name and address of Surety \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name and address of agent or representative  
for service of process in California, if different  
from above \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone number of Surety and agent or representative  
for service of process in California \_\_\_\_\_

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the corporation named as principal to the within bond; that \_\_\_\_\_ who signed the said bond on behalf of the principal was then \_\_\_\_\_ of said corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing Board.

\_\_\_\_\_  
Signature

(Corporate Seal)

**CONTRACT CERTIFICATE OF INSURANCE**

ISSUE DATE: \_\_\_\_\_

OWNER OR CERTIFICATE HOLDER: RUBIDOUX COMMUNITY SERVICES DISTRICT

This certificate is issued as a matter of information only and confers no rights upon the certificate holder; it does not alter, amend, or extend the coverage afforded by the policies listed below.

CONTRACTOR OR INSURED: \_\_\_\_\_

PROJECT: LELAND J. THOMPSON WATER TREATMENT PLANT FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE

Certificate of Insurance - Page 1 of 1

Insurance Type	Insurance Company	Policy Number	Policy Effective Date	Policy Expiration Date	Limits		
					Description	Furnished	Specified
<b>Worker's Compensation and Employer's Liability</b>					Statutory	Statutory	Statutory
					Accident-Policy Limit	\$ _____	\$1,000,000
					Disease-Policy Limit	\$ _____	\$1,000,000
					Disease-Each Employee	\$ _____	\$1,000,000
<b>Automobile Liability</b> Business _____ Commercial _____					Combined Single Limit	\$ _____	\$1,000,000
					Bodily Injury (per accident)	\$ _____	\$1,000,000
					Bodily Injury (per person)	\$ _____	\$1,000,000
					Property Damage	\$ _____	\$500,000
<b>General Liability</b> Commercial _____ Comprehensive _____ Claims Made _____ Occurrence _____					General Aggregate*	\$ _____	\$2,000,000
					Each Occurrence*	\$ _____	\$1,000,000
					* Occurrence and aggregate limits apply per project.		
<b>Excess Liability</b> Umbrella Form _____ Other Form _____					Each Occurrence	\$ _____	\$ _____
					Aggregate	\$ _____	\$ _____
<b>Course of Construction or Installation Floater</b>						\$ _____	<b>TOTAL CONTRACT AMOUNT</b>
						\$ _____	

SIGNATURE OF AUTHORIZED REPRESENTATIVE OF THE INSURER(S)

I, \_\_\_\_\_, certify that I have authority to and hereby execute this certificate on behalf of the insurer(s) referenced above.

Date: \_\_\_\_\_ Signature: \_\_\_\_\_ Title \_\_\_\_\_ Address: \_\_\_\_\_ Telephone: \_\_\_\_\_

See required Contract Insurance Endorsement



**CONTRACT INSURANCE ENDORSEMENT  
(REQUIRED)**

Company names, policy numbers, effective and expiration dates, and furnished limits set forth in the Contract Certificate of Insurance identify applicable insurance policies in which coverage is provided for the named project. Policy of insurance listed in the Certificate of Insurance has been issued to the named insured by each indicated insurance company for the policy period indicated and, as of the date of the aforementioned certificate, is in full force and effect. The insurance afforded by each policy described therein is subject to all the terms, conditions, limitations, and exclusions of such policy.

Automobile liability insurance covers all owned, non-owned, borrowed, and/or hired vehicles used by or for the benefit of Contractor. General liability insurance covers premises and operations, products and completed operations, blanket contractual (oral and written), independent contractors, owners and contractors protective, and, if applicable to the Work, collapse, explosion and underground hazards. Excess liability insurance covers all automobile and general liability coverages. Course of construction insurance covers fire and lightning, extended coverage, and vandalism and malicious mischief.

With respect to automobile, general, and excess liability insurance, Owner and additional insureds, their officials, officers, managers, agents, engineers, employees, and volunteers are covered as additional insureds to the extent of the limits set forth in the Contract Certificate of Insurance, but only while acting in their capacities as such, for liability arising from or in connection with the performance of the Work by Contractor, its agents, associates, representatives, employees, and subcontractors of every tier. With respect to course of construction or installation floater insurance, Owner is covered as additional insured. Insurer waives its rights of subrogation against the additional insureds.

Contractor's insurance is primary for additional insureds with respect to the performance of Contractor, those associated therewith, and those working thereunder, and any like insurance of Owner and additional insureds, their officials, officers, managers, agents, engineers, employees, and volunteers is excess and not contributing insurance with respect to insured claims under Contractor's policies. Contractor's insurance will apply separately to each insured against whom claim is made or suit is brought.

Contractor's insurance will not be cancelled, reduced, suspended, terminated, or voided in coverage or limits [except for general liability where the general aggregate limit has been reduced by claim(s) in which case insurer will immediately notify Owner of reduction in general aggregate limit resulting from such claim(s)] unless thirty (30) days prior written notice, by certified mail return receipt requested, has been given to Owner. Any failure to comply with reporting provisions of policies, including breaches of warranties, will not affect coverage provided to additional insureds.

**SIGNATURE OF AUTHORIZED REPRESENTATIVE OF THE INSURER(S)**

I, \_\_\_\_\_, certify that I have authority to and hereby execute this endorsement on behalf of the insurer(s) referenced below.

Date: \_\_\_\_\_ Signature: \_\_\_\_\_ Title: \_\_\_\_\_  
 Address: \_\_\_\_\_ Telephone: \_\_\_\_\_

Insurance policies to which this Contract Insurance Endorsement apply are as follows:

<u>Insurance Type</u>	<u>Insurance Company</u>	<u>Policy Number</u>	<u>Policy Effective Date</u>	<u>Policy Expiration Date</u>
Workers Compensation and Employers Liability	_____	_____	_____	_____
Automobile Liability	_____	_____	_____	_____
General Liability	_____	_____	_____	_____
Excess Liability	_____	_____	_____	_____
Course of Construction or Installation Floater	_____	_____	_____	_____

Use separate Contract Insurance Endorsement if required (copy as needed).



RUBIDOUX COMMUNITY SERVICES DISTRICT  
P.O. BOX 3098  
RUBIDOUX, CA 92519

PAYMENT REQUEST NO. \_\_\_\_\_

DATE: \_\_\_\_\_

CONSTRUCTION OF  
LELAND J. THOMPSON WATER TREATMENT PLANT  
FE/MN FILTRATION SYSTEM  
BACKWASH SUPPLY PIPELINE

K&S JOB #: 587-19.65.8

CONTRACTOR: \_\_\_\_\_

PAGE \_\_\_ OF \_\_\_

FEDERAL TAX IDENTIFICATION NO. OR SOCIAL SECURITY NO: \_\_\_\_\_

ORIGINAL CONTRACT AMOUNT: \$ \_\_\_\_\_

ADJUSTED CONTRACT AMOUNT: \$ \_\_\_\_\_

BID ITEM OR CHANGE ORDER NO.	DESCRIPTION	CONTRACT AMOUNT	CONTRACT WORK	
			PERCENT COMPLETED	AMOUNT COMPLETED
SUBTOTAL:				

ENGINEER'S STATEMENT

WE HAVE EXAMINED THIS PAYMENT REQUEST  
AND APPROVE IT FOR PAYMENT, SUBJECT TO  
THE NOTED CHANGES AND/OR CORRECTIONS.

5% RETENTION (DEDUCT FROM SUBTOTAL): ( \_\_\_\_\_ )  
BALANCE: \_\_\_\_\_  
PREVIOUS PAYMENTS (DEDUCT FROM BALANCE): ( \_\_\_\_\_ )  
PAYMENT DUE: \_\_\_\_\_

**KRIEGER & STEWART**

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

BY: \_\_\_\_\_

BY: \_\_\_\_\_

(Signature & Date)

(Signature & Date)

C-16

**CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT**

California Civil Code Section 8136

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

**Identifying Information**

Name of Claimant: \_\_\_\_\_

Name of Customer: \_\_\_\_\_

Job Location: \_\_\_\_\_

Owner: \_\_\_\_\_

Project: \_\_\_\_\_

**Conditional Waiver and Release**

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: \_\_\_\_\_

Amount of Check: \$ \_\_\_\_\_

Check Payable to: \_\_\_\_\_

**Exceptions**

This document does not affect any of the following:

Disputed claims for extras in the amount of: \$ \_\_\_\_\_

**Signature**

Claimant's Signature: \_\_\_\_\_

Claimant's Title: \_\_\_\_\_

Date of Signature: \_\_\_\_\_

**CONTRACT CHANGE ORDER NO. \_\_\_\_\_**

W.O. 587-19.65.8 F/C

**To Contract:** LELAND J. THOMPSON WATER TREATMENT PLANT , dated \_\_\_\_\_  
FE/MN FILTRATION SYSTEM BACKWASH SUPPLY PIPELINE

**by and between:** RUBIDOUX COMMUNITY SERVICES DISTRICT (OWNER),

and: \_\_\_\_\_ (CONTRACTOR),

**Contractor is hereby directed to make the following change in Contract Work:**

Item No.	Description of Change	Decrease \$	Increase \$
<b>Total Decrease in Contract Amount:</b>		\$	
<b>Total Increase in Contract Amount:</b>			\$
<b>Net Change in Contract Amount:</b>		\$	
<b>Contract Amount Prior to Change:</b>		\$	
<b>Contract Amount Adjusted for Change:</b>		\$	

By reason of Change Order No. \_\_\_\_, time of completion shall be adjusted as follows: \_\_\_\_ calendar days. Adjusted Contract Completion Date shall be \_\_\_\_\_. All provisions of the Contract shall apply hereto, and shall become effective when fully executed (signed and dated) by both parties.

Contractor accepts the terms and conditions stated herein as full and final settlement of any and all claims arising from this Change Order. The adjustments to the contract price and contract time in this Change Order constitute the entire compensation and/or adjustment thereto due to Contractor, including but not limited to all direct, indirect, consequential, profit, labor, equipment, tools, idle time, incidentals, and overhead (field and home office) costs, due to Contractor arising out of or related to the change in the Work covered by this Change Order. The Contractor hereby releases and agrees to waive all rights, without exception or reservation of any kind whatsoever, to file any further claim or request for equitable adjustment of any type, for any reasonably foreseeable cause that shall arise out of, or as a result of, this Change Order and/or its impact on the remainder of the Work under the Contract.

**Recommended by (Engineer)** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Accepted by (Contractor)** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Approved by (Owner)** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Remarks** \_\_\_\_\_



## CONTRACT APPENDIX

### 1. Definitions

Wherever words or phrases defined here, or pronouns used in their stead, occur in any of the contract documents, they shall have the meanings here given:

- A. The word "Owner" shall mean the RUBIDOUX COMMUNITY SERVICES DISTRICT, P.O. Box 3098, Jurupa Valley, CA 92519, Riverside County, California and shall include Owner's officers, agents, consultants, and employees acting within their authority.
- B. The word "Contractor" shall mean the successful bidder who is entering into this contract with the RUBIDOUX COMMUNITY SERVICES DISTRICT, for the furnishing of the material, equipment, and/or services specified in this contract, and the legal representatives of said party, or the agent appointed to act for said party in the execution of the contract. Said party is referred to throughout the contract documents as if of the singular number and the masculine gender.
- C. The word "Engineer" shall mean the Registered Professional Engineer designated by Owner to give the Work general engineering supervision.
- D. The phrase "Owner Property" shall mean the Work site(s) upon which Contractor shall be required to perform under the contract including property owned in-fee by Owner or upon which it holds an appropriate lease, license, or encroachment permit.
- E. The phrase "Contract Documents" shall mean the Notice Inviting Bids, Bidding Documents including addenda or bulletins, executed Contract forms including, but not limited to, bonds, insurance, and endorsements, Contract Appendix, Special Requirements, Basic Specifications, Technical Specifications, and Contract Drawings including Construction and Standard Drawings.
- F. The word "Work" shall mean the construction to be performed pursuant to the Contract.
- G. The phrase "Liquidated Damages" as defined under Section 21 of this Contract Appendix shall be the amount specified in Paragraph B.2 of the Contract.
- H. The word "County" wherever used shall mean the County in which the Work is situated.

### 2. Authority of Owner

- A. Power of Decision. Owner shall decide every question regarding the interpretation of the Contract Documents or the true meaning or import of any provisions contained herein. A dispute which arises from Owner's final decision shall be submitted to independent arbitration, if mutually agreeable to the parties; otherwise by litigation in a court of competent jurisdiction.
- B. No Power to Waive Contract. It is expressly agreed that Owner shall not have any power to waive the obligation of the contract for the performance of work and/or furnishing by Contractor of the equipment and/or material conforming to the Contract Documents.
- C. Access to Contractor's Plant. Owner shall at all times have immediate access to all parts of Contractor's plant(s) where the production of any equipment and/or material for delivery under this agreement is in progress and shall be afforded there, without charge to Owner, full facilities for determining that all said equipment and/or material is being produced so as to comply strictly with the Contract Documents.

- D. Access to the Work Site. Owner shall at all times have immediate access to the Work site and to all parts of Contractor's plant used in conjunction with work being performed hereunder on Owner property and shall be afforded there, without charge to Owner, full facilities for determining that all said work is being performed so as to comply strictly with the Contract Documents. Such use or inspection shall not constitute acceptance of work.

### 3. **Contract Document Priority**

In the event of any inconsistency between discrete portions of the Contract Documents, the following documents first listed shall govern over all other documents subsequently listed, according to the following priority:

- A. Contract Change Orders issued during the course of the Work.
- B. Addenda and Bulletins issued during the bidding process.
- C. Contract
- D. Construction Drawings.
- E. Special Requirements.
- F. Technical Specifications.
- G. Basic Specifications.
- H. Standard Drawings as included or referenced.
- I. Contract Appendix, specifically the applicable provisions therein.
- J. Available or referenced reports.

### 4. **Contractor Responsibility**

- A. Legal Address. Contractor shall provide, at the end of Contractor's proposal herein, an address which shall be the place to which all notices, letters, and other communications to Contractor shall be mailed or delivered. The mailing to or delivering at the above-named place of any notice, letter, or other communication to Contractor shall be deemed sufficient service thereof upon Contractor. The date of service shall be the date of such mailing or delivery. Such address may be changed at any time by a written notice signed by Contractor and hand delivered to Owner. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon Contractor personally.
- B. License Classification. Pursuant to Section 7059 of the Business and Professions Code, Contractor (bidder) must have a license classification which is sufficient to permit him to perform a majority of the Work. The Owner has determined and set forth in the Notice Inviting Bids the class of license necessary for this project. If the bidder is a specialty contractor, the bidder is alerted to the requirements of the Business and Professions Code Section 7059.
- C. Contractors' State License Board Notice. Contractors are required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against contractors if a complaint regarding a patent act or omission is filed within four years of the date of the alleged violation. A complaint regarding a latent act or omission pertaining to structural defects must be filed within 10 years of the date of the alleged violation. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, CA 95826.
- D. Cooperation with Owner. Contractor shall comply with all orders of Owner in regard to maintaining adequate progress, but neither the making of such demands nor the failure of Owner to make such demands shall relieve Contractor of his obligation to secure the quality of equipment and/or material and/or performance of work and the rate of delivery of said equipment and/or material and/or completion of work as stipulated in the Contract, and Contractor alone shall be responsible for the safety, efficiency, and adequacy of Contractor's plant, equipment, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance, or operation.



- E. Examination of Site and Documents. Contractor acknowledges and warrants that he has examined the Contract Documents, and all available or referenced reports, and has visited and examined the delivery route(s) and the installation site for equipment and/or materials which he has agreed to supply herein, and/or the Work site upon which he has agreed to perform herein and is familiar with local conditions which may affect the manufacture and delivery of the said equipment and/or materials, and/or performance of said work, and that except as provided herein, he will make no claims for additional compensation over and above the quotations set forth in the Bidding Documents because of difficulties, real or anticipated.

Contractor is hereby advised that all available or referenced reports that are furnished to and are reviewed by Contractor are intended to provide general, not specific, information to assist Contractor in understanding the Work. These reports shall not be considered comprehensive, exhaustive, or conclusive; they shall be considered advisory only. Information contained in any available or referenced report shall not relieve Contractor of his obligation to perform the Work as specified herein.

Contractor is hereby advised that any available or referenced geological report that provides geotechnical data describing geologic conditions and material characteristics at the Work site shall not be considered a warranty of geologic conditions and material characteristics to be encountered in performing the Work. The geotechnical information shall be limited to and not extrapolated beyond the borings, excavations, holes, and pits constructed, examined, or used in the geotechnical investigation. Contractor shall determine, to his satisfaction, all geologic conditions which may affect the Work as specified herein and Contractor shall conduct all necessary geologic investigations to make that determination.

- F. Contractor to Furnish Information. Before erecting any construction plant, including sheeting, bracing, and other temporary structures upon property of Owner, Contractor shall furnish Owner with information and drawings of all such structures as may be required by Owner. Contractor shall furnish, and submit for approval, drawings and prints in such detail as may be required for articles, machinery, or fabricated materials entering into permanent construction, which are by the Contract Documents required to be furnished by Contractor. Once approved, said drawings and prints shall become property of Owner; however, such approval shall not operate to waive or modify any provision or requirement contained in the Contract Documents.
- G. Contract Documents. Contractor shall keep at the Work site the Contract Documents and shall at all times give Owner access thereto. Contractor shall check all dimensions and quantities contained in the Contract Documents and he shall notify Owner of any errors which are discovered by examining and checking said Contract Documents. He shall not take advantage of any error or omission in the Contract Documents. For those portions of the Contract Documents specifically describing the Work, Owner will furnish full instructions should such error or omission be discovered and Contractor shall carry out such instructions as if originally specified.
- H. Risk of Loss. Until by formal acceptance by Owner of the Work of Contractor hereunder either by furnishing equipment and/or materials or by performance of work, Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. Contractor shall rebuild, repair, restore, replace, and make good all injuries or damages to any portion of that which he is to improve, provide, or complete hereunder occasioned by any of the above causes before completion and acceptance and shall bear the expense thereof, except for such injuries or damages as are occasioned by acts of the Federal Government and the public enemy, and only to the extent of five (5) percent of the Contract amount where such injuries or damages are proximately caused by an act of God (an earthquake in excess of magnitude 3.5 on the Richter Scale or a tidal wave) as defined in Public Contract Code Section 7105. In case of suspension of work from any cause whatsoever, Contractor shall be responsible for all equipment and/or materials then upon Owner property and shall properly store them, if necessary, and shall erect temporary structures where necessary in so doing. Nothing in this Contract shall be considered as vesting in Contractor any right of property in materials used

after they have been attached or affixed to the Work or Owner property, but all such materials shall, upon being so attached or so affixed, become property of Owner.

- I. Copyrights and Patents. Contractor shall and does hereby hold and save Owner harmless from liability of any nature and kind, including costs and expenses, for or on account of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance, manufactured, furnished, or used by him in the performance of this Contract, including use by Owner, unless otherwise specifically stipulated in this Contract.
- J. Contractor's Personal Attention and Supervision. Contractor shall give his personal attention constantly to the faithful prosecution of the Work, and shall be present, either in person or by a duly authorized and competent representative, on the site of the Work, continually during progress of any work hereunder upon Owner property, to receive directions or instructions from Owner. Whenever Contractor is not present on any part of the Work where it may be desired to give directions, orders may be given by Owner and shall be received and obeyed by the superintendent or foreman who may have charge of the particular part of the Work in reference to which orders are given.
- K. Materials, Workmanship, and Tests. All materials furnished by Contractor shall be new and of the best quality for their particular use. Pursuant to Public Contract Code Section 20676, sellers of "mined materials" must be on an approved list of sellers published pursuant to Resources Code Section 2717(b) in order to supply mined material for this Contract. Work shall be performed by skilled workmen fully qualified for their trade, and shall be subject to the approval of Owner.

Contractor shall submit to Owner samples, specimens, or test pieces of such materials to be furnished or used in the Work as Owner may require. All materials must be of the specified quality and equal to approved sample, if samples have been submitted. All work shall be done and completed in a thorough, workmanlike manner, notwithstanding any omission from the Contract Documents.

Contractor shall furnish, without cost to Owner, such quantities of concrete, concrete aggregates, and other construction material as may be required for test purposes and shall place at Owner's disposal all available facilities for and cooperate with him in the sampling and testing of all materials and workmanship.

- L. Laws and Regulations. Contractor shall keep himself fully informed of all laws, ordinances, and regulations in any manner affecting those engaged or employed on the Work, or the materials used in the Work, or in any way affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over the Work. If any discrepancy or inconsistency should be discovered in the Contract Documents in relation to any such law, ordinance, regulation, order, or decree, Contractor shall forthwith report the same in writing to Owner. He shall at all times himself observe and comply with and shall cause all his agents and employees to observe and comply with all such applicable laws, ordinances, regulations, orders, and decrees in effect or which may become effective before completion of the Work; and shall protect and indemnify Owner and its officers and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself, by his employee, or by a subcontractor. Except as otherwise explicitly provided elsewhere in the Contract Documents, all permits and/or licenses necessary for the prosecution of the Work shall be secured by Contractor at his own expense, and he shall pay all taxes properly assessed against his equipment or property used or required in connection with the Work.
- M. Removing Obstructions and Maintenance of Existing Improvements. When the Work hereunder involves performance upon Owner property, and when the proper completion of said Work requires their temporary or permanent removal, Contractor shall, at his own expense, remove, and without unreasonable delay temporarily or permanently replace or relocate in a workmanlike manner and to the satisfaction of Owner and of any other person or agency having jurisdiction, all water pipes, gas pipes, drainage lines, irrigation lines, sewer lines, pipelines, conduits, culverts,

roads, driveways, fences, bridges, railroad tracks, wires, poles, towers, retaining walls, buildings, curbs, gutters, concrete walks, trees, shrubs, lawns, and all other improvements of whatsoever character not required by law to be removed by Owner thereof; and all such improvements temporarily removed shall be maintained until permanently replaced, all at Contractor's expense.

Where the Work is to be constructed in or adjacent to areas which have been improved by lawns, trees, shrubs, or gardens, Contractor shall remove such trees or plants as may be necessary for the prosecution of the Work and give them proper care and attention until the Work has been satisfactorily completed, after which Contractor shall replace them in as nearly the original condition and location as is reasonably possible. Where it is necessary to deposit excavated materials on lawns during the process of construction, Contractor shall first lay burlap or canvas on the lawns to prevent contact between the excavated material and the lawns.

Unless otherwise indicated in the Contract Documents, all utility lines, conduits, wires, or structures shall be maintained by Contractor and shall not be disturbed, disconnected, or damaged by him during the progress of the Work, provided, that should Contractor in the performance of the Work disturb, disconnect, or damage any of the above, all expenses arising from such disturbance or in the replacement or repair thereof shall be borne by Contractor. However, in accordance with Section 4215 of the California Government Code, Contractor shall be compensated for costs of locating and repairing damage to main or trunkline utility facilities located on the Work site and for costs of operating equipment on the Work site necessarily idled during such work where Contractor has exercised reasonable care in removing or relocating utility facilities which are inaccurately indicated in the Contract Documents.

With regard to subsurface installations, locating of utilities shall be in conformance with Government Code Section 4216 set seq. Contractor shall, at least two (2) working days but no more than fourteen (14) calendar days before commencing any excavation on the Work, notify the regional notification center (i.e. Underground Service Alert) of its intent to excavate. Contractor shall also obtain from the regional notification center an inquiry identification number and maintain an active and valid inquiry identification number throughout the course of the Work. Contractor shall have the inquiry identification number validated and revalidated as necessary to have operators approximately locate their subsurface installations during the course of the Work. Contractor shall delineate with delineators or suitable markings, including white paint if appropriate, areas to be excavated. Following the approximate locations of subsurface installations, Contractor shall determine the exact locations of the subsurface installations by excavating with hand tools before using any power operated or power driven equipment within the approximate locations of the subsurface installations, except that power operated or power driven equipment may be used for the removal of existing pavement which does not contain any subsurface installations.

N. Hazardous Conditions. Contractor shall promptly, within three (3) calendar days, notify Owner, in writing, of the following Work site conditions upon their discovery and before they are disturbed:

- 1) subsurface or latent physical conditions at the site differing from those indicated in the Contract Documents; or
- 2) unknown physical conditions at the site of any unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the Work specified in the Contract Documents; or
- 3) material differing from that indicated in the Contract Documents which Contractor believes may be hazardous waste, as defined in Section 25117 of the California Health & Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law.

Contractor's failure to provide written notification promptly on discovery and before disturbance shall constitute a waiver of all claims in connection therewith.

Upon such notification, Owner shall promptly investigate such conditions. If Owner finds that the reported conditions materially differ, or involve hazardous waste, and cause a decrease or increase in Contractor's cost of, or the time required for, performance of any part of the Work, Owner shall issue a change order pursuant to the procedures described in this Contract. Owner will advise Contractor in writing if such conditions do not warrant the issuance of a change order. If Contractor disagrees with Owner's determination, Contractor shall so advise Owner in writing.

In the event a dispute arises between Owner and Contractor as to whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in Contractor's cost of, or time required for, performance of any part of the Work, Contractor shall not be excused from any scheduled completion date specified by this Contract, but shall proceed with all work to be performed under this Contract. Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

- O. Pursuant to Public Contract Code Section 6109, contractors or subcontractors who are ineligible to perform work on a public works project as determined by the Department of Industrial Relations pursuant to Section 1777.1 or Section 1777.7 of the California Labor Code shall not perform any portion of the work contemplated herein. Any subcontract between the Contractor and an ineligible subcontractor shall be void as a matter of law, and the ineligible subcontractor shall not receive any payment for performing such work. Any public money that has been paid to the ineligible subcontractor on the project shall be returned to the Owner. The Contractor shall be responsible for the payment of wages to workers of an ineligible subcontractor who has been allowed to work on the project.
- P. Iran Contracting Act. Pursuant to Public Contract Code Sections 2200-2208, if this Contract is in the amount of \$1,000,000 or more, the Contractor shall have certified at the time of submission of its bid that it is not identified in the list established pursuant to Public Contract Code Section 2203, unless otherwise exempt from the requirement to so certify.
- Q. Independent Contractor. Contractor shall be an independent contractor for Owner and not an employee. Contractor understands and agrees that it and all of its employees shall not be considered officers, employees, or agents of Owner and are not entitled to benefits of any kind normally provided employees of Owner, including but not limited to, state unemployment compensation or workers' compensation. Contractor assumes full responsibility for the acts and omissions of its employees or agents related to the Work.

## 5. Contractor's Liability

- A. Contractor shall be responsible, and Owner shall not be answerable or accountable in any manner, for any loss or damage that may happen to the Work to be performed hereunder by Contractor, subcontractors, or those associated with or working under Contractor, or for any materials or equipment used or employed in performing the Work, or for injury to any person or persons, including employees, the public or others, or for damage to property from any cause other than the Owner's sole negligence, willful misconduct, or active negligence.
- B. To the fullest extent permitted by law, Contractor shall immediately defend (with counsel of the Owner's choosing), indemnify and hold harmless the Owner, its officials, officers, employees, agents, and authorized volunteers, and each of them from and against:
  - 1. Any and all claims, demands, causes of action, costs, expenses, injuries, losses or liabilities, in law or in equity, of every kind or nature whatsoever, but not limited to, injury to or death, including wrongful death, of any person, and damages to or destruction of property of any person, arising out of, related to, or in any manner directly or

indirectly connected with the Work or this Contract, including claims made by subcontractors for nonpayment, including without limitation the payment of all consequential damages and attorney's fees and other related costs and expenses, however caused, regardless of whether the allegations are false, fraudulent, or groundless, and regardless of any negligence of the Owner or its officials, officers, employees, agents, or authorized volunteers (including passive negligence), except such loss or damages caused by the sole negligence or willful misconduct or active negligence of the Owner or its officials, officers, employees, or authorized volunteers.

2. Contractor's defense and indemnity obligation herein includes, but is not limited to damages, fines, penalties, attorney's fees and costs arising from claims under the Americans with Disabilities Act (ADA) or other federal or state disability access or discrimination laws arising from Contractor's Work during the course of construction of the improvements or after the Work is complete, as the result of defects or negligence in Contractor's construction of the improvements.
  3. Any and all actions, proceedings, damages, costs, expenses, fines, penalties or liabilities, in law or equity, of every kind or nature whatsoever, arising out of, resulting from, or on account of the violation of any governmental law or regulation, compliance with which is the responsibility of Contractor.
  4. Any and all losses, expenses, damages (including damages to the Work itself), attorney's fees, and other costs, including all costs of defense which any of them may incur with respect to the failure, neglect, or refusal of Contractor to faithfully perform the Work and all of Contractor's obligations under Contract. Such costs, expenses, and damages shall include all costs, including attorney's fees, incurred by the indemnified parties in any lawsuit to which they are a party.
- C. Contractor shall indemnify, defend, and hold Owner harmless from any and all claims, demands, fines, and penalties imposed or levied by any Federal, State, or local agency associated with or related to the taking (as defined by the United States Fish and Wildlife Service and, or the California Department of Fish and Game) of any protected animal or plant species or habitat by Contractor, subcontractors, or those associated with or working under Contractor.
- D. Contractor shall immediately defend, at Contractor's own cost, expense and risk, with the counsel of the Owner choosing, any and all such aforesaid suits, actions or other legal proceedings of every kind that may be brought or instituted against the Owner or its officials, officers, employees, agents, or authorized volunteers. Contractor shall pay and satisfy any judgment, award or decree that may be rendered against the Owner or its officials, officers, employees, agents, or authorized volunteers, in any such suit, action or other legal proceeding. Contractor shall reimburse the Owner and its officials, officers, employees, agents, and authorized volunteers for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. The only limitations on this provision shall be those imposed by Civil Code section 2782.
- E. The provisions of this Section shall survive the termination of this Contract howsoever caused, and no payment, partial payment, or acceptance of occupancy in whole or part of the Work shall waive or release any of the provisions of this Section. Contractor's obligation to indemnify the Owner shall not be restricted to insurance proceeds, if any, received by the Owner and its officials, officers, employees, agents, and authorized volunteers.
- F. Until final disposition of any claims, demands, fines, penalties, and suits made for such loss, damage, or take, Owner may retain as much from amounts still unpaid under the Contract as may be necessary to assure enforcement of this provision.

## **6. Safety**

In accordance with generally accepted construction practices, Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the Work. Said requirement shall apply continuously and not be limited to normal working hours. Contractor's duty to preserve safety shall include, but not be limited to: placement and use of guards; erection and maintenance of temporary fences, bridges, railings and barriers; placement, maintenance, and operation of needed lights and signals; and all other precautions and measures required by applicable laws and regulations, including but not limited to those specified by Title 8 of the California Code of Regulations and enforced by the California Occupational Safety and Health Administration (Cal/OSHA).

Before excavating any earth or soil to a depth of five (5) feet or more, Contractor shall, pursuant to Labor Code Section 6705, submit to the Owner detailed drawings (hereafter referred to as excavation safety drawings) showing design of shoring, bracing, sloping, or other provisions to be made for worker, individual, or property protection. Said excavation safety drawings shall comply with OSHA Construction Safety Orders (Cal/OSHA or Federal OSHA, whichever is applicable at time of construction) and shall be prepared and certified by a registered civil or structural engineer, engaged by Contractor at his expense, who shall affix his signature and seal to each sheet of said excavation safety drawings. Contractor shall not excavate until the Owner has received and acknowledged properly certified excavation safety drawings. Contractor shall comply with all other applicable requirements of Labor Code Section 6705 and, as therein provided, no requirements of that Section shall be construed to impose tort liability on Owner or Owner's representatives, including Owner's Engineer.

Contractor shall advise Owner of intended use, production, or storage of all materials or substances which contain one (1) or more ingredients or components which are listed in the "Chemical Cross-Index", latest edition, published by the State of California Office of Environmental Protection, Office of Hazardous Materials Data Management, P.O. Box 2815, Sacramento, CA, 95812. In addition, Contractor shall furnish with other Contract submittal documents Material Safety Data Sheets (MSDS) for all said materials or substances which may be used, produced, or stored on the jobsite.

Any duty on the part of the Engineer to give general engineering supervision of Contractor's performance is not intended to and shall not include the review of the adequacy of Contractor's safety measures. Nothing herein shall relieve Contractor of his sole and complete responsibility for safety conditions on the jobsite.

Owner's project relationship may or may not include direct on-site observation of Contractor's work. Even if on-site observation is provided, continuous presence of Owner's representatives shall not be an obligation under this Contract and shall not be expected. Furthermore, no special training or knowledge in the specific area of safety engineering or safety practices shall be required or expected of Owner's representatives.

## **7. Trespass**

Contractor shall be responsible for all damage or injury which may be caused on any property by trespass by Contractor, his agents, employees, or subcontractors in the course of performance of the Work hereunder, whether said trespass was committed with or without the consent or knowledge of Contractor.

## **8. Bonds, Insurance, and Endorsements**

Contractor shall furnish bonds issued on the forms provided in these Contract Documents by a bonding company (surety) admitted in and regulated by the State of California, and by the United States Treasury if the work or project is financed in whole or in part with federal grant or loan funds, as approved by Owner, prior to commencement of the Work hereunder.

Contractor shall maintain for the duration of the Contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with performance of the Work by Contractor, its agents, associates, representatives, employees, and subcontractors of every tier and their agents, associates, representatives, and employees.

Contractor shall not commence work under this Contract until it has secured all specified and required insurance. Also, Contractor shall not allow any subcontractor to commence work on any subcontract until the subcontractor has secured similar insurance, as appropriate to the subcontract work, with limits no less than those specified for Contractor. Contractor shall be responsible for type and form of all subcontractor's insurance for the benefit of Contractor and Owner. Further, Contractor shall be responsible to Owner for any deficiencies in subcontractor's insurance.

In accordance with Section 3700 of California Labor Code, Contractor shall, at its expense, (a) maintain adequate Workers' Compensation Insurance under the laws of the State of California for all labor employed by Contractor or any subcontractor, or (b) secure from the Director of Industrial Relations a certificate to self-insure such labor, when such labor comes within the protection of such Workers' Compensation Insurance Laws. In addition, Contractor shall, at its expense, maintain Employer's Liability Insurance with limits of \$1,000,000 each for bodily injury by accident (each accident), bodily injury by disease (policy limit), and bodily injury by disease (each employee).

In addition to Worker's Compensation and Employer's Liability Insurance, Contractor shall, at its expense, maintain in effect at all times during the performance of the Work at least the following, or equivalent, insurances and limits, unless otherwise specified in the Contract Certificate of Insurance set forth in the Contract Documents.

- A. Business or commercial automobile liability, with a combined single limit of \$1,000,000 per accident for bodily injury and property damage, covering all owned, non-owned, borrowed, and/or hired vehicles used by or for the benefit of Contractor.
- B. Commercial or comprehensive general liability, with an occurrence limit of \$1,000,000 and a general aggregate limit of \$2,000,000 for bodily injury, personal injury, and property damage, covering premises and operations, products and completed operations, blanket contractual (oral and written), independent contractors, owners and contractors protective, and, if applicable to the Work, collapse, explosion, and underground hazards.

Both the occurrence and general aggregate limits shall apply on a project basis.

- C. Excess or umbrella liability with coverage for automobile and general liability at limits sufficient to meet the specified insurance requirements set forth in the Contract Documents.
- D. Course of construction, or alternatively, installation floater where permitted by Owner, with limits of liability equal to the full Contract amount. Course of construction insurance shall, at a minimum, cover perils of fire and lightning, extended coverage, vandalism and malicious mischief. It shall also cover perils of theft of installed and uninstalled materials and other perils if additionally specified in the Contract Certificate of Insurance and the Contract Insurance Endorsement.

With respect to the automobile, general, and excess liability insurance specified above, Owner, its officials, officers, managers, agents, engineers, employees, and volunteers shall be covered as additional insureds, but only while acting in their capacities as such, for liability arising from or in connection with the performance of the Work by Contractor, its agents, associates, representatives, employees, and subcontractors of every tier. With respect to course of construction or installation floater insurance, Owner shall be covered as additional insured. Contractor's insurer(s) shall waive rights of subrogation against additional insureds.

Contractor's insurance shall be primary for all additional insureds with respect to the performance of Contractor, those associated therewith, and those working thereunder, and any like insurance of said additional insureds shall be excess and not contributing insurance with respect to insured claims under Contractor's policies. Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought.

Contractor's insurance shall not be cancelled, reduced in scope, suspended, terminated, or voided in coverage, nor shall the limits of liability be reduced [except for reductions in the general aggregate caused by claim(s), in which case insurer shall immediately notify Owner of reduction in general aggregate limits resulting from such claim(s)] unless thirty (30) days prior notice, by certified mail return receipt requested, has been given to Owner. Any failure to comply with reporting provisions of policies, including breaches of warranties, shall not affect coverage provided to additional insureds.

Promptly upon execution of the Contract and prior to commencement of any work, Contractor shall furnish Owner with certificates of insurance for all applicable policies required hereunder on the Contract certificate form, or alternatively, on an ACORD certificate form issued by the insurer(s) provided it contains the same information and statements, by notations thereon or addenda thereto. The certificates shall be signed on behalf of the insurer(s) by an authorized representative thereof.

In addition, Contractor shall promptly furnish Owner with insurance endorsements for all applicable policies to reflect the additional insured, primary and not contributing insurance, and waiver of subrogation requirements specified herein, as well as any coverage necessary to augment insurance policies to meet requirements specified herein, on the Contract Insurance Endorsement form, or alternatively, on standard insurance endorsement forms provided they contain the same information and statements or are amended to satisfy the same requirements as set forth in the Contract Insurance Endorsement form. The endorsements shall be signed on behalf of the insurer(s) by an authorized representative thereof.

Contractor agrees, upon written request, to furnish Owner with certified copies of policies and/or endorsements executed by authorized representative(s) of the insurer(s).

All insurance issued under the provisions of this section shall be issued in forms consistent with industry standards and by insurers having a Best's Rating of at least "A(VII)", all as approved by Owner, prior to commencement of the Work hereunder.

## **9. Agents of Owner Not Personally Liable**

No agent of Owner shall be personally responsible for any liability arising under this Contract, and no claim shall be made or filed, and neither Owner nor any of its agents shall be liable for or held to pay any money, except as specifically provided in this Contract.

## **10. Subcontracts**

- A. Contractor represents and warrants that he has read and is familiar with the provisions of The Subletting and Subcontracting Fair Practices Act (Public Contract Code Sections 4100, et. seq.), which are incorporated herein and made a part hereof by this reference.
- B. A copy of each subcontract, if in writing, or if not in writing then a written statement signed by Contractor, giving the name of the subcontractor, and the terms and conditions of such subcontract, shall be filed with Owner before the subcontractor commences performance of the Work. Each subcontract shall contain a reference to the agreement between Owner and Contractor, and the terms of that agreement and all parts thereof shall be made a part of such subcontract insofar as applicable to the Work covered thereby. Each subcontract shall provide for its annulment by Contractor at the order of Owner, if, in Owner's opinion, the subcontractor fails to comply with the requirements of the principal Contract insofar as the same may be applicable to his work. Nothing herein contained shall create any contractual relation between any subcontractor and Owner or relieve Contractor of any liability or obligation hereunder.
- C. Contractor is hereby alerted to provisions of Section 7107 of the Public Contract Code, requiring Contractor to pay to each of its subcontractors from whom retention has been withheld, each subcontractor's share of the retention received, within ten (10) days from receipt of all or any portion of such retention proceeds from Owner.



D. Pursuant to Public Contract Code Section 6109, subcontractors who are ineligible to perform work on a public works project as determined by the Department of Industrial Relations pursuant to Section 1777.1 or Section 1777.7 of the California Labor Code shall not perform any portion of the work contemplated herein. Any subcontract between the Contractor and an ineligible subcontractor shall be void as a matter of law, and the ineligible subcontractor shall not receive any payment for performing such work.

**11. Assignment Forbidden**

Contractor shall not assign, transfer, convey, or otherwise dispose of this Contract, or of his right, title or interest in or to the same or any part hereof, without the previous consent in writing of Owner; and he shall not assign by power of attorney, or otherwise, any of the monies to become due and payable under the Contract, unless by and with the like consent signified in like manner. If Contractor shall, without such previous written consent, assign, transfer, convey, or otherwise dispose of the Contract, or of his right, title or interest therein, or of any of the monies to become due under the Contract to any other person, company, or other corporation, the Contract may, at the option of Owner, be terminated and revoked, and Owner shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to Contractor, and to his assignee or transferee. No right under the Contract, nor any right to any money to become due hereunder, shall be asserted against Owner in law or equity by reason of any so-called assignment of the Contract, or any part thereof, or by reason of the assignment of any monies to become due hereunder, unless authorized as aforesaid by the written consent of Owner.

**12. Lines, Grades, and Measurements**

Unless otherwise provided in the Special Requirements, any and all lines and grades will be furnished by Owner. Contractor shall provide such materials and give such assistance as may be required. Contractor shall preserve all bench marks, monuments, survey marks, and stakes upon Owner property, and in case of their removal or destruction by him, his employees, or subcontractors, he shall be liable for the cost of their replacement. Contractor shall keep Owner informed, a reasonable time in advance, of the times and places at which he intends to do work, in order that lines and grades may be furnished, that inspection may be provided, and that necessary measurements for record and payment may be made with the minimum of inconvenience to Owner or delay to Contractor. Whenever Owner finds it necessary to carry on his operations outside of regular working hours or at other times when the Work of Contractor is not in progress, Contractor shall furnish all necessary service and assistance. No payment shall be made to Contractor for any of the Work or delay occasioned by giving lines and grades, or making other necessary measurements, or by inspection.

**13. No Discrimination**

Contractor shall not discriminate in the employment of persons upon the Work because of the age, ancestry, color, race, sex, marital status, national origin, mental disability, physical disability, or religious creed of such persons, or as otherwise prohibited by law, except as provided by Government Code Section 12940. Contractor shall cause an identical clause to be included in every subcontract for the Work.

**14. Legal Day's Work**

Pursuant to the California Labor Code, eight (8) hours of labor shall constitute a legal day's work, and the time of service of any worker employed on the Work shall be limited and restricted to eight (8) hours during any one (1) calendar day and forty (40) hours in any one (1) calendar week except when payment for overtime is made in accordance with Labor Code Section 1815. Contractor or any subcontractor shall, as a penalty to the Owner, forfeit twenty-five (\$25.00) for each worker employed in the execution of this Contract by the respective Contractor or subcontractor for each calendar day during which the worker is required or permitted to work more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one calendar week in violation of the provisions of this article. Contractor shall be responsible for ensuring compliance with this and all other provisions of the Labor Code.

## 15. Prevailing Rates of Wages

The Contractor is aware of the requirements of Labor Code sections 1720 *et seq.* and 1770 *et seq.*, as well as California Code of Regulations, Title 8, Section 16000 *et seq.* ("Prevailing Wage Laws"). As indicated in the Notice Inviting Bids, Owner has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the general prevailing rate for holidays and overtime work in the locality in which work is to be performed for each craft, classification, or type of worker needed to execute the Contract, a copy of which is hereby incorporated by reference into this Contract Appendix. Copies of the prevailing rates of per diem wages are on file at Owner's office and are available to any interested party. Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification, or type of worker needed to perform work on the project available to interested parties upon request, and shall post copies at the Contractor's principal place of business and at the project site. Contractor shall defend, indemnify and hold Owner, its officials, officers, employees and authorized volunteers free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws.

Contractor shall forfeit to Owner, as a penalty, \$200.00 for each calendar day, or a portion thereof, for each worker paid less than said per diem wage for any work done under the Contract by him or by any subcontractor under him in violation of the provisions of the California Labor Code. It is hereby stipulated by and between Owner that Contractor will comply with provisions of California Labor Code, Section 1775. All wages and penalties withheld for failure by Contractor to pay said per diem wages shall be withheld and retained by Owner to the extent authorized or required by the Labor Code.

Contractor shall keep accurate payroll records on forms provided by the Division of Labor Standards Enforcement, or alternatively, Contractor shall keep accurate payroll records containing the same information. Said information shall include, but not be limited to, a record of the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and actual per diem wages paid to each journeyman, apprentice, or worker employed by Contractor. Such records shall be available for inspection at all reasonable hours, and a copy shall be made available to employee or his authorized representative, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards in compliance with California Labor Code, Section 1776. Upon written notice from Owner or the Division of Labor Standards Enforcement, Contractor shall within ten (10) days file with Owner a certified copy of the payroll records. Contractor shall cause an identical clause to be included in every subcontract for the Work. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency, Owner, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the Contractor awarded the Contract or performing the contract shall not be marked or obliterated. Should noncompliance still be evident after such 10-day period, the Contractor shall pay a penalty of one hundred dollars (\$100.00) to Owner for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payment then due.

In accordance with Labor Code section 1771.4, Contractor and each subcontractor shall furnish certified payroll records directly to the Department of Industrial Relations on a weekly basis and in the format prescribed by the Department of Industrial Relations. Contractor shall comply with all requirements and regulations from the Department of Industrial Relations relating to labor compliance monitoring and enforcement.

Contractor shall have an affirmative obligation to verify that all subcontractors are currently and validly registered with the Department of Industrial Relations to perform public work and shall not permit a subcontractor of any tier to perform work on the project without first verifying the subcontractor's Public Works Contractor Registration. Contractor shall include the requirements of Labor Code sections 1725.5 and 1771.1 in all contracts with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain valid registration for the duration of the project.

Any stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor that affect Contractor's performance of Work, including any delay, shall be Contractor's sole responsibility. Any delay arising out of or resulting from such stop orders shall be considered Contractor caused delay subject to any applicable liquidated damages and shall not be compensable by Owner. Contractor shall defend, indemnify and hold Owner, its officials, officers, employees and agents free and harmless from any claim or liability arising out of stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor.

**16. Mandatory Certification of Contractor and Employment of Apprentices**

This Contract shall not prevent the employment of properly indentured apprentices in accordance with the California Labor Code, and no employer or labor union shall refuse to accept otherwise qualified employees as indentured apprentices on the Work performed hereunder solely on the grounds of age, ancestry, color, race, sex, marital status, national origin, mental disability, physical disability, religious creed, or other protective classification. Every qualified apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade in which he or she is employed, and shall be employed only in the craft or trade to which he or she is indentured.

If California Labor Code Section 1777.5 applies to the Work, Contractor and any subcontractor hereunder who employs workers in any apprenticeable craft or trade shall apply to the joint apprenticeship council administering applicable standards for a certificate approving Contractor or subcontractor for the employment and training of apprentices. Upon issuance of this certificate, Contractor and any subcontractor shall employ the number of apprentices provided for therein, as well as contribute to the fund to administer the apprenticeship program in each craft or trade in the area of work hereunder.

The parties expressly understand that the responsibility for compliance with this Section 17 and with Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code in regard to all apprenticeable occupations lies with Contractor hereunder.

In accordance with Labor Code Section 1773.3, Owner will send notice of the award of this Contract to the Division of Apprenticeship Standards within five (5) days after award if the Contract is awarded to a general or specialty contractor in the amount of at least \$30,000.00 and involves work in an apprenticeable craft or trade.

**17. Payment of Wages**

The issuance as payment for wages of any evidence of indebtedness is prohibited unless the same is negotiable and payable on demand without discount. Wages must be paid at least semi-monthly on regular pay days established in advance, and shall include all amounts for labor or services performed by employees of every description, as required under the California Labor Code.

**18. Overtime - No Extra Compensation**

Overtime work, i.e., work in excess of eight (8) hours in any one (1) calendar day or forty (40) hours in any one (1) calendar week, or work performed on a Sunday or other legal holiday, shall not entitle Contractor to any compensation for any Contract item in addition to that stipulated in the Contract for the kind of work performed, even though such overtime or legal holiday work may be required under emergency conditions and may be ordered by Owner. In case of extra work ordered by Owner under the provisions hereof, no additional payment will be made to Contractor because of the payment by him of overtime or legal holiday rates for such work, unless the use of overtime or legal holiday rates in connection with such extra work is specifically ordered by Owner and then only to such extent as extra payment is regularly being made by Contractor to his men for overtime or legal holiday work of a similar nature in the same locality.

**19. Time and Order of Performance**

Time is of the essence to this Contract ("Time" is defined herein as the time(s) specified by the bidder in the Bidding Documents within which he would perform if awarded the Contract, and if there be no such

specific designation, "Time" shall be the time for completion designated in the Contract Completion Schedule located in the Special Requirements herein). Contractor shall at all times employ such force, equipment, plant, materials, and/or tools as will be sufficient, in the opinion of Owner, to complete the performance of the Contract and every part thereof within the time limit(s) fixed by the Contract. If, in the opinion of Owner, Contractor fails to employ sufficient force, equipment, plant, materials, and tools, or to maintain adequate progress toward meeting the said time limits, he may, after such failure, be required to increase the efficiency, capacity, or character of his equipment, or to modify his plans and procedure in such manner and to such extent as Owner may direct. No extension of time shall be made for ordinary delays and accidents, and the occurrence of such shall not relieve Contractor from the necessity of maintaining the required progress. If Owner grants an extension of time for completion of the Contract, as hereinafter provided, Owner may prescribe a revised schedule of progress in accordance with such extension of time.

It shall be understood and agreed by Contractor hereunder that no material shall be delivered and/or on site work commenced upon Owner property until Contractor is given written Notice to Proceed by Owner. It shall be further understood and agreed by Contractor that his performance hereunder must be coordinated by Owner with other work in progress in the immediate vicinity; that unavoidable delays may occur and that the time schedule as set forth on the Bidding Documents or designated in the Special Requirements shall be subject to adjustment by Owner, all at no additional cost to Owner.

## **20. Delays**

- A. If delay to the critical path results as the consequence of acts of God or other natural disaster occurring at the project site, terrorism or the acts of a public enemy, orders of the Government (including, without limitation, unreasonable and unforeseeable delay in the issuance of permits or approvals by governmental authorities that are required for the Work), strikes, fires, floods, freight embargoes, pandemics, epidemics or quarantine restrictions or other unforeseeable causes beyond the control and without the fault or negligence of Contractor (all of which shall be determined by Owner, whose determination and certification thereof shall be binding and conclusive upon Contractor), Contractor shall be entitled to additional time wherein to perform and complete the Contract on his part as Owner determines to be necessary and certifies in writing to be just.
- B. Application for extension of time must be made promptly in writing, stating cause. No delay shall be made the basis in any application for extension of time, unless Contractor calls such delay and the causes thereof to the attention of Owner in writing within ten (10) days of the beginning of such delay, and Contractor thereafter advises Owner in writing of the extent of such delay within ten (10) days of the end of such delay. Applications for extension of time shall be addressed to Owner.
- C. Permitting Contractor to continue and complete the delivery of the equipment and/or material or any part thereof after the date fixed herein for delivery to be completed or after expiration of any extension of said time, shall not operate as a waiver on the part of Owner of any of its rights under this Contract.
- D. Contractor shall receive no compensation on account of any suspension of deliveries, and/or performance of work either in whole or in part, or for any delay or hindrance herein mentioned, except as required by Public Contract Code Section 7102 or as provided elsewhere herein. Damages caused by unreasonable Owner delay shall be based on actual costs only, no proportions or formulas shall be used to calculate any delay damages.
- E. Nothing herein shall be construed to require Contractor to be responsible for the cost of repairing or restoring damage to the Work in excess of five (5) percent of the Contract amount, if such damage is proximately caused by an act of God (an earthquake in excess of magnitude 3.5 on the Richter Scale or a tidal wave) as defined in Public Contract Code Section 7105.

## **21. Liquidated Damages**

It is agreed by the parties to this Contract that in case all construction called for under the Contract is not completed per the Contract Completion Schedule herein, as extended by delays approved in accordance with the next-prior paragraph, damage will be sustained by Owner, and that it is, and will be impracticable or extremely difficult to ascertain and determine the actual damages Owner will sustain in the event of and by reason of such delay. It is, therefore, agreed that such damages shall be presumed to be the amount set forth in Paragraph B.2 of the Contract, and that Contractor will pay to Owner, or Owner may retain from amounts otherwise payable to Contractor said amount for each day after failure to meet the requirements of the Contract Completion Schedule herein.

Contractor will be assessed liquidated damages for each day after failure to meet the Contract Completion Date(s) or Schedule(s) until the Work has been completed. Payments made after the scheduled Contract Completion Date(s) or Schedule(s) shall not constitute a waiver of liquidated damages. In accordance with Government Code, Section 4215, Contractor shall not be assessed liquidated damages for any delay in completion of the Work if such delay is caused by failure of Owner to provide for removal or relocation of existing main or trunkline utility facilities not indicated in the Drawings or Specifications with reasonable accuracy.

## **22. Changes in Work**

- A. If Owner finds it impracticable for Contractor to comply with the Contract Documents in performance of work, Owner may alter or modify requirements or methods of said work; and for such purposes, Owner may, at any time during the life of the Contract, by written Contract change order on the form contained in the Contract section of the Contract Documents, make such changes as it shall then find necessary in the design, line, grade, form, location, dimensions, plan, or material of any part of the work, material, or equipment hereinafter specified or in the quantity or character of the work material, or equipment to be furnished.
- B. If such changes reduce the quantity or amount of work to be done, they shall not constitute the basis for claim(s) for damages or anticipated profits on the work eliminated; provided, that if such changes render useless any work already done or material or equipment already furnished or used in the Work, Owner shall make reasonable allowance therefor, which action shall be binding upon both parties.
- C. If such changes decrease the Work, the work actually done or materials or equipment actually furnished shall be paid according to unit price(s) or lump sum(s) listed for such work in the Bidding Documents. If such changes increase the Work, the additional work shall be considered extra work and shall be paid according to prices established as hereinafter provided for extra work.

## **23. Extra Work**

- A. Any extra work performed hereunder shall be subject to all of the provisions of the Contract and considered a part thereof, and Contractor's sureties shall be bound with reference thereto as under the original Contract. Contractor shall notify immediately its sureties of any changes in Contract Work and Contract amount. Contractor shall not perform any extra work unless authorized by Owner to do so in advance of performance. Owner will not pay for extra work unless covered by Contract Change Order. Contractor agrees that he shall not be entitled to impact costs, extended job costs, extended overhead costs, or construction acceleration costs related to any and all changes in the Work.
- B. If, during the performance of the Contract, it shall, in the opinion of Owner, become necessary or desirable for the proper completion of the Contract to order work done and/or materials and/or equipment furnished which, in the judgment of Owner, is of like character to and susceptible of classification under the unit price or lump sum items of the Contract as specified, the extra work shall be paid at the unit price(s) or lump sum(s) listed for such work in the Bidding Documents. Such extra work shall be ordered in writing before such work is started.

- C. If, during the performance of the Contract, it shall, in the opinion of Owner, become necessary or desirable for the proper completion of the Contract to order work done and/or materials and/or equipment furnished which, in the judgment of Owner, are not susceptible of classification under the unit price or lump sum items listed in the Bidding Documents, the extra work shall be paid at the unit prices or lump sums mutually established by the Owner and the Contractor. Such extra work shall be ordered in writing before such work is started.
- D. Whenever, in the judgment of Owner, the price for extra work, extra material, extra equipment, and extra subcontract work, as the case may be, cannot be agreed upon by the Owner and the Contractor or it is impracticable to fix the price before the extra work order shall be issued, extra work, material, equipment, and subcontract work, when furnished by Contractor, shall be paid at actual necessary cost of labor, materials, equipment, and subcontract work, plus (for profit, general expenses, excise taxes, property taxes, bond premiums, license and inspection fees imposed by any governmental authority, and all other items of expense, whether enumerated herein or otherwise) twenty percent (20%) of actual cost of labor and fifteen percent (15%) of actual cost each for materials, equipment, and subcontract work. Extra subcontract work shall be paid at actual necessary cost of labor, materials, and equipment, plus (for profit, general expenses, excise taxes, property taxes, license and inspection fees, and all other items of expense, whether enumerated herein or otherwise) twenty percent (20%) of actual cost of labor and fifteen percent (15%) of actual cost each for materials and equipment. Owner's determination and certification of said actual, necessary cost shall be binding and conclusive on Contractor, and Owner shall be deemed the arbiter to determine the cost of such work.

Labor costs for workers (including foremen) shall consist of employer paid actual wages, together with health and welfare, pension, vacation, holidays, and training, plus a surcharge for Workers' Compensation, Social Security, Medicare, Federal Unemployment, State Unemployment, and State Training taxes. Said surcharge shall be based on the labor surcharge set forth in the California Department of Transportation publication entitled "Labor Surcharge & Equipment Rental Rates" in effect during the performance of the Work.

Material costs shall consist of invoiced amounts or lowest current price at which such materials are locally available and delivered to the job site, plus sales taxes and freight and delivery charges. Owner reserves the right to approve materials and sources of supply. Owner also reserves the right to supply materials to the Contractor if necessary, but the Contractor shall not apply any markups to Owner furnished materials.

Regardless of ownership, equipment costs shall consist of rental rates set forth in the California Department of Transportation publication entitled "Labor Surcharge & Equipment Rental Rates" in effect during the performance of the Work. The rental rates shall include the cost of fuel, oil, lubrication, supplies, small tools, storage, necessary attachments, repairs and maintenance, depreciation and insurance, and all incidental expenses. Charges, other than the hourly rate, shall not apply to equipment already on the job site.

If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to the Owner than holding it at the work site, it shall be returned unless the Contractor elects to keep it at the work site at no cost to the Owner.

Copies of the California Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates" may be downloaded: <http://www.dot.ca.gov/hq/construc/equipmnt.html>.

If any work and/or materials and/or equipment is ordered by Owner under this section on an actual necessary cost basis, Contractor shall, while performing work and/or furnishing materials and/or equipment, render to Owner signed daily written reports within two (2) days of the end of the day in which the extra work was performed, on forms provided in the Contract section of the Contract documents, showing name and number of each worker employed thereon, number of hours employed thereon, character of work performed, wages paid or to be paid, materials and equipment delivered and used, quantity and character of such material and equipment, from whom

purchased, net amount paid or to be paid therefor, and such other information as directed by Owner.

If required by Owner, Contractor shall also produce copies of any books, invoices, receipts, vouchers, other records, or memoranda which will assist Owner in determining the true, necessary cost of work and materials furnished by Contractor within two (2) days of the Owner's request. Contractor shall certify in writing that the copies of the records conveyed are accurate and that they pertain to the actual extra work.

Owner will establish Contract Change Order amounts based on Owner review of the aforementioned Contractor supplied daily written reports, and if requested, other pertinent records. If Contractor fails to furnish said daily written reports and other pertinent records as requested within the aforementioned two (2) days as required, Owner will establish Contract Change Order amounts in the absence of the aforementioned reports and records and said Contract Change Order amounts shall be binding and conclusive on Contractor.

E. In the event Contractor requests a Contract Change Order for extra work required as a result of field conditions which are significantly different from those reasonably anticipated when the Contract was executed, such request shall be submitted to the Owner in writing no later than ten (10) days after Contractor discovers the circumstances causing the need for a Contract Change Order. It shall be accompanied by the following declaration, signed by the Contractor:

I, \_\_\_\_\_, (name of contractor's authorized representative) being the \_\_\_\_\_ (title of contractor's authorized representative) of \_\_\_\_\_ (contractor's name) ("Contractor"), declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached claim for additional compensation and/or extension of time, know its contents, and know said claim is made in good faith; the supporting data is truthful and accurate; the amount requested accurately reflects the contract adjustment for which Contractor believes the Owner is liable. I am familiar with California Penal Code Section 72 and California Government Code Sections 12560 et seq., pertaining to false claims, and I know and understand that submission or certification of a false claim may lead to fines, imprisonment, and/or other severe legal consequences.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

Submission of a claim, properly certified, with all required supporting documentation, and written rejection or denial of all or part of the claim by Owner, is a condition precedent to any action, proceeding, litigation, suit, or demand for arbitration by Contractor.

Contractor recognizes and acknowledges that timely submission of a Change Order request, whether or not the circumstances of the change may be known to Owner or available to Owner through other means, is not a mere formality but is of crucial importance to the ability of Owner to promptly identify, prioritize, evaluate and mitigate the potential effects of changes. Any form of informal notice, whether verbal or written (including, without limitation, statements in requests for information, statements in submittals, statements at any job meeting or entries on monthly reports, daily logs or job meeting minutes), that does not strictly comply with the formal requirements of this Section, shall accordingly be insufficient.

Contractor's failure to provide a complete and timely Change Order request, or to comply with any other requirement of this Section, shall constitute a waiver by Contractor of the right to a contract adjustment on account of such circumstances and a waiver of any right to further recourse or recovery by reason of or related to such change by means of the claims dispute resolution process or by any other legal process otherwise provided for under applicable laws.

- F. Contractor's disagreement over the amount to be paid for extra work shall not relieve Contractor of the obligation to continue to perform all Work required by the Contract.

## **24. Protests**

In the event Contractor considers any requirement demanded of him to be outside the requirements of the Contract, or if he considers any order or ruling of Owner or of any inspector to be unfair, he shall within five (5) days upon such requirement being demanded or such order or ruling being made, ask that it be confirmed in writing delivered to him, and he shall, within ten (10) days after receipt of same, and without delaying performance of such order or ruling, file a written protest with Owner, stating clearly and in detail his objections and the reasons therefor. Except for such grounds of protest or objections as are made of record in the manner specified and within the time stated herein, Contractor hereby waives all grounds for protests or objections to the orders, rulings, instructions, or decisions of Owner, and hereby agrees that as to all matters not included in such protests, the orders, instructions, and decisions of Owner shall be final and conclusive.

## **25. Inspection and Testing**

All materials and equipment furnished and all work performed shall be subject to rigid inspection by Owner. Work covered or performed in the absence of such inspection or without inspector's knowledge shall be, upon order of Owner, uncovered to the extent required to permit inspection, removed and replaced under proper inspection as necessary for compliance, and recovered, all at Contractor's sole cost. Contractor shall bear all costs and fees incurred as a result of inspection services furnished by utilities or others. Inspection shall not constitute acceptance by the Owner nor relieve Contractor from its obligations under this Contract.

Whenever Contractor arranges to perform work outside regular or specified work periods or to vary the work period for any particular day, he shall give Owner twenty-four (24) hours notice so Owner may arrange and provide proper inspection. Such work shall be performed without extra compensation.

Contractor shall not pay Owner for inspection services during regular hours during regular work days and during otherwise specified work hours except for scheduled but aborted, defective, or failed compliance inspection and testing; however, if Contractor requests to work outside the stated working hours or on Saturdays, Sundays, and holidays and Owner agrees to same, Contractor shall pay Owner for inspection services in excess of eight (8) hours during regular work days and for Saturdays, Sundays and holidays, except during otherwise specified work hours, in accordance with Owner established rates.

Certain materials, equipment, and facilities furnished or constructed shall be subject to rigid and thorough compliance inspection and testing. Contractor shall schedule such inspection and testing only after furnished or constructed materials, equipment, or facilities are operational and function as intended. Once inspection and testing have been scheduled for any particular or specific material, equipment, or facility, Contractor shall pay for all aborted, defective, or failed inspection and testing thereof attributable to Contractor's, subcontractor's, or supplier's performance and operations, or materials and equipment. Materials, equipment, and facilities subject to inspection and testing shall include, but shall not be limited to, earthwork (especially compaction testing), concrete (especially strength testing), pumping and process equipment (laboratory and field testing), electrical and control equipment, piping and pipelines, valves and fittings, and reservoirs and vessels. Inspection and testing shall include start up and final testing as well as performance and operation testing of mechanical and electrical facilities and systems.



**26. Examination of the Work**

Contractor shall furnish Owner every reasonable facility for ascertaining whether the Work is in accordance with the requirements and intention of the Contract Documents, even to the extent of uncovering or taking down portions of finished work which have been previously approved or authorized to be covered. Should such previously approved work thus exposed or examined prove satisfactory, the uncovering or taking down and the replacing of the covering or the making good of the parts removed shall be included in the Contract Payment estimates and will be paid at the Contract prices for the kind of work done or as extra work, as determined by Owner; but should the work exposed or examined prove unsatisfactory, the uncovering, taking down, replacing, and making good shall be at the expense of Contractor, and he shall be charged with the cost to Owner of any materials furnished by Owner for the unsatisfactory work and its replacement in excess of the requirements for satisfactory original construction.

**27. Defective Materials**

- A. The inspection of the Work to be performed under the Contract shall not relieve Contractor of any of his obligations to fulfill his Contract, as herein prescribed, and all defective materials or workmanship shall be made good notwithstanding such material or workmanship may have been previously inspected by Owner and accepted or estimated for payment. If the material or workmanship shall be found defective at any time before the final acceptance of the entire Contract performance, Contractor shall forthwith make good such defect, without compensation, in a manner satisfactory to Owner. Owner shall be the sole judge of determining whether any defective material or workmanship is the result of the materials and methods of Contractor or whether the defects have been caused by other contractors of Owner having the responsibility of supplying the material.
- B. If Contractor shall fail or neglect to make ordered repairs of defective material or workmanship or to remove condemned material from the Work within ten (10) days after the service by Owner of an order to do such repair work or remove such materials, Owner may make the ordered repairs or remove the condemned materials and deduct the cost thereof from any monies due Contractor.

**28. Unpaid Claims**

Pursuant to Section 9350 et seq. of the California Civil Code, upon or before completion of the Work agreed to be performed or at any time prior to the expiration of the period within which claims may be filed for record, certain persons claiming to have performed labor or furnished material, supplies, or services toward the performance of this Contract may file with Owner a verified statement of such claim, stating in general terms the kind of labor and materials and the name of the person to or for whom the same was performed or furnished or both, together with a statement that the same has not been paid. If so, or if any person brings any action against Owner or against any officer thereof to enforce such claim, Owner shall withhold from the money under its control so much of said money due or to become due Contractor under this Contract as shall be sufficient to satisfy and discharge the amount claimed and potential costs of suit, but in no event less than one and one-fourth (1-1/4) times the amount claimed. However, if Owner in its discretion permits Contractor to file such additional bond as is authorized by Section 9364 of the Civil Code in a penal sum equal to one and one-fourth (1-1/4) times the amount of the claim, Owner shall not thereafter withhold said money on account of the claim.

**29. Partial Estimates and Payments**

Each month, Contractor shall submit to Owner on the forms provided in the Contract section of the Contract Documents a written request for payment, together with such supporting data as Owner may request, covering the amount of the Work then completed. Unless specified otherwise, such request and supporting data shall be submitted by Contractor so that it is received by Owner no later than the 20th day of the month preceding the month in which payment will be made. Upon approval by Owner, payment in the amount of ninety-five percent (95%) of the estimated value of the Work will be made by the 20th day of the month following the month in which request for payment is made.

Review and payment of such requests by Owner under this section are also subject to provisions of Section 20104.50 of the California Public Contract Code, summarized below:

Upon failure to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted payment request from Contractor, as set out below, Owner shall pay interest to Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the California Code of Civil Procedure.

Each payment request shall be reviewed by Owner as soon as practicable after receipt for the purpose of determining that the payment request is a proper payment request. Any payment request determined by Owner not to be a proper payment request suitable for payment shall be returned to Contractor as soon as practicable, but not later than seven (7) days after receipt. A request returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reason why the payment request is not proper.

The number of days available to Owner to make a payment without incurring interest pursuant to Section 20104.50 of the California Public Contract Code shall be reduced by the number of days by which Owner exceeds the seven (7) day return requirement set forth herein. For purposes of Section 20104.50 of the California Public Contract Code, "progress payments" include all payments properly due to Contractor, except that portion of the final payment designated by this Contract as retention earnings.

### **30. Withheld Contract Funds**

Contractor, at his request and expense and in accordance with Section 22300 of the California Public Contract Code, will be permitted to substitute securities equivalent to any monies withheld by Owner to ensure performance under the Contract as follows.

- A. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with Owner, or with a state or federally chartered bank in California as the escrow agent, and thereafter, Owner shall pay Contractor the retained amounts as they become due. Except as otherwise provided in the Contract Documents, upon satisfactory completion of the Contract, the securities shall be returned to Contractor.
- B. Alternatively, Contractor may request, at his expense, that Owner make payment of retention earned directly to the Escrow Agent. Contractor may, at his expense, direct the investment of the payments into securities and receive the interest earned on those investments upon the same terms provided in Public Contract Code Section 22300. The Escrow Agent shall pay Contractor all securities, interest, and payments received by the Escrow Agent from Owner pursuant to such Section, upon satisfactory completion of the Contract. Contractor shall pay to each subcontractor, not later than twenty (20) days following receipt of payment, respective amounts of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to ensure performance of Contractor.
- C. Securities eligible for investment shall include those listed in California Government Code Section 16430, bank or savings and loan Certificates of Deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually acceptable to Contractor and Owner. Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.
- D. In accordance with conditions of Public Contract Code Section 22300, any escrow agreement entered pursuant to these conditions shall be executed in the form included in the Contract section of the Contract Documents.

### **31. Final Estimate and Payment**

Contractor shall be entitled to final payment of unpaid and undisputed amounts due on the Contract within 60 days after completion of the Work, as hereinafter provided. Prior to that date, Owner will prepare a final estimate of the Work done by Contractor and compute therefrom the total value of the Work done by Contractor, from which Owner will deduct: (a) all previous partial payments made to Contractor under this Contract, (b) any amounts to be deducted from the Contract pursuant to the terms of the Contract, (c) 150% of all unpaid Contract amounts then in dispute, and (d) 125% of all stop notices then on file with Owner. The net amount shall be paid to Contractor upon Contractor's transmittal to Owner of the properly executed release, upon the form provided in the Contract section of the Contract Documents, releasing Owner from all claims or liability relating to undisputed Contract amounts or work performed in relation to said amounts. Amounts withheld from final payment pending resolution of disputes, or to satisfy third-party claims or stop notices, will be subsequently released to Contractor according to the terms of such settlements as may be subsequently reached between the parties thereto.

It shall be understood and agreed by Contractor that all partial payments are estimates only and may be revised, adjusted, and corrected at the time of computing final payment. For purposes of final payment on the Contract, the term "completion" shall mean any of the following:

- A. Occupation, beneficial use, and enjoyment of the Work, performed pursuant to the Contract, excluding any operation only for testing, start-up, or commissioning, by Owner or its agent, accompanied by cessation of labor on the Contract.
- B. Acceptance of the Work by Owner.
- C. Cessation of labor on the Contract for a continuous period of 100 days or more, due to factors beyond Contractor's control.
- D. After commencement of the Work on the Contract, cessation of labor for a continuous period of 30 days or more, if Owner has filed for record a Notice of Cessation or a Notice of Completion.

### **32. Sales and Use Taxes**

The Contract price includes all taxes, and Contractor shall pay all taxes of any nature due and payable by Owner or by Contractor to the State of California and its political subdivisions or to any charter city, and all taxes of every nature due and payable by Owner or by Contractor to the United States of America or any of its agencies in connection with any or all work or equipment provided for in the Contract. This shall include, but not be limited to, sales taxes and use taxes. Contractor is hereby notified that in accordance with Revenue and Taxation Code Section 107.6 the Contract Documents may create a possessory interest subject to personal property taxation, for which Contractor is responsible.

### **33. Payment Only in Accordance with Contract**

Contractor shall not demand or be entitled to receive payment for work to be performed and/or equipment and/or materials furnished, or any portion thereof, except in the manner set forth in this Contract; nor unless each and every one (1) of the promises, agreements, stipulations, terms, and conditions herein contained to be performed, kept, observed, and fulfilled on the part of Contractor shall have been performed, kept, observed, and fulfilled, and Owner shall have accepted the Work.

### **34. Monies to be Retained**

Owner may keep any monies which would otherwise be payable at any time hereunder and apply the same, or so much as may be necessary therefor, to the payment of any expenses, losses, or damages as determined by Owner, incurred by Owner for which Contractor is liable under the Contract. Owner shall also withhold all forfeited funds pursuant to applicable provisions of the Labor Code.

**35. Recovery of Damages**

The making of an estimate and payment in accordance therewith shall not preclude Owner from demanding and recovering from Contractor such damages as it may sustain by reason of his failure to comply with the Contract Documents.

**36. Acceptance of the Work Not a Waiver**

Neither the acceptance of all or part of the Work by Owner, nor any order, measurements, or certificate by the Engineer, nor the filing of a Notice of Completion, nor granting an extension of time, nor payment of any money, nor any possession taken by Owner shall operate as a waiver of any portion of this Contract or of any power herein provided; nor shall any waiver of any breach of this Contract be held to be a waiver of any other or subsequent breach.

**37. Maintenance and Guarantee**

A. Contractor hereby guarantees that all materials and workmanship furnished by him under the Contract will meet fully all requirements thereof as to quality or workmanship and of materials furnished by him. Contractor hereby agrees to replace all materials and pay for all installation costs made necessary by defects in materials or workmanship supplied by him that become evident within one (1) year after the date of final payment and to pay for all work necessary to remove, restore, and replace the materials to full serviceability and to full compliance with the requirements of the Contract Documents, including the test requirements for any part of the materials furnished hereunder which, during said one (1) year period, are found to be deficient with respect to any provision of the Contract Documents.

Contractor also agrees and does hereby hold Owner harmless from claims of any kind which may arise from injury or damage due to said defects. Contractor shall replace all defective materials promptly upon receipt of written orders for same from Owner. If Contractor fails to replace all defective materials promptly, Owner may secure the service of others to do this work, and Contractor and his surety shall be liable to Owner for the cost, including removal and replacement thereof.

B. The guarantees, indemnifications and agreements set forth in Subsection a. hereof are secured by the Contract Performance Bond provided by Contractor herein, and for this purpose said bond shall remain in force for the entire period for which the Contractor has any remaining obligations, whether under such guarantees, indemnifications, and agreements, or in law or in equity.

C. This article shall not limit the Owner's rights under this Contract or with respect to latent defects, gross mistakes, or fraud. The Owner specifically reserves all rights relating to defective work, including but not limited to those relating to defect claims pursuant to Code of Civil Procedure Section 337.15.

**38. Suspension of Contract**

A. If the equipment and/or material to be furnished or the work to be performed by Contractor under the Contract shall be abandoned by Contractor, or if Contractor shall make a general assignment for the benefit of his creditors or be adjudicated a bankrupt, or if a receiver of his property or business be appointed by a court of competent jurisdiction, or if his Contract shall be assigned by him otherwise than hereinbefore specified, or if, at any time, Owner shall be of the opinion that the performance of the Contract is unnecessarily or unreasonably delayed, or that Contractor is willfully violating any of the conditions or covenants of the Contract, or of the Specifications, or is executing the same in bad faith or not in accordance with the terms thereof, or if the terms of the Contract be not fully completed within the time named in the Contract for its completion or within the time to which the completion of the Contract may have been extended, as hereinbefore provided, Owner may, by written notice, instruct Contractor to suspend the operation of all or any

part of the Contract, and Contractor shall do so and shall resume the same only upon written instruction by Owner.

- B. Upon such suspension of the Contract, Owner may procure the equipment and/or the materials, and/or performance of the work necessary to fulfill the Contract requirements in such manner as it may deem proper. In so doing, Owner may take possession of and use any of any materials, plant, tools, equipment, supplies, and property of every kind which may be provided by Contractor upon Owner property for the purposes of his work. Owner may procure other equipment and/or materials and provide labor for the completion of the same, or Contract therefor, and charge the expense of completion by either method to Contractor. These charges shall be deducted from such monies as may be due or may at any time hereafter become due Contractor under and by virtue of this Contract or any part thereof. In case such expense shall exceed the amount which would have been due Contractor under the Contract if the same had been completed by him, Contractor shall pay the amount of such excess to Owner and in case such expense shall be less than the amount which would have been payable under this Contract if the same had been completed by Contractor, he shall have no claim to the difference, except to such extent as may be necessary, in the opinion of Owner, to reimburse Contractor or Contractor's sureties for any expense properly incurred for plant, camp, equipment, materials, supplies, and labor devoted to the prosecution of the Work of which Owner shall have received the benefits and which shall not have been otherwise paid by Owner. In computing such expense so far as it shall relate to plant and equipment taken over by Owner the salvage value of such plant and equipment at completion of the Work shall be deducted from the depreciated value thereof at the time taken over by Owner, and the difference shall be considered an expense. Evidence of such expense, satisfactory to Owner, shall be required, and all necessary estimates and appraisements shall be made by him. When any particular part of the Work is being carried on by Owner, by Contract or otherwise, under the provisions of this section, Contractor shall continue the remainder of the Work in conformity with the terms of his Contract and in such manner as in nowise to hinder or interfere with the persons or workers employed, as above provided, by Owner, by Contract or otherwise, to do any part of the Work or to complete the same under the provisions of this Section.
- C. In the determination of the question whether there has been such non-compliance with the Contract as to warrant its suspension or the procurement of the equipment, labor, or material elsewhere by Owner as herein provided, the decision of Owner shall be final. Suspension of the Contract or any portion thereof shall operate only to terminate the right of Contractor to proceed with the furnishing of the equipment and/or material, or performing the work covered by the Contract or the suspended portions thereof. All other stipulations of the Contract, shall be and remain in full force and effect after such suspension and until the Contract shall have been completed, final payment made, and formal acceptance given.

### **39. Additional Surety**

If, during the continuance of the Contract, any of the sureties upon the performance or payment bonds in the opinion of Owner, are or become insufficient, Owner may require additional sufficient sureties, which Contractor shall furnish to the satisfaction of Owner within fifteen (15) days after notice, and in default thereof, the Contract may be suspended with the same force and effect as provided in Section 38.

### **40. Termination of Contract**

If, at any time before manufacture of all equipment and/or materials, or completion of performance of work, it shall be found by Owner that reasons beyond the control of the parties hereto render it impossible or against the public interest of Owner to buy and receive any remaining portion of the equipment and/or materials or have the Work completed, Owner at any time, by written notice to Contractor, may call for discontinuance of manufacture of the equipment and/or materials and/or performance of work, and terminate the Contract. Upon the service of such notice of termination, Contractor shall discontinue the manufacture and/or performance of work in such manner, sequence, and at such times as Owner may direct, continuing after said notice only such manufacturing of the equipment and/or material and/or only such performance of work and only until such time, or times, as Owner may direct, and Contractor shall

have no claim for damages for such discontinuance or termination of the Contract; nor shall Contractor have any claim for anticipated profits on the equipment and/or materials or performance of work thus dispensed with, nor any other claim except for the equipment and/or materials and/or of work actually manufactured or performed up to the times of said notice, or in accordance therewith.

**41. Right to Occupy Completed Portions of the Work**

Owner may wish to occupy or place in service completed portions of the Work before final completion of the Contract and shall be at liberty to do so, but such occupancy or placing in service of any completed portion of the Work shall not void the Contract nor relieve Contractor of his responsibility of protection and care of all Work until final completion and acceptance of the entire Work, provided, however, that expense directly attributable to operation and placing in service the portions of the Work shall not be chargeable to Contractor.

**42. Anti Trust Claims and Third Party Claims**

In entering into a public works Contract or a subcontract to supply goods, services, or materials pursuant to a public works Contract, Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 of Part 2 of Division 7 of the Business and Professions Code), arising from the purchases of goods, services, or materials pursuant to the public works Contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to Contractor, without further acknowledgment by the parties.

Pursuant to Public Contract Code Section 9201, the Owner shall provide Contractor with timely notice of the receipt of third party claims relating to this Contract.

**43. Dispute Resolution**

Contractor shall timely comply with any and all requirement of the Contract Documents pertaining to notices and requests for changes to the contract time or contract price. The failure to timely submit a notice of delay or notice of change, or to timely request a change to the time for completion or Contractor's compensation, or to timely provide any other notice or request required herein shall constitute a waiver of the right to further pursue the claim under the Contract or at law.

A. Intent. Effective January 1, 1991, Section 20104 et seq., of the California Public Contract Code prescribes a process utilizing informal conferences, non-binding judicial supervised mediation, and judicial arbitration to resolve disputes on construction claims of \$375,000 or less. Effective January 1, 2017, Section 9204 of the Public Contract Code prescribes a process for negotiation and mediation to resolve disputes on construction claims. The intent of this Section is to implement Sections 20104 et seq. and Section 9204 of the California Public Contract Code. This Section shall be construed to be consistent with all applicable law, including but not limited to these statutes.

B. Claims. For purposes of this Section, "Claim" means a separate demand by the Contractor for:

1. An adjustment to the time for completion including, without limitation, for relief from damages or penalties for delay assessed by Owner;
2. Payment by Owner of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract, payment for which is not otherwise expressly provided or to which the Contractor is not otherwise entitled; or
3. An amount the payment of which is disputed by Owner.

A "Claim" does not include any demand for payment for which the Contractor has failed to provide notice, request a change order, or otherwise failed to follow any procedures contained in the Contract Documents.

- C. Filing Claims. Claims governed by this Section may not be filed unless and until the Contractor completes any and all requirements of the Contract Documents pertaining to notices and requests for changes to the contract time or contract price, and Contractor's request for a change has been denied in whole or in part. Claims governed by this Section must be filed no later than thirty (30) days after a request for change has been denied in whole or in part or after any other event giving rise to the Claim. The Claim shall be submitted in writing to Owner and shall include on its first page the following words in 16 point capital font: "THIS IS A CLAIM." The Claim shall include the all information and documents necessary to substantiate the Claim, including but not limited to those identified below. Nothing in this Section is intended to extend the time limit or supersede notice requirements otherwise provided by Contract Documents. Failure to follow such contractual requirements shall bar any Claims or subsequent proceedings for compensation or payment thereon.
- D. Documentation. The Contractor shall submit all Claims in the following format:
1. Summary description of Claim including basis of entitlement, merit and amount of time or money requested, with specific reference to the Contract Document provisions pursuant to which the Claim is made
  2. List of documents relating to Claim:
    - a. Specifications
    - b. Drawings
    - c. Clarifications (Requests for Information)
    - d. Schedules
    - e. Other
  3. Chronology of events and correspondence
  4. Narrative analysis of Claim merit
  5. Analysis of Claim cost, including calculations and supporting documents
  6. Time impact analysis in the form required by the Contract Documents or, if the Contract Documents do not require a particular format, CPM format, if an adjustment of the contract time is requested
- E. Owner's Response. Upon receipt of a Claim pursuant to this Section, Owner shall conduct a reasonable review of the Claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Any payment due on an undisputed portion of the Claim will be processed and made within 60 days after Owner issues its written statement.
1. If Owner needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and Owner's governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a Claim sent by registered mail or certified mail, return receipt requested, Owner shall have up to three days following the next duly publicly noticed meeting of Owner's governing body after the 45-day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

2. Within 30 days of receipt of a Claim, Owner may request in writing additional documentation supporting the Claim or relating to defenses or Claims Owner may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of Owner and the Contractor. Owner's written response to the Claim, as further documented, shall be submitted to the Contractor within 30 days (if the Claim is less than \$50,000, within 15 days) after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.
- F. Meet and Confer. If the Contractor disputes Owner's written response, or Owner fails to respond within the time prescribed, the Contractor may so notify Owner, in writing, either within 15 days of receipt of Owner's response or within 15 days of Owner's failure to respond within the time prescribed, respectively, and demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand, Owner shall schedule a meet and confer conference within 30 days for settlement of the dispute.
- G. Mediation. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, Owner shall provide the Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after Owner issues its written statement. Any disputed portion of the Claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with Owner and the Contractor sharing the associated costs equally. The Owner and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing, unless the parties agree to select a mediator at a later time.
1. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.
  2. For purposes of this Section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this Section.
  3. Unless otherwise agreed to by Owner and the Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.
  4. The mediation shall be held no earlier than the date the Contractor completes the Work or the date that the Contractor last performs Work, whichever is earlier. All unresolved Claims shall be considered jointly in a single mediation, unless a new unrelated Claim arises after mediation is completed.
- H. Procedures After Mediation. If following the mediation, the Claim or any portion remains in dispute, the Contractor must file a Claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code prior to initiating litigation. For purposes of those provisions, the running of the period of time within which a Claim must be filed shall be tolled from the time the Contractor submits his or her written Claim pursuant to subdivision (a) until the time the Claim is denied, including any period of time utilized by the meet and confer conference.



I. Civil Actions. The following procedures are established for all civil actions filed to resolve Claims of \$375,000 or less:

1. Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties or unless mediation was held prior to commencement of the action in accordance with Public Contract Code section 9204 and the terms of this Agreement. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court.
2. If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1114.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration. In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, (A) arbitrators shall, when possible, be experienced in construction law, and (B) any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party.

J. Government Code Claim Procedures.

1. This Section does not apply to tort claims and nothing in this Section is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.5 of Title 1 of the Government Code.
2. In addition to any and all requirements of the Contract Documents pertaining to notices of and requests for adjustment to the contract time, contract price, or compensation or payment for extra Work, disputed Work, construction claims and/or changed conditions, the Contractor must comply with the claim procedures set forth in Government Code Section 900, et seq. prior to filing any lawsuit against Owner.
3. Such Government Code claims and any subsequent lawsuit based upon the Government Code claims shall be limited to those matters that remain unresolved after all procedures pertaining to adjustment of the contract time or contract price for extra Work, disputed Work, construction claims, and/or changed conditions have been followed by Contractor. If Contractor does not comply with the Government Code claim procedure or the prerequisite contractual requirements, Contractor may not file any action against Owner.
4. **A Government Code claim must be filed no earlier than the date the Work is completed or the date the Contractor last performs Work on the Project, whichever occurs first. A Government Code claim shall be inclusive of all unresolved claims known to Contractor or that should reasonably be known to Contractor excepting only new unrelated Claims that arise after the Government Code claim is submitted.**
5. Non-Waiver. Owner's failure to respond to a Claim from the Contractor within the time periods described in this Section or to otherwise meet the time requirements of this Section shall result in the Claim being deemed rejected in its entirety, and shall not constitute a waiver of any rights under this Section.

- K. Waiver of Rights. Except as set forth in this Section 43, or as otherwise provided under State law, it is understood and agreed by the parties that all rights any of them may have to arbitration for the settling of disputes, claims, and other matters arising out of or relating to this Contract or the breach thereof are hereby specifically waived by all of them.

## **SPECIAL REQUIREMENTS**

## SPECIAL REQUIREMENTS

### 1. The Work

The Contract Work to be performed hereunder includes the furnishing of all labor and furnishing and installing all equipment and materials, unless herein specifically excepted, necessary for the complete and satisfactory construction of the proposed backwash supply (BWS) pipeline and appurtenances and proposed modifications to the high pressure relief/raw water bypass (HPR/RWB) system at the existing Leland J. Thompson Water Treatment Facility (Facility Plant).

Contractor shall, upon completion of construction required herein, make any additions, adjustments, corrections, repairs, replacements, and reconstructions necessary to provide Owner with complete and correctly operating facilities.

### 2. Mandatory Pre-Bid Job Walk

Prospective bidders are hereby advised that Owner will conduct a mandatory pre-bid job walk at the Work site on Tuesday, December 5, 2023 commencing at 11:00 a.m. Prospective bidders shall meet Owner's representative at the project site (5245 34th Street, Jurupa Valley, CA 92509).

### 3. Contract Drawings

The following contract drawings are made a part of these Contract Documents:

#### CONSTRUCTION DRAWINGS (24" x 36")

<u>Drawing No.</u>	<u>Title</u>	<u>Sheet No.</u>
G-1	Title Sheet, Location and Vicinity Maps, and Drawing Index	1
G-2	Construction Notes	2
G-3	Legends, Symbols, and Abbreviations	3
G-4	Schedules	4
G-5	Treatment Process Schematic	5
C-1	Site Plan	6
C-2	Civil Sections and Details	7
M-1	Mechanical Plan	8
M-2	Mechanical Sections	9
M-3	Mechanical Details	10

#### STANDARD DRAWINGS (8-1/2" x 11")

(Attached in the back of these Contract Documents)

#### Title    Drawing No.

#### Rubidoux Community Services District

Pipeline Trench	G20
Butterfly Valve Installation	W1030
Normally Closed Valve Box Installation	W1040
Welded Steel Pipe Cut-to-Fit and Joint Repair Detail	W1220

#### **4. Notice of Award and Authorization to Proceed**

Upon Notice of Award, Contractor is hereby authorized to execute Contract and secure Performance and Payment Bonds and Certificates of Insurance.

Contract award will be subject to Owner approval of executed Contract, Performance and Payment Bonds, and Certificates of Insurance. Once properly completed documents are received by Owner, it is anticipated that Owner review and approval and subsequent execution of Contract will be completed within ten working days.

Upon execution of Contract by Owner, Contractor is authorized to begin document submission, material ordering, and construction scheduling. Upon acceptance of submittal documents for all equipment and materials necessary to begin construction and following the pre-construction meeting, Contractor may proceed with construction.

#### **5. Insurance**

Contractor shall list Owner, State of California, and City of Jurupa Valley as additionally insured on certificates of insurance. Contractor's insurance company shall provide a primary endorsement stating that Contractor's insurance policy is primary insurance and that any other insurance maintained by those listed as additionally insured is excess and non-contributing with respect to the insurance required for the Contractor. Contractor is referred to the funding requirements in Item 9 herein.

#### **6. Pre-Construction and Progress Meetings**

Contractor and his major subcontractors shall attend a pre-construction meeting at Owner's office as soon after award as Owner considers necessary. Contractor will be given adequate notice of such meeting. Contractor shall submit a proposed CPM Progress Schedule, as specified in Specification Section 01300, Contractor Submittals Technical Specifications, at said meeting for Owner's subsequent approval. Contractor shall also submit all other required data at the same meeting, or, alternatively, a submittal schedule for approval.

Contractor shall attend weekly progress meetings at the job site (at the times and dates established by Owner). Progress meetings will be attended by appropriate Owner personnel, contract administration staff, inspector(s), and Contractor's project manager and field superintendent as a minimum. Contract administration staff will prepare meeting agendas and minutes. Contractor shall prepare three-week look ahead schedules for review at each progress meeting. Said three-week look ahead schedules are not an acceptable substitute for CPM schedule updates that must be submitted with Contractor's monthly partial payment requests.

It should be noted that inspection will not be provided during the scheduled progress meetings. Contractor is not permitted to perform work that requires inspection (as determined by Owner) during the progress meetings. Contractor shall adjust his schedule to accommodate said weekly progress meetings and no additional compensation will be provided for same. Contractor's bid shall consider Owner's requirement for weekly progress meetings. Owner, at its sole discretion, may decrease the frequency of progress meetings if deemed appropriate.

#### **7. Continuous Plant Operation; Contractor's Cooperation and Coordination; and Sequence of Work**

Contractor shall perform his work in a manner which will not interrupt or interfere with Owner's operation of the existing facilities unless otherwise permitted by these Specifications.

Contractor shall coordinate and cooperate with Owner, who will have representatives onsite to operate the facilities and to inspect the construction work. Contractor shall not operate any existing equipment or valves.

Contractor shall be responsible to schedule their work activities related to connections to existing facilities with Owner. Contractor shall notify Owner in accordance with Specification Section 01185 in advance of Contractor's planned procedure for each specific alteration of existing facilities before the alteration begins. Contractor shall not begin an alteration until specific permission has been granted by Owner in each case. The making of connections of the existing equipment shall be completed as quickly as possible and with as little delay as possible. Plant operation and maintenance personnel will cooperate in order to expedite Contractor's operation; however, if it necessary for the proper operation or maintenance of portions of the existing facilities, Contractor shall reschedule his operations so there shall be no conflict with necessary operations or maintenance of the Plant.

Contractor shall perform their work in accordance with the Sequence of Work and abide by all work restrictions as specified in Specification Section 01185, Sequence of Work and Work Restrictions.

#### **8. Pre-Construction Audio Video Recording**

Contractor shall make arrangements with a *professional videographer*, approved by Owner, to prepare a full color high definition pre-construction audio-video recording of the project site with Owner's inspector present prior to mobilizing (refer to Specification Section 01381) and shall provide Owner with an original and two (2) copies of same (on DVD).

#### **9. Existing Conditions and Examination of Contract Documents**

Contractor represents that Contractor has carefully examined the Contract Documents and the site where the work is to be performed and that Contractor has become familiarized with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may affect in any manner the performance of the work.

Contractor further represents that Contractor has studied all surveys and investigation reports about subsurface and latent physical conditions pertaining to the job site, that Contractor has performed such additional surveys and investigations as Contractor has deemed necessary to complete the work at the Contractor's bid price, and that Contractor has correlated the results of all such data with the requirements of the Contract Documents. The submittal of a bid shall be conclusive evidence that Contractor has investigated and is satisfied as to the conditions to be encountered, including locality, uncertainty of weather, and all other contingencies, and as to the character, quality, quantities, and the scope of the work.

The Contract Documents (Drawings and Specifications) for the Work show subsurface conditions or otherwise hidden conditions as they are supposed or believed by Engineer to exist; but it is not intended or to be inferred that the conditions as shown thereon constitute a representation that such conditions are actually existent. Except as otherwise specifically provided in the Contract Documents, Owner, Engineer, and their consultants shall not be liable for any loss sustained by Contractor as a result of any variances of such conditions shown on the Drawings and the actual conditions revealed during the progress of the Work or otherwise.

The records of such investigations are not a part of the Contract and are shown solely for the convenience of Contractor. It is expressly understood and agreed that the Owner, Engineer, and their consultants assume no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations; the records thereof; or of the interpretations set forth therein or made by Owner's consultants, the Engineer, or their consultants in the use thereof by Engineer, and there is no warranty or guarantee, either records thereof are representative of those existing throughout such areas, or any part thereof, or that unlooked-for developments may not occur, or that materials other than, or in proportions, densities, or characteristics different from, those indicated may not be encountered.

When a log of test borings showing a record of the data obtained by the investigation of subsurface conditions by Owner, Engineer, or their consultants is included with the Drawings or other documents, it is expressly understood and agreed that said log of test borings does not constitute a part of the Contract, represents only the opinion of the Owner, Engineer, or their consultants as to the character of the materials encountered by them in the test borings, is included in the Drawings or other document only for the convenience of Contractor, and its use is subject to all of the conditions and limitations set forth in this section.

The availability or use of information described in this section is not to be construed in any way as a waiver of the provisions of the preceding paragraphs in this section and Contractor is cautioned to make such independent investigations and examinations as the Contractor has deemed necessary to satisfy Contractor as to the conditions to be encountered in the performance of the Work.

No information derived from such inspection of records of investigations or compilation thereof made by Owner, Engineer, or their consultants will in any way relieve Contractor from any risk or from properly fulfilling the terms of the Contract nor entitle Contractor to any additional compensation.

#### **10. Materials to be Furnished by Contractor**

Contractor shall furnish and install all materials necessary to complete the awarded Contract Work, all in strict accordance with the Contract Documents. Said materials shall be new, unused, of latest manufactured model, and shall include, but shall not be limited to, materials specified or necessary to comply with normally acceptable standards of construction.

#### **11. Geologic Conditions at Work Site**

Geologic conditions and characteristics of the materials that were encountered during the geological investigation performed by Owner for project design are contained in a report by Converse Consultants dated May 22, 2020. A copy of the report is attached in Appendix B.

The report is neither exhaustive nor conclusive; all soil boring data, including sieve analysis results, field and laboratory test data, and compaction test data applies only to soil borings described in this report. Investigations of subsurface conditions are made for the purpose of design, and Owner assumes no responsibility whatsoever in respect to the sufficiency or accuracy of borings or of the log of test borings or other preliminary investigations, or of the interpretation thereof, and there is no guarantee either expressed or implied, that the conditions indicated are representative of those existing throughout the work, or any part thereof, or that unlooked-for developments may not occur. Making such information available to bidders is not to be construed in any way a waiver of the above provisions and bidders must satisfy themselves through their own investigations as to conditions to be encountered.

## **12. Working Days and Working Hours**

Contractor shall perform all non-continuous Contract Work during daylight hours and within an eight-hour work period between 7:00 a.m. and 5:00 p.m., Monday through Friday. These working days and hours shall apply unless special permission to work outside said limits is requested by Contractor and obtained from Owner, both in writing. Contractor shall not have any personnel living or residing on the job site.

Contractor shall not perform any work on Owner holidays unless special permission is requested by Contractor and obtained from Owner, both in writing. Said holidays are as follows:

- New Year's Day – January 1
- Martin Luther King Jr. Day – Third Monday in January
- Washington's Birthday – Third Monday in February
- Cesar Chavez Birthday – March 31
- Lincoln's Birthday– February 12
- Washington's Birthday– February 19
- Memorial Day – Last Monday in May
- Independence Day – July 4
- Labor Day – First Monday in September
- Admission's Day– September 18
- Columbus Day – October 9
- Veterans Day – November 10
- Thanksgiving Day and the day after – Fourth Thursday and Friday in November
- Christmas Day – December 25

Note: When a holiday falls on a Saturday, it is observed the Friday before, when it falls on Sunday, it is observed the Monday following.

## **13. Weather Days Allowances**

The project completion time specified in the Bidding Documents (Part B.5) includes an allowance for five (5) weather calendar days. Weather days are defined as those days (as approved by Owner) in which the Contractor is unable to work on critical path activities due to the effects of inclement weather. Time extensions will be granted for approved weather days in excess of five (5) calendar days. The weather day allowance shall also apply to any milestones in a prorated fashion.

## **14. Permits, Certificates, Laws, Ordinances, Rights-of-Way, and Easements**

Contractor shall, at Contractor's own expense, procure all other permits, certificates, and licenses required by law for execution of the Work. Contractor shall comply with all Federal, State, and local laws, ordinances, or rules and regulations relating to the performance of said Work. Contractor shall be responsible for all costs and fees incurred as a result of normal business operations. Please note, no building permits are required, the Owner is exempt.

Contractor shall comply with all requirements set forth in the permits, easements, agreements, and licenses required for the project. All of the permit requirements shall be satisfied by Contractor and accepted by all issuing agencies and Owner before a Notice of Completion will be recorded for the project. In the event of conflict between said Permit Requirements and other contract documents, the most stringent requirements shall prevail.



In addition, the following agencies have jurisdiction within the project work site and rights-of-way. Contractor shall comply with all requirements of said agencies:

A. City of Jurupa Valley Encroachment Permit

Contractor shall obtain an encroachment permit from the City of Jurupa Valley for construction of the waterline in 34th Street. In the event that any conflict between the Contract Documents and permit requirements occurs, the most stringent requirement shall prevail. All permit requirements shall be satisfied by Contractor and accepted by the City and Owner before the project is accepted and a Notice of Completion is filed.

B. State Water Resources Control Board (SWRCB)

1) Construction Stormwater

With respect to construction stormwater, Contractor, as District's authorized representative, shall comply with the regulatory requirements of the State Water Resources Control Board's (SWRCB's) Order 2022-057-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit), NPDES No. CAS000002, which is available on the SWRCB's website at [https://www.waterboards.ca.gov/water\\_issues/programs/stormwater/construction.shtml](https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml).

Construction projects under one (1) acre do not require coverage under the General Permit or preparation of a Storm Water Pollution Protection Plan (SWPPP), but will require Best Management Practices (BMPs) to control and reduce discharges of pollutants associated with construction into storm drains and receiving waters. The Contractor shall prepare, implement and maintain a BMP Plan showing location and type of BMPs to be implemented for the project. The Contractor shall alter the plan, implementation and maintenance as necessary for the duration of the project.

Contractor shall include all costs for preparation of the BMP Plan, record keeping, and implementation. No additional compensation will be provided.

2) Pipeline Hydrostatic Test Water and Flushing

Discharges of wastewaters, such as pipeline hydrostatic test water and flushing water and other construction water from this project, will require compliance under the SWRCB's Order WQ 2014-0194-DWQ, General Order No. CAG140001, Statewide NPDES Permit for Drinking Water System Discharges to Waters of the United States, which is available at the SWRCB's website at [https://www.waterboards.ca.gov/water\\_issues/programs/npdes/drinkingwatersystem.shtml](https://www.waterboards.ca.gov/water_issues/programs/npdes/drinkingwatersystem.shtml).

Contractor shall follow the discharge requirements for pipeline hydrostatic test water and flushing water in accordance with the District's permit. Contractor shall provide advance notification of any anticipated discharges as described above. In addition, if discharge volumes are greater than 1 acre-foot (325,850 gallons) per day, Contractor shall provide notification at least five (5) calendar days prior to the start of discharge.

The water discharge shall not contain a concentration of total residual chlorine of more than 0.1 mg/l. In addition, the Contractor shall implement BMPs for discharges from this project, in accordance with American Water Works Association, California-Nevada Section, BMPs for Drinking Water Releases, March 2014, see [http://ca-nv-awwa.org/CANV/downloads/Armando/2014BMPManual\(Final\).pdf](http://ca-nv-awwa.org/CANV/downloads/Armando/2014BMPManual(Final).pdf). The Contractor shall maintain a log of BMP implementation.

3) Groundwater from Trench Dewatering

With respect to discharges of non-polluted wastewater from trench dewatering to surface waters, Contractor shall obtain coverage under and comply with the requirements of the Santa Ana Regional Water Quality Control Board (RWQCB) set forth in Order No. R8-2020-0006, NPDES No. CAG998001, General Waste Discharge Requirements to Surface Waters that Pose an Insignificant (De Minimum) Threat to Water Quality, copies of which are available on the RWQCB's website at [www.waterboards.ca.gov/santaana/board\\_decisions/adopted\\_orders/](http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/). Contractor shall obtain coverage under Order No. R8-2020-0006 prior to making any regulated discharge.

If the non-polluted wastewater discharge is applied to land without entering into a municipal storm drainage conveyance system or natural drainage course, then the discharge is exempt from the requirements of Order No. R8-2020-0006.

If the non-polluted wastewater discharge enters into a municipal storm drainage conveyance system or dry/seasonal drainage course such that the entire discharge will percolate completely prior to reaching any surface water downstream, then the discharge is exempt from the requirements of Order No. R8-2020-0006.

4) Other Wastewater Discharges

For all other wastewater discharges, including discharges of potentially polluted or contaminated wastewater, Contractor shall comply with all applicable requirements of the Regional Board. If required by the Regional Board, Contractor shall, at his sole expense, obtain a wastewater discharge permit from the Regional Board. Contractor shall provide a copy of said wastewater discharge permit to Owner. Contractor shall comply with the conditions therein, and shall perform the monitoring required.

5) General Discharge Requirements

Contractor shall not allow any discharges from the construction site which may have an adverse effect on receiving waters of the United States. Wastewater discharges shall not contain a concentration of total residual chlorine of more than 0.1 mg/l. Wastewater discharges shall not contain oils, greases, waxes, or other materials in concentrations which result in a visible film or coating on the surface of receiving waters. Wastewater discharges shall not cause erosion or sedimentation in the receiving waters.

6) Notification of Wastewater Discharge

Contractor shall provide written notification to Owner and, as applicable, the State and/or Regional Board five (5) days prior to the start of any wastewater discharge; and shall provide written notification to the agency/municipality that owns, operates, and maintains the municipal storm drainage conveyance system a minimum of one (1) week prior to the start of any discharge into a municipal storm drainage conveyance system.

C. Rights-of-Way and Property Owners

The limits of the street rights-of-way and Owner property are shown on the Construction Drawings. Contractor shall perform all work within said rights-of-way and property. Contractor shall not encroach beyond the limits of the rights-of-way or Owner property without prior approval from affected property owners. Only work permitted within street right-of-way shall be for construction of facilities located therein.

If Contractor performs work outside the limits of said rights-of-way or Owner property, Contractor shall stop all work immediately and restore all areas to their pre-construction condition to the satisfaction of the Owner and the affected property owners. The Contractor shall also provide an indemnification letter to the Owner from the affected property owners regarding any unauthorized work outside said rights-of-way or Owner property.

If required, Contractor may obtain additional right-of-way. Contractor shall prepare all required documentation, pay all required fees, obtain all additional right-of-way, and furnish the Owner documentation that additional right-of-way has been obtained prior to performing any work within the area of the additional right-of-way. In addition, Contractor shall provide an indemnification letter to the Owner from the affected property owners. Contractor shall perform all work only within said additional rights-of-way, and shall not encroach beyond same.

**15. Trench and Excavation Protection**

Before making any excavation or trench 5' or more in depth, Contractor shall submit to Owner a detailed excavation plan and drawing(s) showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection. In addition to worker protection, the shoring system shall be designed and constructed in a manner to protect adjacent property and existing public and private improvements. Drawings shall be specific as to where the design applies, and shall reference the code sections, calculations, and soils report prepared for the excavation plan. Proceeding with excavation without accepted excavation plan is a contract violation and, upon notification of Owner, Contractor shall stop excavating and backfill and compact the excavation until such time as the plan has been submitted and accepted by the Owner. Excavation protection shall be installed as excavation proceeds. Excavation depth shall not exceed 5' without protection. Excavation slopes shall not exceed those permitted for Class C soils per CalOSHA, unless noted otherwise herein or unless Contractor provides a soils investigation by licensed soils engineer at the Contractor's expense, to determine alternate slopes.

If said excavation plan and drawing(s) do not vary from the requirements of the OSHA Construction Safety Orders (CalOSHA or FedOSHA, whichever is applicable at the time of construction), a statement signed by a civil or structural engineer registered in the State of California, engaged by Contractor at Contractor's expense, shall be submitted certifying that the Contractor's excavation drawings comply with OSHA Construction Safety Orders. In addition, the submittal shall include the procedures and sequence for construction/installation of the excavation

protection system. The excavation protection system shall be installed as excavation progresses to protect workers and adjacent property and improvements.

If said excavation plan and drawing(s) vary from said OSHA Construction Safety Orders, the excavation plan and drawing(s) shall be prepared and certified by a registered civil or structural engineer and said engineer shall affix their seal and signature to each sheet of said drawing. The submittal shall include the procedures and sequence for construction/installation of the excavation protection system. The excavation protection system shall be installed as excavation progresses to protect workers and adjacent property and improvements.

Contractor shall not perform any excavation that will be over 5' in depth until Owner has received and acknowledged the properly certified excavation plan and drawing(s) and supporting calculations with the registered engineer's statement or stamped drawings.

In addition to the services of a licensed civil or structural engineer to prepare the excavation plan and drawing(s), Contractor shall provide the services of a licensed engineer to perform soils investigations at the site to provide design criteria and slope stability for the excavation plans.

Contractor shall submit to Owner a copy of Contractor's annual Cal/OSHA excavation permit.

#### **16. Data to be Submitted by Contractor**

Contractor shall furnish Owner the following data and said data shall be approved by Owner prior to beginning construction of facilities that are impacted by the data (submittals shall be provided in accordance with Specification Section 01300, Contractor Submittals, and the appropriate Basic or Technical Specifications):

- A. Manufacturer's data for all pipe, valves, fittings, appurtenances, and materials.
- B. All data on Portland cement concrete, asphalt concrete pavement, and building materials.

All materials shall comply with Owner's List of Approved Manufactured Materials (copy attached in Appendix A of these Contract Documents).

In addition, Contractor shall furnish Owner with the following:

- A. Emergency telephone numbers for the construction superintendent, construction foreman, and all company principals.
- B. All data required by the Contract Documents, including but not limited to, Trench and Excavation Protection Plan, Construction Schedule, and Encroachment and Excavation Permits.
- C. Excavation plans and drawings.
- D. Injury and Illness Prevention Program.
- E. Confined Space Entry Permitting Program.
- F. Best Management Practices (BMPs) Plan.

**17. Construction Water**

Owner will provide a reasonable quantity of construction water free of charge to Contractor from existing fire hydrants in 34th Street. Contractor shall install an Owner furnished water meter and shall furnish and install an Owner approved backflow device at fire hydrants to be used for construction water. The Contractor shall furnish and install all necessary piping and appurtenances, including pumps and water trucks, necessary to convey water from fire hydrants to work site.

**18. Construction Staking by Owner and Contractor**

Upon Contractor's request, the District will provide one set of construction staking for one (1) north/south baseline, one (1) east/west baseline and one (1) benchmark. Contractor shall provide all other construction staking required to complete the work. Construction staking provided by Contractor shall be performed by a licensed land survey at Contractor's expense. Owner will use Contractor's construction stakes for inspection of the work. All facility locations shall be checked by Owner prior to installation by Contractor.

Cut sheets will be prepared based on the Construction Drawings. Staking will be 1" x 2" hubs or nails and tins at offsets determined by Contractor. Contractor will be furnished copies of cut sheets prior to beginning construction.

Contractor shall take every precaution to protect all survey monuments and stakes during construction and shall be responsible for paying all costs to re-establish said stakes destroyed or disturbed by his operations.

Contractor shall notify the District a minimum of two (2) weeks prior to start of construction to allow ample time for preparation of grade sheets and construction staking. Contractor shall use the construction stakes and grade sheets for construction. The District will use them for inspection of the work.

**19. Survey Monuments and Benchmarks**

Contractor shall not disturb existing survey monuments or benchmarks. If monuments must be removed, said monuments shall be referenced and reset pursuant to the Business and Professions Code, Sections 8700 to 8805 (Land Surveyor's Act) at no cost to the Owner.

**20. Payment for Contract Work, Schedule of Values, and Payment Requests**

Payments to Contractor shall be based on the lump sum amounts bid, approved Schedule of Values, and work completed. Amounts bid shall include all costs for overhead, sales tax, materials, equipment, and labor for all work for complete and fully operational facilities and appurtenances, including removal and demolition of existing improvements.

Contractor shall submit Schedule of Values per Specification Section 01026 to assist in evaluating value of work completed and remaining.

Contractor shall submit all partial payment requests and final payment request to Owner by the last day of the month. Upon approval by Owner, partial payments will be made by the 30th day of the month following the month in which request for payment is made.

All payment requests shall show all bid items for the Contract Work and the amounts bid, in accordance with the Bidding Sheets and approved Schedule of Values. In addition, said requests

shall show the percentage of completion of each bid item and the amount thereof, said amounts being totaled to arrive at the value of the completed work. The net partial payment amount shall equal 95% of said total. A sample partial payment request form is included within the Contract section.

Contractor shall submit with the payment request an updated project schedule, list of subcontractors scheduled to be onsite the following month, and narrative description of work completed the previous month and work scheduled to be completed the following month.

**21. Inspector's Working Hours and Overtime Costs**

Owner's inspector will inspect all work. Contractor is responsible for notifying Owner's inspector and coordinating for inspection when work is ready for inspection. Contractor shall provide safe access to the work and shoring protection per CalOSHA requirements to allow for Owner's inspector to perform inspection of the work. Any work installed buried without inspection shall be removed and replaced to allow inspection. Owner's inspector will visit the site twice per day to perform inspection services for the project. Visits will be in the morning and afternoon. Contractor shall coordinate with Owner's inspector and Contractor shall perform his work to permit part-time inspection. In the event Contractor works more than 8 hours per day, or on Saturdays or Sundays and holidays, and Owner agrees to same and said work requires inspection, Contractor shall pay for inspection time at the following rates:

<u>Work Period</u>	<u>Inspection Rates</u>
Weekdays (8 hours to 12 hours)	\$181.00
Weekdays (more than 12 hours)	\$218.00
Saturday (12 hours or less)	\$181.00
Saturday (more than 12 hours)	\$218.00
Sunday and Holiday	\$218.00
(Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and the day after, Christmas Day)	

Said rates are subject to change when the Department of Industrial Relations establishes new prevailing wage rates.

Contractor will not be required to pay for Owner inspection performed on regular work days and during specified or permitted work hours (including working from 10:00 p.m. to 5:00 a.m. for connections to existing facilities).

Contractor shall bear all costs and fees incurred as a result of inspection services furnished by utilities or others.

**22. Compliance with Contract Documents**

Contractor shall comply with all instruction of Owner to insure compliance with the Contract Documents, including timely completion of work each day, backfilling trenches each day, placement of pavement, work site cleanup, control of traffic, placement of signs, placement of barricades, and use of flashing lights. If Contractor does not comply with the Contract Documents, then Owner shall provide the required labor, materials, and equipment to perform same and shall deduct the cost from monies otherwise due under the contract.

**23. Preservation of Paved Surfaces, Restoration of Work Site, and Disposal of Spoil and Waste Materials**

- A. Contractor shall perform its operations so that existing roads and other paved surfaces adjacent to or in the vicinity of the work site are not damaged. Contractor shall repair any damaged pavement which results from Contractor's operations (except that which is specifically a part of the Contract Work) to the satisfaction of the Owner, all at his expense.
- B. All work sites shall be restored to pre-job conditions and shall meet the requirements of the Owner and property owners.

Owner is obligated to keep visual impact of the work sites to a minimum; therefore, Contractor is required to restore all areas altered by construction to pre-existing conditions. Such areas shall include, but shall not be limited to, areas used for travel, parking, and storage of vehicles, equipment and materials.

- C. Contractor shall be responsible for the proper disposal of all waste materials resulting from Contractor's operations, including rubbish, packaging materials, discarded equipment parts, and damaged construction materials, in a manner and at locations suitable to the Owner and all health and other regulatory agencies.

Pavement materials shall not be placed in pipeline trenches. Contractor shall remove said pavement materials and dispose of same at an approved location.

**24. Earthwork and Soils Engineering Services by Owner and Contractor**

Earthwork shall be performed in accordance with the Technical Specifications, except as modified herein or on the Construction Drawings. Contractor shall clear and grub the areas to be excavated as well as any area used for temporarily stockpiling excavated material (onsite).

Contractor shall notify Owner when any work is complete and ready for compaction testing. After such notification, Owner will have all necessary tests made by a soils engineer of Owner's choosing, and Owner will pay for all tests which "pass". Contractor shall pay for all tests which "fail" in the course of determining compliance of completed backfill with compaction requirements. Owner will not pay for any "preliminary" or "progress" tests; however, Contractor may do so at Contractor's own expense. Passing compaction tests will be required prior to construction of any structures. Compaction testing shall be completed and accepted by Owner prior to testing of piping.

For site piping, compaction tests will be taken in the pipe zone, trench backfill, and in the subgrade at locations designated by Owner.

Contractor shall assist, at no additional cost to Owner, soils engineer in taking all compaction tests. Contractor shall furnish all equipment (including shoring), labor, and materials needed for such assistance. Contractor shall allow 24 hours from notification of Owner to time of actual testing.

**25. Excavation Dewatering**

Contractor is advised that groundwater was encountered at a depth of approximately 32 feet below ground surface during performance of the Geotechnical Investigation Report. Contractor shall include all costs for providing materials, equipment, power, labor, and related expenses associated with diverting surface water runoff from excavations, dewatering surface water that enters the excavations, and dewatering groundwater within the excavations within each associated bid

amount. Contractor shall be responsible for establishing Well Points (if necessary) or pumping locations in the excavations to adequately remove water from within the excavations during construction.

All dewatering shall be performed in conformance with all safety regulations and RWQCB requirements (see Section 14.C. herein). Contractor shall have the sole responsibility to obtain all permits and clearances from any and all regulatory agencies. Where required by RWQCB, monitoring shall be performed by Contractor.

**26. Contractor's Project Superintendent and Field Supervisors**

Contractor shall have a designated project superintendent or field supervisor from Contractor's organization at the job site during all construction activities, to respond to the Owner and receive directions or instructions from Owner. Contractor shall provide Owner with a twenty-four (24) hour emergency phone number for project superintendent and field supervisors prior to beginning of construction.

**27. Project Schedule**

Within thirty (30) calendar days after award of the Contract, the Contractor shall submit a detailed project schedule showing the order in which Contractor proposes to carry out the work and the dates when the various parts are to begin and to be completed. The Owner will utilize the schedule to coordinate the Owner's activities, including inspection, and for identifying any conflicts, errors, or misunderstandings of Contract Document requirements by Contractor. The Contractor is solely responsible for project progress planning, completion of the work within the project completion time specified, and the accurate preparation of the project schedule to assist in meeting the Contract Completion Times specified. Schedule shall meet the requirements set forth in Specification Section 01300, Contractor Submittal, except for the following:

Schedule does not need to distinguish between critical path and non-critical path activities. Contractor shall revise and resubmit the progress schedule monthly; however, flagging all slippages and missed milestones and the narrative description is not required.

Note that revision and resubmittal of the project schedule is required monthly and that the project schedule will be reviewed by Owner before the monthly progress payment will be made. Although Owner may provide commentary relative to the Contractor's schedule, the schedule (and related schedule updates) will not be "approved".

**28. Early Completion and Overhead**

Contractor shall include in Contractor's bid all overhead, both field and home office, for the entire duration from the Contract Time as listed in the Notice Inviting Bids and/or the Bidding Documents, or, if modified by these Special Requirements, the Contract Time included in these Special Requirements. Submission of an early-completion schedule shall not entitle Contractor to compensation for delays that do not extend the completion of the project beyond the Contract Completion Date.

**29. Specified Manufacturers and Model Numbers**

Inclusion of a specific manufacturer's name in the Specifications does not mean that the specific manufacturer's standard equipment will be acceptable. Specified manufacturer's or other



manufacturer's standard equipment shall be modified as required to meet the Specifications. All model numbers supplied herein or on the Construction Drawings are provided for information only, to assist Contractor in selecting equipment that conforms to Specification and Drawing requirements. In case of any conflict between model numbers provided and the descriptive specifications or performance specified, the descriptive specifications and performance specified shall govern.

**30. Safety Requirements of Equipment Furnished by Contractor**

The equipment furnished by Contractor shall comply with the applicable requirements of the Safety Orders of the Division of Industrial Safety of the State of California. Copies of the Safety Orders are available at the Printing Division, Documents Section, State of California, Sacramento, California, 95814.

**31. Construction Power**

120V electrical power is available to Contractor at the project site via receptacles at the Equipment Building (15A maximum). Contractor shall provide their own electric power in excess of 15A and 120V if necessary for the work. Contractor may arrange to obtain temporary construction power from SCE if necessary, at Contractor's own expense.

**32. Storage of Materials and Equipment, Site and Adjacent Property Security, and Backfill of Excavations**

Contractor shall not store materials or equipment on private or public property or within street right-of-way without written permission from the affected property and Owner approving such use. Said written permission shall be submitted to Owner prior to Contractor moving materials or equipment onto site.

Contractor's designated storage area for materials and equipment is limited to the Plant site.

Contractor's equipment shall be removed from public right-of-way and placed in the Contractor's designated storage area at the end of each work day.

The project site is subject to vandalism. Contractor shall be responsible for providing all security measures necessary to secure stored materials and equipment, and to protect construction areas. Owner is not responsible for items lost, damaged, or stolen from said areas or for injuries to the public due to unsafe conditions. Contractor shall coordinate with Owner for locks on site access gates.

All excavations in public right-of-way, including pipeline trenches, shall be backfilled at the end of each working day.

**33. Sanitation**

For the entire period of construction, Contractor shall provide portable toilets for Contractor's personnel at the Plant site.

**34. Site Cleanup**

Contractor is required to maintain the cleanliness of the work area. All construction debris shall be promptly removed and disposed in accordance with the specifications. Any debris left on the work

area that poses a safety hazard or hampers access to the site shall be removed immediately. Contractor shall be responsible for all costs associated with site cleanup. Failure to clean up the site will result in withholding \$50,000 per month from the monthly periodic pay estimate.

**35. Records of Construction**

Contractor shall keep and maintain, at the project site, one (1) record set of Construction Drawings as specified in Specification Section 01300, Contractor Submittals. Requests for partial payments will not be accepted if the record drawings are not kept current.

The Owner will not process Contractor's Final Payment Request until all records of construction have been completed and delivered to the Owner.

**36. Confined Spaces**

Before entering or working in any confined spaces, particularly excavations, Contractor shall conform to the provision of the State of California, California Administrative Code, Title 8 - Industrial Relations, Chapter 4 - Division of Industrial Safety, Subchapter 7 - General Industry Safety Orders, Article 108 - Confined Spaces, Sections 5156, 5157, and 5158.

Contractor shall submit an adopted Injury and Illness Prevention Program and a Confined Space Entry Permitting Program for the Owner's records. Contractor shall follow the provisions of Contractor's adopted safety plans.

As a minimum, the following are considered confined spaces:

Excavations, including Trenches and Shored Pits over 4' Deep

Contractor shall test the atmosphere inside the confined space with an instrument capable of measuring oxygen, carbon monoxide, hydrogen sulfide, and explosive gases. If safe, Contractor shall continue to continuously monitor the atmosphere since the work being performed could affect the atmosphere. If unsafe levels of oxygen, carbon monoxide, hydrogen sulfide, or explosive gases are detected, the Contractor shall force ventilate confined spaces until atmosphere therein has been purged and is safe for personnel. Contractor shall continuously monitor atmosphere for oxygen, carbon monoxide, hydrogen sulfide, and explosive gases, and if unsafe levels are detected, he shall remove personnel from the confined spaces.

**37. Construction Mitigation Measures**

Contractor shall implement the following mitigation measures to reduce construction impacts:

- A. Throughout all phases of construction, including suspension of work, and until final acceptance of the project, Contractor shall abate dust nuisance by cleaning, sweeping, and sprinkling with water, and other means as necessary. Contractor shall furnish and apply all water necessary for dust abatement purposes. The use of water for dust control and abatement shall not result in mud on public streets. The areas under construction shall be adequately watered throughout each working day to keep dust to a minimum. Watering of the site shall include all areas where dust conditions so warrant, including all areas void of vegetation.
- B. Contractor shall comply with all regulations of the South Coast Air Quality Management District (SCAQMD). To minimize adverse impacts to air quality, all heavy equipment

used by Contractor shall utilize Tier 1 or better engines as required by SCAQMD. All construction equipment shall be properly maintained and tuned per manufacturer's recommendations to keep air emissions to a minimum. Contractor shall submit verification of same to Owner every six months for each item of equipment on the Work site.

- C. Project grading shall not occur on days with winds over 20 miles per hour.
- D. If petroleum products are accidentally released to the environment by the Contractor, the area or contamination shall be defined and any contaminated soil or material shall be removed and disposed of legally. Identification, testing, and removal shall be performed by a properly licensed contractor.
- E. Contractor shall operate all construction equipment with required noise attenuation devices (such as mufflers) based on the regulations in place at the time of construction. Contractor shall comply with the Riverside County Noise Regulations.
- F. Contractor shall place all trash and food items in secure containers, and remove them to an approved disposal site on a daily basis.

**38. Noise Control and Mitigation**

Contractor shall implement preventative measures to minimize excessive noise while performing the work in order to limit noise during construction to levels specified herein.

Proposed methods of noise mitigation and soundproofing may include: (1) equipping all internal combustion engines with critical residential silencers (mufflers), (2) shielding noise-producing equipment and directing greatest noise emissions away from residences, and (3) conducting operations in a manner to minimize noise generation consistent with Contract execution in a timely and economic manner.

A. Noise Limits

Maximum continuous levels from construction activities shall not exceed the following at the nearest dwellings:

Monday through Friday

Time	Sound Level (dBA)
7:00 AM to 5:00 PM	65 <sup>(1)</sup>
5:00 PM to 7:00 AM	55 <sup>(2)</sup>

Saturdays, Sundays and Holidays<sup>(2)</sup>

Time	Sound Level (dBA)
6:00 AM to 6:00 PM	55
6:00 PM to 6:00 AM	45

<sup>(1)</sup> Normal construction activities

<sup>(2)</sup> Special activity such as connecting to existing pipelines during low demand periods.

B. Equipment Noise Control

High performance mufflers shall be used on all diesel engines in regular use on the site. Truck engines are excluded.

C. Onsite Compliance

Contractor shall provide the services of an independent (third-party) noise monitoring consultant/firm to analyze noise at the project site at any time as directed by the Owner to demonstrate compliance with the noise levels specified herein.

D. Non-Compliance Corrective Action

If at any time during construction noise limits are exceeded, Contractor shall take immediate corrective action. Contractor shall verify compliance with noise limits by having the independent (third-party) noise consultant/firm take and record continuous noise measurements.

E. Noise Consultant

Independent noise consultant/firm shall have a minimum of ten (10) years' experience with similar projects requiring heavy construction equipment within close proximity to residences. Qualifications and experience, licenses, and required licensing for the consultant/firm and the method of noise monitoring shall be submitted to Owner for review and approval.

**39. Use of Construction Methods Employing Vibrating Equipment**

Due to the close proximity of existing dwellings and improvements adjacent to the project site, Contractor shall limit the use of construction methods employing vibrating equipment during installation and removal of shoring systems or driving equipment for sheet piling or other construction methods, such as vibration compactors where ground vibration is created that could damage the adjacent dwellings and improvements.

If Contractor proposes to use construction methods employing vibrating equipment, then Contractor shall conduct a Vibration Study to determine the acceptable level of vibration for the existing structures and improvements adjoining the area that will be impacted by the installation and removal of shoring, excavation, and backfilling (as a minimum, the structures and improvements within 300' of the excavation). Contractor shall employ the services of a Vibration Consultant to perform the study, examine structures to determine acceptable vibration levels which will not damage structures, and to continuously monitor vibration during said construction activities and to confirm compliance with vibration limits determined by the Vibration Study. As a minimum, four vibration sensors shall be located with one at each end of existing buildings along the properly line. Vibration criteria shall be submitted to Owner for review. Vibration monitoring instrumentation shall be used to continuously measure and record the vibration and actual velocity produced by said construction activities and the Vibration Consultant shall prepare a monthly compliance report. If not in compliance, the Vibration Consultant shall provide recommendations to achieve compliance and Contractor shall perform corrective action and modify his construction activities to comply with the acceptable limits determined by the Vibration Study.

**40. Right to Operate Unsatisfactory Facilities**

If the operation of the facilities after installation proves to be unsatisfactory to Owner, Owner shall have the right to operate equipment until it can be taken out of service without injury to Owner for the correction of defects, errors, or omissions, provided the period of such operation pending the correction of defects, errors, or omissions shall not exceed one year without written consent of Owner and Contractor.

**41. Warranty/Guarantee**

Guarantee shall be as specified per the Contract Appendix, Item 37. In addition, Contractor shall provide to Owner, the warranties, extended warranties/guarantees, and license agreements from manufacturers as specified in the Technical Specifications for equipment.

**42. Abbreviations**

Whenever in these Contract Documents the following abbreviations are used, the intent and meaning shall be interpreted as follows:

- AA.....Aluminum Association
- AFBMA .....Anti-Friction Bearing Manufacturer's Association
- AGMA .....American Gear Manufacturer's Association
- CBC.....California Building Code
- FM.....Factory Mutual
- IEC .....International Electrotechnical Commission
- ICBO .....International Conference of Building Officials
- JIC .....Joint Industry Conferences of Hydraulic Manufacturers
- NBFU .....National Bureau of Fire Underwriters
- NESC .....National Electric Safety Code
- NFPA .....National Fire Protection Association
- NSF .....National Sanitation Foundation
- PS .....Product Standards Section - U.S. Department of Commerce
- REA.....Rural Electrification Administration
- SCE .....Southern California Edison Company
- SFSA .....Steel Founder's Society of America
- SSPWC .....Standard Specifications for Public Works Construction
- UFC.....Uniform Fire Code
- UL .....Underwriter's Laboratories, Inc.
- UPC.....Uniform Plumbing Code
- UMC .....Uniform Mechanical Code

Unless a particular issue is designated, all references to the above specifications, standards, or methods shall, in each instance, be understood to refer to the issue in effect (including all amendments) on the first published date of the Notice Inviting Bids. Additional abbreviations are defined in the Basic Specifications and on the Contract Drawings.

#### **43. National Standards**

The equipment and materials furnished under these Specifications shall be designed, constructed, and tested to meet all of the applicable requirements of the IEEE, ANSI, NEMA, ASTM, and ASME Standards, all as last revised, unless stated otherwise in these Specifications.

All steel castings used in the manufacture of the equipment shall conform to the latest applicable requirements of the Steel Castings Handbook as published by the Steel Founder's Society of America.

#### **44. Traffic Control**

Contractor shall maintain one (1) lane of traffic in each direction at all times. Contractor shall prepare all traffic control and detour plans in accordance with City of Jurupa Valley encroachment permit requirements, and shall submit same to the City of Jurupa Valley for review and approval. Contractor shall not begin any work until the City of Jurupa Valley has reviewed, signed, and approved traffic control and detour plans and issued encroachment permits and the Owner has issued a Notice to Proceed for the project. Traffic control and detour plans shall be prepared, signed, and stamped by a registered civil engineer or traffic engineer licensed in the State of California.

Contractor shall be prepared to modify traffic control and detour plan requirements as required by the City of Jurupa or the District as conditions warrant. Throughout the work, Contractor shall inspect traffic control equipment (signs, barricades, arrowboards, and delineators) and shall maintain same in accordance with the traffic control and detour plan drawings.

At a minimum, all construction signing, lighting, and barricading shall comply with State of California, Department of Transportation "Manual of Uniform Traffic Control Devices" (MUTCD), latest edition.

#### **46. Reference Documents**

The following documents are provided in Appendices C and D of these Specifications. These documents provide information relative to existing facilities and equipment.

1. Appendix C - Record Drawings for Wells No. 17 and No. 18 Iron and Manganese Facility prepared by Krieger & Stewart, dated May 21, 2013
2. Appendix D - Record Drawings for PFAS Treatment Project at Mn Plant #2 (Leland Thompson Water Treatment Facility) prepared by Hazen & Sawyer, dated October 10, 2020

Contractor shall be aware that these documents are to be utilized for reference purposes only and may not accurately depict the actual location of the facilities constructed. Contractor shall be responsible for verifying actual conditions of existing facilities at the project site.

[PAGE INTENTIONALLY LEFT BLANK]

## **BASIC AND TECHNICAL SPECIFICATIONS**



# **SECTION VIII-1 TECHNICAL SPECIFICATION - GENERAL REQUIREMENTS**

## **TABLE OF CONTENTS**

A.	DEFINITIONS	VIII-1-1
B.	ABBREVIATIONS	VIII-1-2
C.	PERMITS, CERTIFICATES, LAWS, AND ORDINANCES	VIII-1-3
D.	CONTRACTOR'S LIABILITY	VIII-1-3
E.	RIGHTS-OF-WAY	VIII-1-3
F.	INTERFERENCES	VIII-1-4
G.	SANITATION	VIII-1-4
H.	ACCIDENT PREVENTION AND FIRST AID	VIII-1-4
I.	FIRST AID FACILITIES	VIII-1-5
J.	MATERIALS	VIII-1-5
K.	CONSTRUCTION	VIII-1-5
L.	RECORDS OF CONSTRUCTION	VIII-1-6
M.	INSPECTION	VIII-1-6
N.	EXAMINATION OF WORK	VIII-1-6
O.	RIGHT TO OCCUPY WORK	VIII-1-6
P.	MAINTENANCE AND GUARANTEE	VIII-1-6
Q.	CONSTRUCTION POWER	VIII-1-7
R.	CONSTRUCTION WATER	VIII-1-7
S.	WELDING	VIII-1-7
T.	ENVIRONMENTAL FACTORS	VIII-1-7
U.	PROTECTION OF FACILITIES AND PROPERTY	VIII-1-9

## **SECTION VIII-1 TECHNICAL SPECIFICATION - GENERAL REQUIREMENTS**

### **A. DEFINITIONS**

Whenever the terms herein defined occur in these Specifications or other related documents, they shall have the meanings here given.

1. "District" or "Rubidoux" shall mean the RUBIDOUX COMMUNITY SERVICES DISTRICT, 3590 Rubidoux Boulevard, Rubidoux, California, 92509, its Manager, and any other person or persons designated by the District to act on its behalf.
2. "Manager" shall mean the person designated by the Board of Directors of the RUBIDOUX COMMUNITY SERVICES DISTRICT to have charge, supervision, and administration of said District.
3. "Engineer" shall mean the California Registered Professional Engineer designated by the District to give the work general engineering supervision.
4. "Developer" shall mean the person, persons, or firm having legal authority to enter into agreements with the District as related to work performed within the public rights-of-way and Public Utility Easements and having legal responsibility of the Developer's Engineer and Contractor retained or contracted by the Developer to perform the work.
5. "Developer's Engineer" shall mean the California Registered Engineer designated by the Developer to design the proposed water and/or sewer system facilities in accordance with District rules, regulations and standards.
6. "Contractor" shall mean the person, firm, or corporation responsible for the construction of water and/or sewer system facilities and improvements or any portions thereof to be integrated into the District's water and/or sewer system either on behalf of the District or on behalf of a Developer.

Contractor shall at all times be represented on the Work in person or by a duly designated agent or superintendent. Contractor shall hold a valid Contractor's License in accordance with the provisions of Division 3, Chapter 9 of the Business and Professions Code of the State of California, and any amendments thereto.

7. "County" shall mean Riverside County, California and/or San Bernardino County, California.
8. "Work" shall mean all Work to be performed by Contractor and shall be as specified by these Specifications and the Construction Drawings, Special Requirements, and Specific Directions for any particular project.

The District may at any time during Work, by written order, make such changes as found necessary in the character, quality, or quantity of the Work to be furnished.

9. "Construction Drawings" shall mean those drawings approved by the District showing dimensions, details, features, and requirements of the Work. Said Construction Drawings shall be used in conjunction with Special Requirements or Specific Directions and shall be augmented by these Specifications and the Standard Drawings.

10. "Special Requirements" shall mean those requirements describing Work not specified by Construction Drawings or Specific Directions, clarifying Work as shown by Construction Drawings or as described by Specific Directions, or supplementing or modifying these Specifications. Said requirements may be written or verbal.
11. "Specific Directions" shall mean those instructions of the District supplementing or modifying the Construction Drawings, Special Requirements, and Specifications and shall include all Work not specified by Construction Drawings or Special Requirements. Said instructions may be written or verbal.
12. "Specifications", also "Construction Specifications", shall mean the requirements contained herein and shall apply to all Work, where applicable, unless specified otherwise, in the Construction Drawings, Special Requirements, or Specific Directions. Said Specifications shall augment Construction Drawings, Special Requirements, or Specific Directions and shall pertain to all methods and materials of construction.
13. "Standard Drawings" shall mean all drawings referenced as such and bound with the Specifications. Said Standard Drawings shall be considered an integral part of the Specifications.
14. "Standard Specifications" shall mean the Standard Specifications for Public Works Construction, latest edition, as published by Building News, Inc, Los Angeles, California. The Standard Specifications shall augment, not supersede, the "Construction Specifications". As used herein, the Standard Specifications shall not apply to measurement, payment, schedule, delays, or extra work.

**B. ABBREVIATIONS**

Whenever used in these Specifications, the following abbreviations shall refer to the agency shown:

- |     |        |  |
|-----|--------|--|
| 1.  | AASHTO | American Association of State Highway and Transportation Officials |
| 2.  | ACI    | American Concrete Institute  |
| 3.  | AISC   | American Institute of Steel Construction                           |
| 4.  | AISI   | American Iron and Steel Institute                                  |
| 5.  | ANSI   | American National Standards Institute                              |
| 6.  | API    | American Petroleum Institute                                       |
| 7.  | ASTM   | American Society for Testing Materials                             |
| 8.  | AWWA   | American Water Works Association                                   |
| 9.  | AWS    | American Welding Society   |
| 10. | CRSI   | Concrete Reinforcement and Steel Institute                         |
| 11. | DIPRA  | Ductile Iron Pipe Research Institute                               |
| 12. | EIA    | Electronic Industries Association                                  |
| 13. | IEEE   | Institute of Electrical and Electronic Engineers                   |
| 14. | IPCEA  | Insulated Power Cable Engineers' Association                       |
| 15. | NBFU   | National Board of Fire Underwriters                                |
| 16. | NEC    | National Electrical Code   |
| 17. | NEMA   | National Electrical Manufacturing Association                      |
| 18. | REA    | Rural Electrification Administration                               |
| 19. | SSPC   | Steel Structures Painting Council                                  |
| 20. | UL     | Underwriters' Laboratories   |

All references to Specifications of any of the above agencies shall mean the latest editions thereof.

### **C. PERMITS, CERTIFICATES, LAWS, AND ORDINANCES**

Unless specified otherwise, Contractor shall at no cost to the District, obtain all necessary permits, certificates, and licenses from such Federal, State, and local agencies as required to perform the Work. Contractor shall comply with all laws, ordinances, or rules and regulations of said agencies in performance of the Work.

### **D. CONTRACTOR'S LIABILITY**

Contractor shall be responsible, and the District shall not be answerable or accountable in any manner, for any loss or damage that may happen to the Work performed by Contractor, subcontractors, or those associated with or working under Contractor, or for any of materials or equipment used or employed in performing the Work, or for injury to any person or persons, including employees, the public, or others, or for damage to property from any cause which might have been prevented by Contractor, subcontractors, or those associated with or working under Contractor. Contractor having control over such Work must properly guard and does indemnify and hold the District harmless, and will defend the District therefrom at Contractor's own expense, against all injuries or damages to persons and property.

Contractor shall indemnify, defend, and hold the District harmless from any and all claims, demands, fines, and penalties imposed or levied by any Federal, State, or local agency associated with or related to the taking (as defined by the United States Fish and Wildlife Service and, or the California Department of Fish and Game) of any protected animal or plant species or habitat by Contractor, subcontractors, or those associated with or working under Contractor.

### **E. RIGHTS-OF-WAY**

Rights-of-way for the pipelines and appurtenances to be constructed shall be acquired before the Notice to Proceed is issued. Neither the terms hereof nor anything shown on the drawings in connection with the right-of-way shall be construed to entitle the Contractor to conduct operations in said right-of-way in violation of any public agency ordinance or regulation restricting interference with water courses and drainage channels, road, alley, or street, until the Contractor has obtained permits from the proper authorities.

In all of the streets in which the Contractor's work may interfere with ingress or egress of the occupants of the abutting property or of their vehicles, the Contractor shall maintain temporary practical means of ingress and egress or shall make satisfactory arrangements with the occupants for the obstructing of ways to their properties for the duration of the interference. Such arrangements shall be made in writing and a copy submitted to the District.

Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street or way during performance of the contract work, and the Contractor shall so conduct the work as not to interfere unnecessarily with the authorized work of other agencies in such streets and ways.

1. Permanent Rights-of-Way - For Developer financed Work, Developer shall provide the District with all permanent rights-of-way or permanent easements in a form approved by the District, unless specified otherwise.

For District financed Work, the District will obtain all permanent rights-of-way or permanent easements as required to perform the Work unless specified otherwise. Said rights-of-way will not include rights-of-way for which permits, certificates, and licenses are required from Federal, State, and local agencies, unless specified otherwise.

2. Access or Temporary Rights-of-Way - Contractor shall, at no cost to the District, obtain all access or construction rights-of-way of a temporary nature other than specified.

#### **F. INTERFERENCES**

Any and all crossings of public utility facilities such as waterlines, sewerlines, gas lines, electrical or control cables and/or conduits, telephone and/or telegraph cables and/or conduits shall be made by Contractor in accordance with requirements and Specifications of appropriate agencies. Contractor shall obtain any necessary permits, licenses, and/or agreements required by said agencies.

Whenever facilities are encountered, the Contractor shall ascertain the ownership thereof and shall make all necessary arrangements with the owners for the protection, removal, relocation, and/or replacement thereof. Contractor shall give the owners due notice of the requirements and shall give them convenient access and cooperate with them in every way while any work of removal and/or replacement is being performed.

#### **G. SANITATION**

All parts of the Work shall be maintained in a neat, clean, sanitary condition. Fixed and portable toilets, inaccessible to insects, shall be provided wherever needed for use by employees and their use shall be strictly enforced. All waste and refuse from sanitary facilities or from any source related to Contractor's operations shall be disposed of in a sanitary manner satisfactory to the District and in accordance with laws and regulations pertaining thereto. Contractor shall rigorously prohibit and prevent committing of nuisance within the Work area or upon the District's right-of-way or adjacent private property. Contractor shall furnish all facilities and means for proper sanitation for the Work and shall indemnify, protect, and save the District harmless from any liability resulting from improper or insufficient sanitation.

#### **H. ACCIDENT PREVENTION AND FIRST AID**

Contractor shall provide a safe working environment for all persons working on or affected by the Work. Contractor shall take precautions for the protection of persons and property at all times during the course of the Work. Contractor shall exercise and observe the safety provisions of applicable laws and building and construction codes. Contractor shall maintain in good and safe operating condition all equipment and facilities required for proper execution and inspection of the Work.

Contractor shall guard machinery, equipment, and hazards in accordance with safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, the Construction Safety Orders and Trench Construction Safety Orders as issued by the Division of Industrial Safety of the Department of Industrial relations of the State of California, and Chapter 8 ("Traffic Control and Protection of Workmen") of the Manual of Instruction for the Maintenance Department of the California State Division of Highways, to the extent that such provisions are not inconsistent with applicable laws or regulations.

All warning signs, lights, barricades, and other measures designed to protect the traveling public shall be erected and maintained in good order by Contractor in accordance with applicable provisions of Chapter 21 ("Maintenance Signs, Barricades, and Traffic Control") of the Manual of Instruction for the Maintenance Department of the California State Division of Highways and of the applicable ordinances of the public agency having jurisdiction over the maintenance and policing of highways, thoroughfares, and streets. Special regard shall be given to the rights and convenience of the traveling public and the property owners and residents in the area of Work. Cross-over boards or steel plates approved by the District shall be placed and other precautions taken

whenever necessary to provide for at least one-way traffic along all traveled streets and to provide access to driveways and residences, unless specified otherwise.

#### **I. FIRST AID FACILITIES**

Contractor shall keep first aid facilities and supplies on the jobsite. Contractor shall provide instruction in first aid as required by State regulations. Contractor shall provide emergency first aid treatment and supplies for Contractor's employees sufficient to comply with all applicable laws.

#### **J. MATERIALS**

Contractor shall furnish only approved materials as listed in the District's approved material list. All materials to be furnished by Contractor shall be new and of the best quality for their intended use. All like materials shall be of one manufacture for any particular project.

Contractor shall submit 3 copies of all material lists to the District for approval thereof. Said material lists shall include manufacturer's name, designation, description, and related information of all materials to be furnished and installed or otherwise used by Contractor in the performance of the Work. Said material lists shall be submitted at or prior to project preconstruction meeting and said lists shall be approved by the District prior to beginning construction.

#### **K. CONSTRUCTION**

Contractor alone shall be responsible for the safety, efficiency, and adequacy of Contractor's plant, equipment, appliances, and methods and for any damage which may result from their failure or their improper construction, maintenance, or operation.

Contractor shall be responsible for examining all Construction Drawings, Specifications, Standard Drawings, Work site, delivery routes, and local conditions which may affect the Work.

Before proceeding with the Work, Contractor shall furnish the District any information required by the Construction Drawings, Specifications, Standard Drawings, Special Requirements, and Directions of the District.

Contractor shall keep at jobsite a complete set of Construction Drawings, Specifications, Standard Drawings, permits, certificates and licenses for the Work, and all other data required by the District. Contractor shall be responsible for checking all dimensions and quantities on said drawings or schedules and shall notify the District of any errors and omissions found.

Until acceptance of the Work by the District, Contractor shall bear the risk of injury or damage to any part of the Work by action of the elements or from any other cause and Contractor shall rebuild, repair, restore, and make good any injuries or damages to the Work except as limited in the Contract Appendix.

Contractor shall cooperate with other contractors who are working in the project area as the District may specify and shall comply with all orders of the District. Contractor shall employ only competent and skillful persons to perform the Work. Said persons shall be qualified or certified to perform the Work in accordance with requirements of said person's trade.

Contractor shall submit to the District for approval a construction schedule covering all Work based on normal work periods. Contractor shall not deviate from approved schedule without prior permission from the District. Whenever Contractor arranges to work at night or at any time other than normal work periods or to vary the period during which Work is to be carried on each day,

Contractor shall obtain special permission from the District to do so and shall keep the District properly informed of Contractor's activities. Construction schedule shall show the order in which Contractor proposes to carry out Work, dates of anticipated commencement and completion of Work and salient components thereof, and estimated percentage of Work to be completed at any time during the construction period.

**L. RECORDS OF CONSTRUCTION**

Contractor shall maintain at least one complete set of Construction Drawings on the jobsite during the course of construction upon which changes in the Work shall be noted as they occur. Contractor shall maintain said Drawings so that the District may at any time during the course of construction ascertain the changes that have occurred. Said Construction Drawings shall be the basis of the two sets of record drawings that Contractor shall provide the District upon completion of the Work.

**M. INSPECTION**

All materials and equipment furnished and all Work performed shall be subject to rigid inspection by the District. Contractor may be required to remove and replace under proper inspection any Work performed in the absence of prescribed inspection, with the entire cost being borne by Contractor irrespective of whether such Work is found to be defective. Work covered up without authority of the District shall, upon order of the District, be uncovered to the extent required to permit inspection, repair, or replacement and thereafter be recovered, and Contractor shall bear entire cost.

**N. EXAMINATION OF WORK**

Contractor shall furnish the District every reasonable facility for ascertaining whether Work is being accomplished in accordance with the requirements and intention of the Construction Drawings, Specifications, Standard Drawings, Special Requirements, and Directions of the District.

**O. RIGHT TO OCCUPY WORK**

The District may wish to occupy or place in service portions of the Work before its final completion and shall be at liberty to do so. Such occupancy or placing in service of any portion of the Work shall not relieve Contractor of the responsibility of protection and care of all Work until final completion and acceptance provided, however, that expense directly attributable to operation and placing portions of Work in service shall not be chargeable to Contractor.

**P. MAINTENANCE AND GUARANTEE**

Contractor shall guarantee that all Work performed meets all requirements specified as to character, quality, and quantity of materials and workmanship. Contractor shall replace all materials and pay all installation costs made necessary by defects in materials or workmanship supplied that become evident within one year after acceptance of the facilities.

Contractor shall replace all defective materials promptly upon receipt of written notice from the District. If Contractor fails to replace all defective materials promptly, the District may secure the service of others to perform the Work and Contractor shall be liable to the District for any costs including removal and replacement thereof.



## **Q. CONSTRUCTION POWER**

Contractor shall provide all necessary power required for Contractor's operations, and shall provide and maintain in good order such modern power equipment and installation as shall be adequate, in the opinion of the District, to perform the required Work in a safe and satisfactory manner.

## **R. CONSTRUCTION WATER**

Unless specified otherwise, the District will provide construction water to Contractor from its existing non-potable wells at established rates. Contractor shall furnish and install all necessary piping and appurtenances necessary to convey water from the District's metered service connection to place of use.

## **S. WELDING**

Welding shall be done by the electric arc method using a process which excludes the atmosphere from the molten metal, except where otherwise approved by the District. Welding electrodes used for manual welding shall be an approved type. Except as modified herein, welding process qualification and operator qualification shall comply with the applicable requirements of the "Code for Arc and Gas Welding in Building Construction" of the AWS.

Each weld shall be uniform in width and size throughout its entire length. Each layer shall be smooth, free from slag, cracks, pinholes, and undercut and shall be completely fused to adjacent weld beads and base metal. Cover pass shall be completely free of course ripples, irregular surfaces, non-uniform bead pattern, high crown, deep ridges, or valleys between beads, and shall blend smoothly and gradually into surface of base metal. Butt welds shall be slightly convex, of uniform height, and shall have full penetration. Fillet welds shall be of size indicated, with full throat, and with each leg of equal length. Repair, chipping, or grinding of welds shall not gouge, groove, or reduce base metal thickness.

## **T. ENVIRONMENTAL FACTORS**

Contractor shall take all reasonable precautions to protect the environment.

1. Air Pollution - Contractor shall use only machinery and equipment which is equipped with suitable air pollution control devices so that undue quantities of pollutants are not added to the atmosphere in the vicinity of the Work site. Contractor's equipment shall meet all Federal, State, and local requirements for air quality emissions and Contractor shall comply with all applicable Federal, State, and local air pollution control regulations.

Contractor shall also take all necessary precautions to control dust created by construction operations. Contractor shall be especially diligent in implementing a dust control program and shall be prepared to respond immediately and positively to any instructions for corrective action given by the District. Contractor shall use dust palliatives if necessary to satisfactorily control dust; however, Contractor shall secure the District's approval for use of dust palliatives other than water.

2. Explosives - Contractor shall handle, transport, store, and use explosives in accordance with applicable Federal, State, and local laws and regulations. Contractor shall be responsible for and make good any damage caused by Contractor's use of explosives.
3. Fires - Contractor shall exercise all precautions necessary to prevent unauthorized fires within or adjacent to the limits of the Work. Contractor shall be responsible for all damage resulting



from fire due directly or indirectly to Contractor's employees' activities or the activities of subcontractors or their employees.

4. Drainage and Flooding - Contractor shall manage excavation and spoil banks such that existing drainage conditions are not impaired. Contractor shall provide drainage in all cases where the existing drainage conditions are being unavoidably altered or disturbed by Contractor's operations. Temporary diversions, ditches, checks, swales, or other drainage structures or features necessary to ensure proper drainage and flood control shall be provided by Contractor at no extra cost to the District.
5. Historical and Archaeological Sites - If Contractor should encounter any evidence of historical or archaeological significance, the contractor shall immediately cease construction, notify the District, and refrain from any activity until the District orders Work to resume.
6. Noise Pollution - Contractor shall equip all machinery and equipment used for construction with noise control devices such as mufflers for internal combustion engines or other suitable noise suppressers. Noise produced by construction operations shall be kept to a minimum and shall be consistent with reasonable human health requirements considering time of day and location of Work site. Contractor shall comply with all applicable Federal, State, and local noise pollution control regulations.

Unless specified otherwise, noise levels in connection with the Work shall not exceed 75 dB(A) at a distance of one hundred (100) feet for relatively continuous exposure and they shall not exceed 90 dB(A) at that same distance for relatively infrequent intermittent exposure. Contractor shall be prepared to respond immediately and positively to any instructions for corrective action given by the District particularly with respect to complaints from the public.

7. Public Relations - Contractor shall give due consideration to the comfort and convenience of the public and shall instruct Contractor's employees to be polite and respectful in their dealings with the public at the Work site and in traveling to and from the Work site.
8. Traffic - Contractor shall adequately protect the public using any roads which are involved in Contractor's operations and shall maintain safe traffic flow in the vicinity of the Work. Contractor shall use signs, barricades, delineators, flashers, and flagmen, all in strict compliance with Federal, State, and local rules and regulations regarding traffic control. Public roadways shall not be barricaded or blockaded except in accordance with requirements of public agencies having jurisdiction over same. Contractor shall provide access to all walkways, sidewalks, driveways, and streets at all times. If requested by the District, Contractor shall furnish a traffic control program for the Work.
9. Vegetation and Wildlife - Contractor shall not destroy or disturb any vegetation or habitat unless absolutely necessary for the performance of the Work. Contractor shall take all steps necessary to ensure that Contractor's employees do not destroy or disturb any vegetation or wildlife in the prosecution of the Work or incidental thereto, including travel to and from the Work site.
10. Water Pollution - Contractor shall discard materials which might adversely affect ground or surface water at approved dump sites only. Chemicals and other water pollutants shall not be discharged into natural watercourses or on land tributary to said watercourses. Contractor shall comply with all applicable Federal, State, and local water pollution control regulations.
11. Cleanup - Premises occupied by the Contractor shall be kept in a neat, clean condition free from unsightly accumulation of rubbish. Contractor shall maintain all Work areas within or

without the project limits free from dust which would cause a hazard to the Work, operations of other contractors, or other persons or property. Upon completion of the Work, Contractor shall satisfactorily dispose of or remove from the vicinity of the Work all plants, building, rubbish, unused materials, concrete forms, and other equipment and materials belonging to or used under the Contractor's direction during construction and, if the Contractor fails to do so, the same may be removed and disposed of by the District at Contractor's expense.

#### **U. PROTECTION OF FACILITIES AND PROPERTY**

The drawings identify the various pipelines, conduits, and other existing utility structures as they are supposed to exist in construction areas, but no error or omission on said drawings shall be construed to relieve the Contractor from the responsibility of protecting any such pipeline, conduit, or other existing utility structures.

When deemed necessary by the District, revisions to the contract drawings and additional detailed drawings may be issued to the Contractor during the progress of the work.

No District valves or appurtenances of other utility facilities shall be operated by the Contractor without approval and/or instruction from the District or the utility, as appropriate.

Insofar as practical during the progress of the work, the property of any owner (including facilities such as a pipeline, conduit, sewer, culvert, storm drain, drainage ditch, flood control channel, overhead wire, cable, underground wire, or any other facility) shall not be disturbed but shall be supported and protected against injury and maintained in good operating condition at the expense of the Contractor. In no case shall any such property be disturbed or removed without the consent of the owner and approval of the District. The Contractor shall be responsible for making good all damage due to his operations and the provisions of this section shall not be abated even in the event such damage occurs after backfilling, or is not discovered until after completion of backfilling.

The Contractor shall explore the location and depth of underground facilities, sewers, and storm drains sufficiently in advance of pipeline laying or other construction operations so that changes in line or grade, or both, can be made in the pipeline without delay of the Contractor's construction schedule, without relaying or reconstructing previously installed pipelines or other facilities and to avoid wherever possible moving, altering, or reconstruction of the obstructing underground facilities, sewers, or storm drains.

It shall be the responsibility of the Contractor to verify the location of all obstructions shown on the plans and to locate any other underground utilities and structures which might necessitate a change in the line and/or grade of the new work. If the Contractor, while performing the work of construction, discovers utility facilities not identified in contract plans or specifications, the Contractor shall immediately notify the District.

In no case shall any utility that has been damaged, whether shown or not shown on the plans, be backfilled without the Contractor notifying the utility company of the damage. If the work requires, as shown on the drawings or as specified, or as required for the Contractor's convenience, that the surface and overhead facilities, underground facilities, sewers and storm drains should be moved, altered, relocated, reconstructed, or temporarily supported, in order that the facilities included in the contract can be constructed, the Contractor shall make all arrangements, therefore, with the respective owners and shall bear all expenses for moving, altering, relocating, or temporarily supporting the facilities.

In addition, the District may require the moving, altering, or reconstructing of obstructing underground facilities, sewers, or storm drains, and any compensation, therefore, will be the responsibility of the contracting party and not the District.

Pipelines determined to be abandoned may be destroyed if conflicting with the contract work and properly disposed of after approval by the District. All pipelines abandoned in place shall be crushed or filled (sand/cement slurry) and exposed ends of abandoned pipelines shall be plugged for water tightness as approved by the District.

THIS PAGE INTENTIONALLY BLANK

**SECTION 01026**  
**SCHEDULE OF VALUES**

**PART 1 - GENERAL**

**1.01 Summary**

- A. Section Includes: Preparation, format, and submittal of Schedule of Values.
- B. The Schedule of Values will establish unit prices for individual items of work and is a detailed breakdown of all lump sum bid items..
- C. The Schedule of Values will be the basis for payment of contract work and will be used to establish payment for any “extra work” i.e., work requested which is beyond the scope of the original contract.
- D. The Schedule of Values shall show percentage of work complete for establishing partial payment requests.

**1.02 Preparation and Requirements**

- A. Prepare satisfactory Schedule of Values identifying costs of items of work shown in sample included at the end of the Section.
- B. Assign unit prices to items of work and calculate total prices, which aggregate the Contract Price. Base unit prices on costs associated with scheduled activities for each item of work. *For any bid item broken down into unit prices, Contractor shall verify that the unit cost of the items does not extend beyond two decimal places and that the unit cost when multiplied by the unit quantity equals the exact bid item value with no remainder.*
- C. The Schedule of Values shall be used as a basis for determining progress payments on a lump sum contract or any designated lump sum bid item. The Schedule of Values shall be a schedule of cost loaded construction activities equal, in total, to the lump sum bid and shall be in such form and sufficient detail to correctly represent a reasonable apportionment of the lump sum. Prior to submitting a monthly payment request, the Contractor shall have submitted a detailed Schedule of Values and obtained approval from the Owner.
- D. Each lump sum bid item on the Bid Schedule(s), as set forth in the Contractor's Bid Proposal must be broken down separately. The breakdown of each lump sum bid item must cover the cost of construction required by the Contract Drawings and Specifications for that item. The sum of the values for the construction activities, within a bid item, must equal the total bid amount for that item. The breakdown shall include subcontract amounts, which shall not deviate from the amounts submitted in the Bid Proposal. The Contractor shall provide certification from the Subcontractors certifying the subcontract amounts.
- E. Each activity in the Schedule of Values shall delineate one construction activity. For example, the placement of concrete between construction joints, the construction of an electrical duct bank or pipeline between points A & B. The costing for each activity should include all costs for the labor and materials or equipment required to complete the activity.

For example, concrete construction activities should include all costs for the forming, placing of reinforcement, placing concrete, and curing. The cost for pipeline construction activities should include materials, equipment and installation including pipeline supports or thrust blocks. The excavation and backfill for a pipeline or structure may be separate activities. The Bid Proposal breakdown shall include the itemized costs for facility startup and testing to be performed before the final project acceptance is made. No non-construction activity shall be cost loaded.

- F. Where Contract Documents require a CPM Construction Schedule, the Contractor shall use cost loaded construction activities from the Construction Schedule as a Schedule of Values. Each construction activity shall be encoded to its bid item and a sort provided for each bid item totaling the cost loaded amount. The total of the Cost Loaded amounts for each bid item shall equal the amount bid for that item.
- G. The total of the Schedule of Values shall equal the current Contract value at all times. At any time during the progress of the Contract Work, the Owner reserves the right to review the cost loading of the Schedules of Values and direct necessary revisions. When requested by the Owner, the Contractor shall provide all information necessary to substantiate the cost loading.

### **1.03 Submittal**

- A. Submit preliminary Schedule of Values within thirty (30) days of the Notice to Proceed or at the preconstruction meeting (whichever is sooner), to the Owner for review and approval. **DO NOT SUBMIT THE SCHEDULE OF VALUES WITH YOUR BID PACKAGE.**
- B. Submit corrected Schedule of Values within ten (10) days upon receipt of reviewed or rejected Schedule of Values for approval by Owner.
- C. Upon request, support prices with data which will substantiate their correctness.
- D. Contractor shall submit Schedule of Values with monthly partial payment requests, and shall identify (at minimum) the following for each line item: contract dollar amount; previous paid percentage and dollar amount; current requested percentage and dollar amount; total (previous plus current) requested percentage and dollar amount; and remaining contract percentage and dollar amount.

## **PART 2 - EXECUTION**

### **2.01 Mobilization**

Contractor shall limit amounts included under mobilization to the following items (if required by the Contract Documents):

- A. Moving onsite any equipment required for first month operations.
- B. Temporary construction power.

- C. Fire protection system.
- D. Construction water supply.
- E. Providing field office trailers.
- F. Providing onsite sanitary facilities.
- G. Providing potable water facilities as specified.
- H. Arranging for and erection of Contractor's work and storage yard.
- I. Contractor's bonds and insurance.
- J. Subcontractor bonds and insurance.
- K. Obtaining all required permits, licenses, and fees.
- L. Developing construction schedule and Schedule of Values.

Contractor shall furnish data and documentation to substantiate the amounts claimed under mobilization. Total cost for mobilization shall be limited to no more than five (5) percent of the Total Contract Amount.

**2.02 Sample Schedule of Values**

The following is a sample and acceptable form for Schedule of Values.

**Owner may request additional detail as necessary to adequately represent the Scope of Work.** The contractor may provide an additional breakdown of any of the items listed below. **THE CONTRACTOR SHALL VERIFY ALL QUANTITIES AND ITEMS OF WORK PRIOR TO SUBMITTAL.**

**SAMPLE  
SCHEDULE OF VALUES**

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
<b>101</b>	<b>Furnish Contract Bonds, Project Insurance, Project Permits, and Project Management</b>				
a	Approved Bonds, Insurance, Schedule, Schedule of Values	1	LS	Lump Sum	
b	Project Permits	1	LS	Lump Sum	
<b>102</b>	<b>Mobilization of Equipment, Materials, and Labor</b>				
a	Mobilization	1	LS	Lump Sum	
b	Equipment	1	LS	Lump Sum	
c	Materials	1	LS	Lump Sum	

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
d	Installation	1	LS	Lump Sum	
e	Demobilization and Site Restoration/Clean Up	1	LS	Lump Sum	
<b>103</b>	<b>Furnish Trench Protection (For Trenches Greater Than 5' Deep)</b>				
a	Excavation		LS or CY		
b	Shoring	1	LS	Lump Sum	
c	Dewatering	1	LS	Lump Sum	
d	Installation	1	LS	Lump Sum	
<b>104</b>	<b>Furnish, Install, and Maintain Traffic Control</b>				
a	Prepare Traffic Control Plans	1	LS	Lump Sum	
b	Signs		EA		
c	Delineators		EA		
d	Arrowboards		EA		
e	Flagmen		EA		
f	Installation	1	LS	Lump Sum	
g	Maintain Traffic Control	1	LS	Lump Sum	
<b>105</b>	<b>Furnish and Install Aboveground and Belowground Backwash Supply Pipeline</b>				
a	Materials (Including Fittings, Adaptors, and Restraints)		LF		
b	Installation	1	LS	Lump Sum	
c	Supports		EA		
d	Valves		EA		
e	Backfill		LS or CY		
f	Import/Export		CY		
g	Miscellaneous Slurry		CY or LF		



Item No.	Description	Qty	Unit	Unit Cost	Total Cost
h	Miscellaneous Concrete <sup>(1)</sup>		CY or LF		
<b>106</b>	<b>Furnish and Install Aboveground and Belowground High-Pressure Relief/Raw Water Bypass Piping</b>				
a	Materials (Including Fittings, Adaptors, and Restraints)		LF		
b	Installation	1	LS	Lump Sum	
c	Supports		EA		
d	Valves		EA		
e	Backfill		LS or CY		
f	Import/Export		CY		
g	Miscellaneous Slurry		CY or LF		
h	Miscellaneous Concrete <sup>(1)</sup>		CY or LF		
<b>107</b>	<b>Modify Existing High Pressure Relief/Raw Water Bypass Valve</b>				
a	Materials	1	LS	Lump Sum	
b	Installation	1	LS	Lump Sum	
<b>108</b>	<b>Pavement Repair/Replacement</b>				
a	Pavement Removal		LF or CY		
b	Pavement Repair	1	LS	Lump Sum	
c	Installation	1	LS	Lump Sum	
d	Asphalt		LF or CY		
<b>109</b>	<b>Testing and Disinfection of Pipeline Facilities</b>				
a	Testing	1	LS	Lump Sum	
b	Disinfection	1	LS	Lump Sum	

Item No.	Description	Qty	Unit	Unit Cost	Total Cost
c	Flushing	1	LS	Lump Sum	
d	Temporary Storage Tanks	1	LS	Lump Sum	
<b>110</b>	<b>Furnish and Install Connection to Existing Distribution System Waterline</b>				
a	Materials (Including Fittings, Adaptors, and Restraints)	1	LS	Lump Sum	
b	Installation	1	LS	Lump Sum	
c	Valves		EA		
d	Backfill		LS or CY		
e	Import/Export		CY		
f	Miscellaneous Slurry		CY or LF		
g	Miscellaneous Concrete <sup>(1)</sup>		CY or LF		
<b>TOTAL (MUST EQUAL BID AMOUNT)</b>					

Footnotes:

- <sup>(1)</sup> Concrete placements shall be broken down into forming, placement of rebar, placement of concrete, and curing (i.e. successful cylinder breaks). If Schedule of Values does not break down concrete placements into these subcategories, payment will not be made until concrete placements are complete.

**DO NOT SUBMIT THE SCHEDULE OF VALUES  
WITH YOUR PROPOSAL PACKAGE**

**END OF SECTION**

**SECTION 01185**  
**WORK RESTRICTIONS AND SEQUENCE OF WORK**

**PART 1 - GENERAL**

**1.01 General**

- A. The Leland J. Thompson Water Treatment Plant (Plant) treats raw water from Well Nos. 1A, 8, and 18. The Plant provides critical water supply to the District's potable water distribution system.
- B. Contractor shall include costs in Contractor's bid price for compliance with the specific sequencing limitations and all the constraints and the related general factors pertaining to the Plant facilities.
- C. Contractor shall provide safe, continuous access to existing Plant facilities for District's staff. Isolation of individual equipment items or pipe segments may require equipment stoppage and/or valve closures. All equipment and valves shall be operated by District staff. Contractor shall not operate any existing equipment or valves.
- D. Unless specified otherwise, time periods specified in days herein shall mean calendar days.

**1.02 Interruption of Operation**

- A. The Work will require shutdown of the existing Plant. Shutdown of the Plant will be permitted to the extent that the District's potable water distribution system water supply demand can be satisfied without Plant operation.
- B. Unless specified otherwise in the Shutdown Coordination Schedule, Contractor shall provide written notification to the District at least 30 days prior to the planned date for commencement of an existing facility shutdown.
- C. Contractor shall minimize shutdown/interruption times by thorough advanced planning. At the time of shutdown/interruption, Contractor shall have onsite all equipment, materials, and labor necessary to perform the required work.

**1.03 Compliance with Regulatory Requirements**

- A. Contractor shall comply with all federal, state, and local regulatory requirements affecting execution of the Work.
- B. Contractor shall be responsible for any fines/penalties from regulatory agencies and consequential damages resulting from Contractor's activities.

**1.04 Utilities**

Contractor shall maintain continuous service of all electrical, communication, water, sanitary, and other utilities within the existing facilities. Contractor shall provide temporary utilities when necessary.

## **1.05 Sequence of Work and Shutdown Constraints**

- A. The sequence of work and constraints presented herein do not include all items affecting the completion of the Work, but are intended to describe some of the critical events necessary to minimize disruption of the existing facilities and to provide compliance with regulatory requirements. It is the Contractor's responsibility to identify any additional constraints for completion of the Work.
- B. Prior to commencing any work on or around existing facilities, Contractor shall collect pertinent measurements, information, and data from existing facilities. If necessary, Contractor shall revise the plans or dimensions shown thereon in order to meet the tie-in or shutdown time constraints without altering the intent of the design. All the Contractor's revisions shall be approved by the District prior to commencing any related work.

Contractor shall obtain all necessary measurements, information, and data of existing facilities required to fabricate and construct the proposed facilities. Fabrication and layout drawings of proposed facilities shall be based on Contractor's field measurements, including measurements of related all related facilities.

- C. All equipment, fabrications, parts, and other components necessary to complete the work during the shutdown shall be on the jobsite prior to final scheduling of the shutdown, unless otherwise allowed herein or by the District.
- D. Contractor shall be responsible for completion of all construction prior to placing each item of material or equipment into service. This shall include all civil, structural, mechanical, electrical, and instrumentation components.
- E. All shutdowns shall be coordinated with the District. Equipment and/or system shutdown will be performed by the District. Contractor shall submit a detailed work and sequencing plan for each shutdown and receive the District's approval at least 30 days prior to the planned date of shutdown. For each approved shutdown, Contractor shall submit a written confirmation notification 14 days in advance of the proposed shutdown to the District. Contractor shall have all materials and equipment onsite required for work to be performed during the shutdown, and notify the District at least 48 hours in advance of the scheduled shutdown. Contractor shall provide a final notification to the District at least 24 hours prior to the shutdown.

## **1.06 Submittals**

- A. Prior to commencing work, Contractor shall submit for District approval a detailed schedule in accordance with Specification Section 01300. The Contractor's schedule shall clearly describe the sequence of construction and shall comply with all constraints and limitations specified herein. The schedule shall include all work activities and sub-activities, and address all work restrictions and constraints, including critical events that may impact the operation of existing facilities. The submittal shall clearly identify required shutdowns and associated durations.
- B. At least 60 days prior to scheduling a shutdown, Contractor shall submit a detailed work plan and sequencing for the shutdown. District approval of the shutdown work plan and sequencing is required at least 30 days prior to the planned date of shutdown.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 Coordination of Work**

- A. Contractor shall maintain overall coordination of work execution throughout the project.
- B. Contractor shall obtain schedules from the subcontractors and suppliers and assume responsibility for correctness.
- C. Contractor shall incorporate schedules from subcontractors and suppliers into the schedule to plan for and comply with specified work, sequencing, and shutdown constraints.

### **3.02 Work by Others**

Where proper execution of the Work depends upon work by others (including work by the District), Contractor shall inspect said work and promptly report any discrepancies and defects to the District.

### **3.03 General Requirements for Execution Of Work**

- A. Locate temporary facilities in a manner that minimizes interference to District's Operations and Maintenance personnel.
- B. Unless specified otherwise, all existing process systems will be filled (charged) with the fluid/gas designated on the Drawings or the District's Record Drawings for the facility. Contractor shall review said Drawings to determine the extent of fluid/gas removal necessary to perform the specified work, including modifications and connections to existing facilities. Contractor shall be responsible for dewatering/evacuating, neutralizing, and disposal of fluids/gases from existing facilities and all other work associated with modifying or making connections to the existing facilities within specified shutdown limitations.
- C. Provide temporary materials and equipment suitable for exposure to construction activities, process elements, and project ambient conditions.

### **3.04 Sequence of Work**

- A. A general sequence of work for construction of the proposed Backwash Supply (BWS) Pipeline is provided below in Subpart D. This is one possible sequence of work and shall be the basis for the Contractor's bid. The general sequence of work does not include all steps or activities that the Contractor shall perform for complete and ready to operate facilities. Contractor shall develop a detailed sequence of work that incorporates the general sequence of work specified herein. Contractor may propose modifications to the general sequence of work. Contractor shall submit to District the detailed sequence of work for review and approval at least 30 days prior to commencing construction activities. The District will have the option to alter or modify Contractor's proposed sequence of work if it deviates from the general sequence of work and/or work restrictions specified herein. If Contractor's proposed modifications to the general

sequence of work are approved by the District, said modified sequence of work shall be implemented by the Contractor at no additional cost to the District. Any proposed modifications to the specified sequence of work shall reflect the necessary changes to all other project components. Contractor shall be responsible for the means and methods of construction and conforming to the approved detailed sequence of work.

- B. Contractor shall schedule and perform work activities, including subcontractor's work activities, in a manner that minimizes impacts on existing facilities operation, reduces the duration of equipment replacement activities as much as possible, and maintains District staff's access to Plant facilities at all times.

Contractor shall not commence removal of any existing equipment or material that is specified to be replaced, until the new equipment, material, and associated appurtenances have been delivered to the project site.

- C. The District's general sequence of work for the project is as specified below. The specified sequence of work is presented in accordance with the project's major work items. Work on any of the project's major items may be performed simultaneously, provided that the specified sequence of work for each major item is followed.

D. Specific Sequence of Work and Work Restrictions

1. Contractor shall construct the proposed BWS piping from the connection location in 34th Street to the existing onsite abovegrade iron and manganese filtration system backwash supply piping system.
2. The District will shut down the distribution system pipeline in 34th Street for a period of eight (8) hours for Contractor to perform the pipeline connection work. The proposed backwash supply pipeline shall be successfully hydrostatic pressure tested and disinfected prior to performing final connection to the backwash supply rate of flow control valve.
3. The District will shut down the onsite iron and manganese filtration system for a period of three (3) days (consecutive working days) for Contractor to remove the existing abovegrade segments of piping specified to be removed, relocate and modify the existing 16" high pressure relief/raw water bypass (HPR/RWB) valve (hydraulically operated diaphragm valve), relocate existing butterfly valves, construct the remainder of the proposed abovegrade piping, install 14" District-furnished magnetic flow meter, construct proposed chemical piping, connect to the existing backwash supply (BWS) rate of flow control valve, and connect to the existing well blowoff (WBO) piping. The proposed backwash supply pipeline shall be successfully hydrostatic pressure tested and disinfected prior to performing final connection to the BWS rate of flow control valve.
4. Contractor's schedule shall include a two (2)-day allowance for the District to construct/modify the electrical facilities associated with the BWS flow meter and HPR/RWB valve.
5. Contractor's schedule shall include a one (1)-day allowance for the District to startup and commission the District-furnished Contractor-installed magnetic flow meter.

**END OF SECTION**

**SECTION 01300**  
**CONTRACTOR SUBMITTALS AND REQUESTS**  
**TECHNICAL SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 Description**

This Section covers requirements for submittals and forms a part of all other Sections in which submittals are specified or required. This Section also covers Contractor's Requests for Information and Requests for Change.

Submittal Requirements Included in this Section

- A. Contractor's Construction Schedule
- B. Shop Drawings
- C. Material Samples
- D. Operation and Maintenance Manuals
- E. Requests for Substitutions or Equals
- F. Record Drawings

Contractor Requests Included in this Section

- A. Requests for Information
- B. Requests for Change
- C. Change Order Proposal

**1.02 CPM Progress Schedule**

Contractor shall submit to Owner a CPM progress schedule to demonstrate the Contractor is sequencing work activities in accordance with the Contract Documents constraints and to assist the Owner in planning the Owner's inspection and operation activities.

- A. Within thirty (30) days of Notice to Proceed (or within forty five (45) days of Notice of Award), Contractor shall submit a Critical Path Method (CPM) analysis for construction progress control, prepared on 11" x 17" charts. All construction activities and procurement shall be indicated in a time scaled format and a calendar shall be shown on all sheets along the entire sheet length. Each activity arrow or node shall be plotted so that the beginning and ending dates of said activity can be determined graphically by comparison with the calendar scale. All activities shall be shown using the symbols that clearly distinguish between critical path activities, non-critical activities, and free float for each non-critical activity. All non-critical path activities shall show estimated performance time and free float time in scaled form.
- B. The duration estimate indicated for each activity shall be computed in working days and shall be shown on the construction schedule in calendar days. It shall represent the single best estimate considering the scope of the work and resources planned for the activity. Except for certain non-labor activities, such as curing concrete or delivering materials, activity duration shall not exceed ten (10) working days (fourteen (14) calendar days), nor be less than one (1) working day unless otherwise accepted by Owner.

C. Contractor shall revise and resubmit the CPM progress schedule monthly, flagging all slippages and missed mile posts. Contractor shall attach a narrative description of proposed corrective actions to the resubmitted CPM progress schedule, including the following minimum information for each activity and critical path item:

1. Date of initial shop drawing submittal, as applicable.
2. Engineers time for review of shop drawings.
3. Ordering dates for long lead time items.
4. Dates for materials onsite.
5. Early start work dates.
6. Early finish work dates.
7. Late start work dates.
8. Late finish work dates.
9. Date of initial submittal of operation and maintenance manuals.
10. Date of final submittal of operation and maintenance manuals.
11. Testing and cleanup.
12. Final completion.

Contractor shall modify any portions of the construction schedule that become infeasible due to activities behind schedule or for any other valid reason. Any activity that cannot be completed by its original latest completion date shall be deemed to be behind schedule.

D. The CPM progress schedule must be submitted to the Owner before the monthly progress payment is made. Scheduling and completion of the project in a timely manner and per Contract completion time, is solely the Contractor's responsibility. The CPM schedules submitted to the Owner shall not modify or revise any Contract provisions presented in the Contract Documents.

E. Although the Owner may provide commentary relative to the Contractor's CPM schedule, the schedule (and related schedule updates) will not be "approved". The Owner will utilize the Contractor's schedules strictly for scheduling of necessary inspection and operations staff and for identifying any apparent conflicts, errors, or misunderstandings of Contract Document requirements by Contractor.

F. The scheduling and work progress is the total responsibility of the Contractor, and work shall be performed to meet the Contract Completion Times or Dates specified in the Contract Documents.

### **1.03 Shop Drawing Submittal**

A. General

1. All submittals shall be provided in searchable electronic PDF format.
2. The term "Shop Drawings" as used herein shall be understood to include all data covering all equipment, equipment components, fabricated materials, and furnished materials.
3. Data shall include, but shall not be limited to, design calculations, equipment drawings, fabrication and installation drawings, erection drawings, mix designs,



operating instructions, catalog sheets, data sheets, lists, graphs, and similar items. Data shall demonstrate full compliance with the Contract Documents.

4. Contractor shall submit shop drawings in a timely manner. Contractor shall allow sufficient time for Owner's review and approval of shop drawings. Contractor shall be responsible for any project delays resulting from late submittal of initial shop drawings or resubmittal of corrected or revised shop drawings.

B. Method of Submittal

Contractor shall deliver shop drawings submittals by means of dated, signed, and sequence numbered transmittals on Contractor's letterhead. Contractor shall clearly describe the submittal contents, identifying whether initial or subsequent submittals and stating the drawing numbers and specification sections, articles, and paragraphs to which the shop drawings pertain. All data sheets, catalog cuts, or drawings showing more than the particular item under consideration shall be clearly marked to delete all but the applicable information. All data sheets, catalog cuts, or drawings shall be clearly marked to delineate all proposed material and/or equipment options and accessories.

C. Deviations or Exceptions from Contract Documents

Where proposed equipment or materials, equipment components, equipment functions, or equipment operations deviate from the specifications and whenever exceptions to the specifications are taken, it shall be clearly noted on the shop drawing submittals. Deviations shall include references to the specific sections, parts, and paragraphs or drawing numbers and notes for which the deviations or exceptions are made.

D. Contractor's Review

All shop drawing submittals shall be carefully reviewed by Contractor prior to submission to Owner. Contractor shall indicate by a signed and dated stamp on the submittal that Contractor has checked the shop drawings as being correct and in strict conformance with the Contract Documents. When applicable, Instrumentation Subcontractor is also required to indicate by a signed and dated stamp on the submittal that Instrumentation Subcontractor has checked the shop drawings as being correct and in strict conformance with the Contract Documents. Shop drawings not so reviewed by Contractor (or Instrumentation Subcontractor, if applicable) may be returned without action taken by Owner, and any delays caused thereby shall be the responsibility of the Contractor.

During Contractor's review of shop drawings, Contractor is expected to thoroughly review all applicable portions of the Contract Documents for which shop drawings apply. This includes cross checking: General Drawings, Civil Drawings, Mechanical Drawings, Structural Drawings, Electrical/Instrumentation Drawings, Architectural Drawings, Landscape/Irrigation Drawings, and all applicable portions of the Specifications. Contractor shall bring any conflicts, errors, or apparent omissions to Owner's attention in writing during the shop drawing submittal process. If Contractor fails to bring conflicts, errors, or apparent omissions to Owner's attention during the shop drawing submittal process, Contractor may be required to remove and reconstruct completed work or perform corrective work at Contractor's expense (all as determined by Owner).

E. Owner's Review

1. Owner's review of the shop drawings submitted by Contractor will cover only general conformity to the Contract Documents. The review of shop drawings shall not relieve Contractor of full responsibility for any deviation from the requirements of the Contract Documents, or for providing a complete and operational system per the intended function. As specified above, deviations or exceptions to the Contract Documents (in addition to any conflicts, errors, or apparent omissions in the Contract Documents) shall be clearly indicated on the Contractor's shop drawing submittal. Contractor shall be responsible for any errors or omissions in the shop drawings and for the accuracy of dimensions, quantities, and the design of adequate connections and details. Contractor is also responsible for any conflicts, errors, or apparent omissions in the Contract Documents that are not brought to the Owner's attention during the shop drawing submittal process.
2. Unless specified elsewhere, Owner will return each shop drawing submittal to Contractor with comments noted thereon, within thirty (30) working days following their receipt by Owner. Alternatively, Owner may elect to provide comments to Contractor via Submittal Comment Sheet. An example Submittal Comment Sheet is attached in this Section for Contractor's reference. Contractor is expected to thoroughly review the Owner's comments, redlines, and dimensional changes for accuracy, and advise if complying with same would prevent the Contractor from providing a complete and operational system per the intended function. It is expected that Contractor shall prepare submittals in such a manner that he is able to obtain a complete and acceptable submittal by the second submission. Owner reserves the right to deduct monies from the amounts due to Contractor to cover the cost of the Owner's review beyond the second submission. Reimbursement to Owner shall be made by deducting such cost from the Contractor's subsequent payment requests. The reimbursements will be calculated at a flat rate of \$200 per hour.

F. Corrections and Resubmittals

Contractor shall make all required corrections and shall resubmit corrected shop drawings until found in general conformance with the Contract Documents and design concept of the project. Contractor shall respond to all of the Owner's submittal review comments (even if the response is that the comment will be addressed at a later date or under a separate submittal). If Contractor fails to address all submittal review comments, Owner reserves the right to return the entire submittal without review and any delays caused thereby shall be the responsibility of the Contractor. No work which requires shop drawing submittals shall be purchased or commenced until the pertinent shop drawings have been submitted, reviewed, and approved.

**1.04 Material Samples Submitted**

A. General

Whenever in the Contract Documents material samples are required, Contractor shall submit to Owner not less than two (2) samples of each such item for review and approval, all at no additional cost to Owner. Upon receiving approval by Owner, one (1) set of the

samples will be stamped and dated by Owner and returned to Contractor, and one (1) set of samples shall remain at the job site until completion of the work.

B. Delivery

Samples, as required herein, shall be submitted for approval at least thirty (30) days prior to ordering such material for delivery to the jobsite.

C. Identification

Contractor shall label or tag each sample, or set of samples, identifying the manufacturer's name and address, brand name, catalog number, project title, and intended use.

D. Colors, Patterns, and Textures

For items required to be of selected colors, patterns, textures, or other finish, Contractor shall submit sufficient samples to show the range of shades, values, patterns, textures, or other features corresponding to the instructions and requirements specified.

## 1.05 Operation and Maintenance Manuals

- A. Contractor shall prepare detailed operation and maintenance (O&M) manuals for all mechanical and electrical equipment furnished. The O&M manuals shall include (but not be limited to) the following information:

Installation and Operation

1. Installation Instruction
2. Design Capabilities
3. Operating Parameters and Recommended Ranges
4. Specific Equipment Installed, Model No., Serial No., etc.
5. General Literature
6. Operating Instructions
7. Special Problems or Precautions and Emergency Procedures
8. Safety Provisions and Precautions

Maintenance

1. Assembly, Disassembly, and Reassembly
2. Parts List, Including Drawings (Blowup Drawings Preferred)
3. Lubrication Type and Schedule
4. Preventative Maintenance Schedule
5. Recommended Replacement Parts Inventory
6. Details of Calibration and Adjustment
7. Wiring Diagrams (as Installed)
8. Completed Equipment Maintenance Data Sheet (Copy of Form Attached)
9. Equipment Warranties
10. Name, Address, and Phone Number of Local Parts Distributor and Service Center.

- B. Preliminary O&M manuals shall be submitted in electronic PDF format (searchable from Table of Contents and bookmarks). Contractor shall provide to Owner three (3) hard copy sets of the final (compiled) O&M manual. Each set shall consist of one (1) or more volumes, each volume shall be bound in a standard size, 3-ring, loose leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 2.5". Binder(s) shall be provided with the following identification inscribed on the cover(s): "Owner's name, project name, Equipment Operation and Maintenance Manual, Volume No." Each volume shall have a table of contents which indicates all equipment in the O&M manual and tabbed divider sheets placed before each section.
- C. All O&M manuals shall be submitted to Owner in final form not later than thirty (30) days before startup; all deficiencies contained therein shall be corrected by Contractor within thirty (30) days from the date of written notification by Owner; any deficiencies or changes noted during startup shall be corrected by Contractor and incorporated into the final O&M manuals.

### **1.06 Requests for Substitutions**

- A. Any reference in the Contract Documents to any item of equipment or material, by manufacturer's name, make, or other proprietary identification is intended to establish the type, function, and quality required. If the manufacturer's name is followed by the words "or equal" or "or approved equal", indicating that a substitution is permitted, such items of equipment or materials manufactured by others may be substituted provided sufficient information is submitted by the Contractor to allow the Owner to determine that such items of equipment or materials are equivalent to those named in the Contract Documents, subject to the following requirements:
  - 1. Contractor shall demonstrate equality as to type, function, and quality of each substitute item of equipment or material. Owner shall be the sole judge as to equality; Owner's decision shall be final.
  - 2. Contractor shall, within 30 days after Notice to Proceed or within 45 days after award of contract, make written application to Owner to furnish or use a substitute item of equipment or material.
  - 3. Contractor shall submit a list of five (5) installations utilizing the substitute item of equipment or material, including location, contact information (name and phone numbers), and dates of initial operation. The reference provided may be used in part as a basis for establishing the ability of a manufacturer to meet the performance requirements of the specification.
  - 4. Contractor shall submit documentation that the substitute item has been in use or operation for a minimum of five years (unless noted otherwise). Documentation shall include location and references telephone numbers that are familiar with the item.
  - 5. Contractor shall provide Owner with all requested data in order to evaluate proposed substitution.
  - 6. Acceptance by the Owner of a substitute item shall not relieve Contractor of the responsibility for full compliance with the Contract Documents and for adequacy

of the substitute item. Contractor shall be responsible for any changes and costs which may be required for substitutions.

7. Owner shall be allowed a reasonable time in which to evaluate each proposed substitute. Owner will record the period of time required to evaluate substitutions; Contractor shall reimburse Owner for charges whether or not the proposed substitute is accepted. Reimbursement to Owner shall be made by deducting such cost from the Contractor's subsequent payment requests. The reimbursements will be calculated at a flat rate of \$200 per hour.

#### **1.07 Record Drawing Submittal**

- A. Contractor shall keep and maintain at the jobsite one (1) set of record drawings. Contractor shall mark on drawings all changes in project conditions, locations, configurations, and any deviations which may vary from the details represented on the original Contract Drawings, including, but not limited to, buried or concealed construction and utility features which are revealed during the course of construction. Contractor shall record 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 detailed sketches as necessary to indicate the work actually constructed. These master record drawings of Contractor's representation of as-built conditions, including all revisions made necessary by addenda, change orders, and the like, shall be maintained up-to-date during the progress of the work. Record drawings shall be accessible to Owner at all times during the construction period and shall be delivered to Owner upon completion of the work.

- B. Payments pursuant to partial payment will not be made if the record drawings are not kept current, and if the record drawings, showing all variations between the work as actually constructed and as originally shown on the Contract Drawings or other Contract Documents, have not been inspected by Owner.
- C. Final payment will not be acted upon until Contractor has prepared and delivered complete, current record drawings to Owner. Said record drawings which must reflect all completed work, may be in the form of a set of prints with carefully plotted information overlaid in colored pencil.

#### **1.08 Contractor's Requests for Information (RFIs)**

Contractor may submit a Request for Information when it is necessary to obtain information or clarification regarding: requirements of Contract Documents, interpretation of Contract Documents, or apparent errors or omissions in Contract Documents. An RFI may also be submitted to state the Contractor's concern related to the omission or misapplication of a product, or to call to Owner's attention a superior product based on the Contractor's expertise. Contractor is expected to use the RFI form attached to this Specification. Contractor is not responsible for the Owner's costs associated with evaluating and responding to an RFI; however, Owner will not review Contractor's RFIs that are in fact Requests for Changes (RFCs), as determined by Owner. In such cases, Contractor will be required to resubmit on the appropriate RFC form. See Part 1.09 herein. Contractor shall allow Owner up to thirty (30) working days to respond to Contractor's RFIs. As such, Contractor is expected to thoroughly review all applicable portions of the Contract Documents for which the work is contemplated well in advance of Contractor commencing the

actual work. This will allow Contractor sufficient time to prepare the necessary RFIs and will allow Owner sufficient time to evaluate and prepare responses to same.

Within one week of receiving an RFI response from Owner, Contractor is required to notify Owner (in writing) if there are any cost or schedule impacts associated with Owner's response. Said notification shall be submitted as a Request for Change Order. All Requests for Change Order shall be submitted with proper justification and supporting documents, as determined by Owner. If no such advisement is made by Contractor, it will be understood that Contractor understands and accepts Owner's response, and that there are no cost or schedule impacts to the Contractor associated with same (even if the RFI response constitutes a change to the Contractor's scope of work).

### **1.09 Contractor's Requests for Change (RFCs)**

Contractor may submit a Request for Change when Contractor proposes a change in the Contract requirements. All change requests shall be submitted on the RFC form attached to this Specification. As shown therein, Contractor is required to fully describe the benefit(s) to the Owner, benefit(s) to the Contractor, the cost and/or schedule impact(s) associated with the requested change, along with whether or not Contractor proposes or requires a Contract Change Order for implementing the change. Except for as described in Part 1.08 herein, any Contractor RFC that is submitted on the RFI form will be returned without review.

As noted on the RFC form, it is understood that certain RFCs can be responded to promptly, with minimal expenditures required by Owner. It is also understood that other RFCs require significant expenditures by Owner in order to properly evaluate and respond to Contractor's RFC. For those RFCs that fall in the latter category, Owner will provide an estimate (time and money) to Contractor as an initial response to RFC. Contractor may then elect to have Owner proceed with evaluating Contractor's RFC (with estimated value deducted from Contractor's Contract with Owner), or elect to withdraw Contractor's RFC.

### **1.10 Change Order Proposal (COP)**

Change Order Proposals shall be prepared by Contractor and shall identify the cost and/or schedule impact(s) associated with changes in Contract work. COPs shall be submitted to the Owner on the COP form attached to this Specification. Contractor shall not perform any work associated with a COP without prior written authorization from Owner.

### **1.12 Submission in Electronic Media Format**

All documents (RFIs, RFCs, Submittals, Change Order Requests, etc.) shall be submitted electronically.

#### **A. General**

Provide all information in searchable portable document file (PDF) format; PC compatible using Windows operating system as utilized by the Owner. All information provided shall be consolidated to one PDF in the latest version of Adobe Acrobat, with a Table of Contents and bookmarks for each major section (for each submittal). When required below (or if required otherwise by Owner), documents shall also be provided electronically in Word format. If document exceeds the size in which Owner can receive by email (generally

larger than 10 MB), the document shall be uploaded to the Owner's FTP site (if available), or saved onto a CD or flash drive and transmitted to Owner.

B. Contractors using other software shall be required to provide to the Engineer conclusive evidence of 100 percent data transfer capability.

C. Shop Drawing Submittals

Contractor shall submit shop drawing submittals electronically in PDF format (searchable from bookmarks). This applies to all text documents, manufacturer's literature, diagrams, and all graphic submittals. Provide one (1) PDF file compatible with the latest version of Adobe Reader.

D. O&M Manuals

Contractor shall submit all preliminary O&M manuals in PDF format (searchable from Table of Contents and bookmarks). In addition to submitting three (3) hard copy sets of the final O&M manual (see Part 1.05 herein), Contractor shall submit the entire final O&M manual in PDF format (searchable from Table of Contents and bookmarks).

E. RFIs, RFCs, Correspondence, and Change Order Requests

Provide electronic submission in Word and PDF format.

**SAMPLE**  
**SHOP DRAWINGS/SUBMITTAL REVIEW COMMENT SHEET**

Job No.:

Date:

Project:

Owner:

Contractor:

Submittal No.: 15

Description: Vertical Turbine Pumping Units

---

---

COMMENTS:

Contractor shall **revise and resubmit** complete submittal addressing the following comments:

1. Vertical Turbine Pumping Units

- A. Per Parts 1.02.B.4 and 1.02.C.4 of Specification Section 11310, each fabricated steel discharge head shall be provided with an AWWA C207 Class E flanged base in lieu of proposed bottom plate.
- B. Although a +5% to +8% increase in total dynamic head is allowed by the Hydraulic Institute, the total dynamic head for each proposed pumping unit at the design flow rate shall be as specified in Parts 1.02.B.1 and 1.02.C.1 of Specification Section 11310. If said design condition causes the proposed motor to be overloaded (at 1.0 service factor) at any point on the pump performance curve, the pumping unit impellers shall be trimmed accordingly to reduce the motor load to non-overloading conditions (at 1.0 service factor).
- C. Although the pump cans will be provided by others, per Part 1.05 of Specification Section 11310 (Schedule A), the manufacturer shall verify the applicability of pumping equipment with respect to NSPHA, suction piping, pump can and discharge geometry to ensure prevention of cavitation, vibration, surging, overheating, corrosion, and vortexing. Refer to the Construction Drawings and piping/pump can fabrication drawings for suction and discharge piping and pump can information.
- D. Per Part 2.02.B of Specification Section 11310, pumping unit impellers shall be hydraulically balanced in addition to dynamically balanced.
- E. Per Part 3.02 of Specification Section 11310, the Contractor shall be responsible for installation. However, per Part 3.04 of Specification Section 11310, Contractor shall submit a letter to the Owner confirming that all pumping equipment was inspected, operation checked, and installation approved in writing by the pumping equipment supplier prior to operation of the equipment.
- F. Per Part 3.03 of Specification Section 11310, the pump manufacturer's representative shall supervise the field acceptance testing and shall certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.



- G. Per Part 3.03.A of Specification Section 11310, vibration of complete pumping unit as tested in the field shall not exceed 0.0025" peak to peak amplitude when operating. If said maximum vibration amplitude is exceeded, the pumping units shall receive a final field trim balance.
- H. Pump performance curves were not submitted for proposed pumping units as required per Parts 1.03 and 1.04 of Specification Section 11310. Submitted curves are not legible. Submit pump performance curves full size on 8-1/2" (ordinate) x 11" (abscissa) paper for proposed pumping units including the following:
- 1) Shutoff head, head versus capacity, pump bowl efficiency versus capacity, and brake horsepower versus capacity, all for full operating range specified.
  - 2) Certified values on each curve at all specified design points demonstrating compliance with the pumping unit requirements as outlined in Parts 1.02.B.1 and 1.02.C.1 of Specification Section 11310.
  - 3) Arrows pointing to the limits of recommended stable operation between which pumps are to be operated to prevent surging, cavitation, and vibrations. Limits of operation shall be included on each speed curve provided for the FE/BWS pump.
- I. Submitted pump manufacturer's brochure is for M Series Vertical Turbine Pumps. Submitted bill of materials, pump data sheets, pump dimensional sheets, and Operation and Maintenance manual indicate the proposed pumps are Model VIC. Submit data confirming that proposed pumps are either M Series or Model VIC. Submit manufacturer's brochure corresponding to the proposed pumps.
- J. Per Parts 1.02.B and 1.02.C of Specification Section 11310, pumping units shall operate with suction can pressure ranging from 0 to 5 psi. Submitted hydraulic analyses indicate the pump is suitable for operating with suction can pressure of 0 psi. Submit data indicating that pumping units are suitable for operation within the specified suction can pressure range.
- K. The FE/BWS pump discharge head shall be provided with a 36" Class E flanged base (46" O.D.) to match the approved pump can fabrication drawings in lieu of proposed 48.75" O.D. bottom plate.
- L. Per Part 1.02.C.4 of Specification Section 11310, the discharge head for the RCW unit shall be provided with the dimensions shown on the Construction Drawings. The dimension shown on the Construction Drawings from the bottom of the discharge head base flange to the centerline of the discharge is 26-1/12". Submitted dimensional drawing for the RCW pump discharge head indicates this dimension will be 27". Revise drawings to include the required 26-1/2" dimension.
- M. Per Part 2.02.A of Specification Section 11310, the pump bowls shall be lined with vitreous porcelain enamel in lieu of submitted epoxy. Per submitted manufacturer's vertical turbine pump brochure, glass-lined cast iron bowls is a standard design feature. Submit manufacturer's product data sheets on glass lining in lieu of epoxy coating.
- N. Per Part 2.02.A of Specification Section 11310, the pump bowls shall be of Class 30 (or better) cast iron and have minimum tensile strengths of 30,000 psi. Submit data verifying same.

- O. Per Part 2.02.B of Specification Section 11310, the pump impellers shall be of the enclosed type. Submit data verifying that proposed impellers are of the enclosed type.
- P. Per Part 2.02.H of Specification Section 11310, the strainer shall be provided with cross vanes for vortex suppression. Submit manufacturer's product data sheets for proposed strainer verifying same.
- Q. Per Parts 1.02.B.8 and 1.02.C.8, basket strainer shall be attached to pump with stainless steel fasteners. Submit data indicating same.
- R. Per Parts 1.02.B.6, 1.02.C.6, and 2.02.J of Specification Section 11310, the top shaft shall be two-piece with a coupling accessible within the pump discharge head. Said coupling shall be flanged. Submit manufacturer's data sheets for required coupling.
- S. Nameplate data was not provided with submittal. Submit proposed nameplate for pumping units per Part 2.04 of Specification Section 11310.
- T. Manufacturer's proposal to provide John Crane Type 1 mechanical seal in lieu of specified John Crane Type 21 mechanical seal is acceptable. However, resubmit manufacturer's product data sheets for proposed mechanical seal clearly delineating the proposed materials of construction. Provide drawing detail of mechanical seal as installed in discharge head, including all necessary piping and drain line to pump can.
- U. Proposed Tnemec N140 epoxy coating is accepted for coating the pump head and column.

2. Vertical Hollow Shaft Electric Motors

- A. Although proposed motors will be balanced to limit the vibration to 0.08 inches per second, the total vibration for the assembled pumping unit as tested in the field shall not exceed 0.0025" peak to peak amplitude when operating.
- B. Per Part 2.06.N of Specification Section 11310, the lubrication system shall have sufficient oil storage and cooling capacity to limit the oil bath temperature rise to 45° C above 40° C ambient temperature. Proposed exception states that Emerson's standard oil bath temperature rise will be provided. Submit data for Emerson's standard oil bath temperature rise design.
- C. Manufacturer's statement that motors will be provided with "Emerson standard oversized main conduit box" is unacceptable. Per Part 2.06.R of Specification Section 11310, motors shall be equipped with extra-large heavy duty split type conduit boxes. Manufacturer's catalog information indicates that conduit boxes one size larger than standard are available for vertical hollow shaft motors. Submit manufacturer's product data sheets indicating proposed motors will be provided with required conduit boxes.
- D. Proposed 7.5 hp TEFC motor shall be provided with drain and breather elements (brass construction). Submit written confirmation of same.
- E. The requirements set forth in Specification Section 16150 do not apply to the proposed vertical hollow shaft motors; therefore, the submitted exceptions to same are not necessary.

- F. Submitted data sheets for the FE/BWS pumping unit motor include an 1,800 rpm motor. Per submitted pumping unit data and Part 1.02.B.1 of Specification Section 11310, a 1,200 rpm motor is required for said pumping unit. Submit manufacturer's product data sheets for required motor.
- G. Submitted data sheets for the proposed motors include an ambient temperature rating of 40° C (104° F). Per Item 10 of the Supplemental Special Requirements, all equipment shall be designed for maximum ambient temperature of 120° F. Submit revised motor data sheets demonstrating that motors will be provided with required temperature rating suitable for continuous operation at 120° F ambient temperature.
- H. Per Part 2.06.L of Specification Section 11310, motors shall be equipped with angular contact ball thrust bearings. Submit data verifying required bearings will be provided. Submit motor thrust capacity for one year L-10 minimum life.
- I. Per Part 2.06.O of Specification Section 11310, motor thermal protection shall be set to open control circuit at 135° C. Submit data verifying same. Contractor shall coordinate installation of motor thermal control modules (Siemens Thermasentry) to be provided by the motor manufacturer with the MCC manufacturer for mounting in the respective bucket.
- J. Not all nameplate data required per Part 2.06.T of Specification Section 11310 is included in submitted motor nameplate data. Resubmittal shall include all the requirements as set forth in the Specification for each proposed pumping unit, including connection nameplate data per Part 2.06.T.2 and bearing nameplate data per Part 2.06.T.3 of Specification Section 11310.
- K. Proposed motors for the RCW pumping units are not required to be inverter duty.
- L. Submit replacement parts list for proposed FE/BWS pump motor, similar to submitted replacement parts list for proposed RCW motor.
- M. Submitted manufacturer's motor brochure is for Weather Protected Type 1 vertical motors. The proposed motor for the RCW pumping unit is Totally Enclosed Fan Cooled (TEFC). Submit manufacturer's product brochures for TEFC motors.

FOR ADDITIONAL COMMENTS, SEE THE FOLLOWING SHEETS AND/OR DRAWINGS:

N/A

- |   |   |
|---|---|
| <input type="checkbox"/> ACCEPTED                       | <input type="checkbox"/> REJECTED             |
| <input checked="" type="checkbox"/> REVISE AND RESUBMIT | <input type="checkbox"/> FURNISH AS CORRECTED |
| <input type="checkbox"/> SUBMIT SPECIFIED ITEMS         | <input type="checkbox"/> _____                |

Corrections or comments noted on shop drawings do not relieve contractor of responsibility to comply with Contract Documents. Shop drawing review is hereby performed only to verify general compliance with the Contract Documents and general conformance with the design concept.

Date: \_\_\_\_\_

By: \_\_\_\_\_

**EQUIPMENT MAINTENANCE DATA SHEET**

<b>PREVENTIVE MAINTENANCE PROGRAM</b>		<b>EQUIPMENT RECORD NUMBER</b>		
<b>EQUIPMENT DESCRIPTION</b>		<b>ELECTRICAL OR MECHANICAL DATA</b>		
Name:		Nameplate Horsepower:		
Serial No.:		Model:		
Vendor:		Catalog Number (polyphase motors):		
Vendor Address:		Type:		
		Manufacturer:		
Vendor Rep:		Voltage:	Measured Current:	Nameplate Current:
Phone:		Phase:	Overload Setting:	Relay rpm:
<b>MAINTENANCE AND LUBRICATION WORK TO BE DONE</b>				Frequency*
<b>SPARE PARTS LIST</b>		<b>FUSES/LAMPS/SEALS</b>		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
<b>WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE</b>				

\*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly; S - Semiannually; A - Annually

**SAMPLE  
EQUIPMENT MAINTENANCE DATA SHEET**

<b>PREVENTATIVE MAINTENANCE PROGRAM</b>		<b>EQUIPMENT RECORD NUMBER</b>		
<b>EQUIPMENT DESCRIPTION</b>		<b>ELECTRICAL OR MECHANICAL DATA</b>		
Name: Influent Pump No. 1 Tag No.: P01-1		Nameplate Horsepower: 15 HP		
Serial No.: 123456ABC		Model: 140T Frame Serial No. 987654ZY Class F Insulation w/ Space Heater		
Vendor: ABC Pump Co.		Catalog Number (polyphase motors): M36999b		
Vendor Address: 1234 Richter Avenue Irvine, CA 92604		Type: Vertical Turbine Pump, Model VTR14 with 3 stages, impeller 147, and 12 1/2" trim.		
		Manufacturer: DEF Motors, Inc.		
Vendor Rep: XYZ Equipment, Inc.		Voltage: 460	Measured Current: 18 amps	Nameplate Current: 20 amps
Phone: 949-752-0505		Phase: 3	Overload Relay Setting: 25 amps	rpm: 1,800
<b>MAINTENANCE AND LUBRICATION WORK TO BE DONE</b>				Frequency*
1. Operate valves and check such things as a) bearing temperature, b) changes in running sound, c) suction and discharge gage readings, d) pump discharge rate, and e) general condition of the drive equipment.				D
2. Check packing.				D
3. Check pumping unit for any dust, dirt or debris.				W
4. Lubricate bearing frame and motor bearings (consult manufacturer's instructions for type of grease or oil).				Q
5. Disassemble and change or repair the following: a) impeller, b) shafts, c) shaft sleeve, d) rotary seals, and e) sleeve bearings.				A
<b>SPARE PARTS LIST</b>		<b>FUSES/LAMPS/SEALS</b>		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
<b>WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE</b>				
For manufacturer's instructions regarding installation, operation, maintenance and troubleshooting of this equipment, see Volume ____, Section ____.				

\*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly; S - Semiannually; A - Annually

**SAMPLE**  
**CONTRACTOR'S REQUEST FOR INFORMATION (RFI) # \_\_\_\_\_**

<b>To (Engineer):</b>	
<b>From (Contractor):</b>	
<b>Subject:</b>	
<b>Reference:</b> Construction Drawing:	Specification (Section and Page):
<b>REQUEST</b>	
<b>Information is requested as follows:</b>	
<b>Information Requested By (Name):</b>	<b>Date:</b>
<b>Response Requested By (Date):</b>	
<b>Received by Krieger &amp; Stewart (Date):</b>	
<b>RESPONSE</b>	
<b>Response to Information Request:</b>	
<b>Response By (Name):</b>	<b>Date:</b>

Final Distribution:

Page \_\_\_ of \_\_\_

**SAMPLE**  
**CONTRACTOR'S REQUEST FOR CHANGE (RFC) # \_\_\_\_\_**

<b>To (Engineer):</b>	
<b>From (Contractor):</b>	
<b>Subject:</b>	
<b>Reference:</b> Construction Drawing:	Specification (Section and Page):
<b>REQUEST</b>	
<b>The following change is requested:</b>	
<b>Change Requested By (Name):</b>	<b>Date:</b>
<b>Response Requested By (Date):</b>	
<b>Received by Krieger &amp; Stewart (Date):</b>	
<b>Benefit to Owner:</b>	
<b>Benefit to Contractor:</b>	
<b>Cost and/or Schedule Impact:</b>	
<b>Change Order Required or Proposed?    <input type="checkbox"/> YES    <input type="checkbox"/> NO</b>	
<b>RESPONSE</b>	
<b>Response to Change Request: <sup>(1)</sup></b>	

**RESPONSE (Continued)**

--

**Response By (Name):**

**Date:**

- (1) It is understood that certain RFCs can be responded to promptly, with minimal expenditures required by Owner. It is also understood that other RFCs require significant expenditures by Owner in order to properly evaluate and respond to Contractor's RFC. For those RFCs that fall in the latter category, Owner will provide an estimate (time and money) to Contractor as an initial response to RFC. Contractor may then elect to have Owner proceed with evaluating Contractor's RFC (with estimated value deducted from Contractor's Contract with Owner), or elect to withdraw Contractor's RFC.

Final Distribution:



**SAMPLE**  
**CHANGE ORDER PROPOSAL (COP) # \_\_\_\_\_**

**DATE:** \_\_\_\_\_

<b>To (Engineer/CA):</b> Krieger & Stewart, Incorporated Attention: Brandon C. Valadez Phone: 951-684-6900 Email: bvaladez@kriegerandstewart.com	<b>From (Contractor):</b>  Attention: Phone: Email:
<b>RCOP No.:</b>	
<b>Subject:</b>	
<b>Reference Documents:</b>	
<b>DESCRIPTION</b>	
<b>COST ESTIMATE</b>	
<b>SCHEDULE IMPACT</b>	
<b>Received by Krieger &amp; Stewart (Date):</b>	
<b>RESPONSE</b>	
<b>Response By (Name):</b>	<b>Date:</b>

[PAGE LEFT INTENTIONALLY BLANK]

**SECTION 01381**  
**PRECONSTRUCTION AUDIO VIDEO RECORDING**

**PART 1 - GENERAL**

**1.01 Scope of Work**

- A. Contractor shall furnish all labor, materials, and equipment required to furnish a color audio video recording of the Leland J. Thompson Water Treatment Plant (Plant) site in locations adjacent to the work, associated access roads, stockpile area, and Contractor's material/staging areas on the Plant site, as specified herein.
- B. Audio video recording shall be of professional quality. The Owner reserves the right to reject the audio video recording because of poor quality, unintelligible audio or uncontrolled pan or zoom. Any recording rejected by the Owner shall be re-recorded at no cost to the Owner.
- C. The recording shall be performed by a qualified, established audio video recording firm knowledgeable in construction practices and which has a minimum of one year of experience in established inspection procedures.
- D. The audio video recording firm shall have a minimum of three (3) years of experience preparing preconstruction audio video recordings of water and/or wastewater facilities for water municipalities. Contractor shall submit to Owner a reference list of at least five (5) similar projects completed within the last 5 years. The reference list shall include the owner's name, facility name and description, year, and owner's contact information with name and phone number. Reference list substantiating qualifications must be submitted and accepted prior to performing the survey.
- E. Under no circumstances shall any construction activity begin until the Owner has received and accepted the audio video recording.

**PART 2 - PRODUCTS**

(NONE THIS SECTION)

**PART 3 - EXECUTION**

**3.01 Color Audio Video Survey**

- A. Contractor shall furnish to the Owner a continuous color audio video recording of the entire construction area and 50' beyond the construction area including, but not limited to, all facilities and areas specified herein. The construction area shall include the existing Equipment Building, Iron and Manganese Filtration System (vessels, piping, appurtenances, etc.), PFAS Ion Exchange Treatment System (vessels, piping, appurtenances, etc.), Backwash Waste Tank (55' diameter welded steel water storage tank), Well 18, onsite SCE electrical service facilities, site perimeter masonry block wall with wrought iron fencing, Contractor's material/staging areas, site access driveways, and existing residences located within the aforementioned work zones.

- B. The audio video recording shall be taken prior to any construction activity. The recording shall clearly and completely show all existing conditions throughout the work site and adjacent areas specified herein.
- C. Complete coverage shall include all surface features and shall be supported by appropriate audio description made simultaneously with video coverage. Such coverage shall include, but not be limited to: all existing buildings, structures, site walls, fencing, equipment, pull boxes, manholes, vaults, driveways, sidewalks, curbs, ditches, roadways, culverts, guard posts, landscaping, etc. located within the aforementioned areas. Video coverage shall extend to the maximum height of all structures within these areas.
- D. All recording shall be done during times of good visibility. No recording shall be done during periods of visible precipitation, or when more than ten percent of the ground area is covered with standing water, unless otherwise authorized by Owner.
- E. Audio shall be recorded at the same time as the video recording and shall have the same information as on the viewing screen. The voice narrative shall briefly describe the project work proposed for each site location being recorded. Special commentary shall be given for unusual conditions or existing defects/damage visible on buildings, sidewalks, curbing, foundations, trees and groundcover, structures, equipment, pavement, etc.
- F. Prior to commencement of audio video recording, Contractor shall notify the Owner in writing when and where the audio video recording will begin. The Owner may provide a designated representative to accompany and oversee coverage of all recording operations. Audio video recording completed without an Owner representative present will be unacceptable unless specifically authorized by the Owner.

### **3.02 Audio Video Recording Requirements and Documentation**

- A. Audio video recordings shall be made on professional grade DVD. Contractor shall furnish to the Owner the original DVD recording, two (2) complete DVD copies, and an electronic copy.
- B. Each DVD shall begin with the Owner's name, Project name and number, Contractor's name, date and location information such as street name, address, direction of travel, viewing side, etc.
- C. Information appearing on the DVD must be continuous and run simultaneously by computer generated transparent digital information. No editing or overlaying of information at a later date will be acceptable.
- D. Digital information to appear in the upper left corner shall be as follows:
  - 1. Name of Contractor
  - 2. Day, Date, and Time
  - 3. Project Name and Number
- E. Time must be accurate and continuously generated.
- F. Written documentation must coincide with the information on the DVD so as to make easy retrieval of locations sought for at a later date.

- G. The video system shall have the capability to transfer individual frames of video electronically into hard copy prints or photographic negatives.
- H. All DVDs and boxes shall bear labels with the following information:
  - 1. DVD Number
  - 2. Owner's Name
  - 3. Date of Recording
  - 4. Project Name and Number
  - 5. Location and Standing Limit of DVD

**END OF SECTION**

[PAGE LEFT INTENTIONALLY BLANK]

**SECTION 02300**  
**EARTHWORK, TRENCHING, BEDDING, AND BACKFILL**

**PART 1 - GENERAL**

**1.01 General Requirements**

- A. Contractor shall furnish all labor, equipment, and material and perform all operations necessary for earthwork, trenching, bedding, and backfill operations including clearing, excavating, filling, backfilling, compacting, and grading specified.
- B. Adequate drainage shall be provided at all times and accumulation of water in excavated areas shall be prevented. All work shall be protected by pumping, ditching, and other measures required for the removal or exclusion of water. Any work damaged by the effects of rain runoff or other weather conditions during any phase of construction shall be reconstructed to conform to the specified requirements. Contractor shall not pass equipment over or alongside facilities that are not protected by ample fill material, properly compacted.
- C. Unless otherwise specified or herein modified, all earthwork shall conform to Section 300 of the Standard Specifications for Public Works Construction, published by Building News, Inc., Los Angeles, California, latest edition, hereinafter "Standard Specifications". References in the Standard Specifications to Measurement and Payment shall not apply.

**1.02 Protection of Existing Work**

Before beginning any cutting or demolition work for removals, Contractor shall carefully survey the existing work and examine the drawings and Specifications to determine the extent of the work. Contractor shall take all necessary precautions to insure against damage to existing work to remain in place or to be reused and any damage to such work shall be repaired or replaced as approved by Owner at no additional cost to Owner. Contractor shall carefully coordinate the work of this section with all other work and construct and maintain shoring, bracing, and supports as required. Contractor shall insure that structural elements are not overloaded and be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this Contract.

**1.03 Grade Control**

Unless specified otherwise, initial bench marks, lines, and grades will be furnished by Owner. Subsequent control stakes as may be required shall be placed and maintained by Contractor. Bench marks, monuments, and other reference points, if unnecessarily disturbed or destroyed by Contractor, will be restored by Owner at Contractor's expense.

**1.04 Field Compaction Tests**

Unless specified otherwise, where reference is made to relative compaction, it shall be deemed to mean ASTM D1557, latest, using ten-pound hammer at 18-inch drop.

Cost of all compaction tests having relative compaction less than specified shall be borne by Contractor. Cost of all compaction tests having relative compaction greater than specified will be borne by Owner. Owner will select soil testing engineer.

### **1.05 Materials to be Excavated**

Materials to be excavated shall be non-classified and shall include all materials encountered in excavating and grading operations hereunder. Materials shall be excavated to the depth and extent specified.

### **1.06 Finish Grading**

Upon completion of construction, Contractor shall bring to finish grade all portions of site affected by contract work. Grading shall be to the finish grade elevations specified. Contractor shall dispose of excess material as directed by Owner.

## **PART 2 - MATERIALS**

(NOT USED)

## **PART 3 - EXECUTION**

### **3.01 Excavations (General)**

Contractor shall excavate to the elevations and dimensions indicated, plus ample space for construction operations and inspection of facilities. Unless specified otherwise, all facilities to be constructed shall bear on undisturbed natural ground or material compacted to the relative compaction specified. If so ordered in writing by Owner, Contractor shall perform additional excavation beyond limits originally specified. Concrete shall not be placed in any excavation which has not been approved by Owner. Care shall be taken not to disturb the excavation prepared for concrete and excess material shall not be removed to make grade until just before concrete is to be placed. This work shall conform to Sections 300-2 and 300-3 of the Standard Specifications unless otherwise specified.

### **3.02 Trench Excavation**

#### **A. General**

1. Excavation for trenches shall include removal of all material of any nature as required for installation of pipe, fittings, or appurtenances and shall include blasting, either sloping or shoring, and all necessary dewatering, if any, all at Contractor's expense.
2. Contractor is advised that unsuitable earth may be encountered during trenching operations. Where such material is encountered, Contractor shall, at his expense, remove such material, discard it at legal disposal site(s), and thereafter replace it with approved backfill material.



B. Excavation Safety Drawings

Before excavating any earth or soil to a depth of five (5) feet or more, Contractor shall, pursuant to Labor Code Section 6705, submit to the Owner detailed drawings (hereafter referred to as excavation safety drawings) showing design of shoring, bracing, sloping, or other provisions to be made for worker, individual, or property protection. Said excavation safety drawings shall comply with OSHA Construction Safety Orders (Cal/OSHA or Federal OSHA, whichever is applicable at time of construction) and shall be prepared and certified by a registered civil or structural engineer, engaged by Contractor at his expense, who shall affix his signature and seal to each sheet of said excavation safety drawings. Contractor shall not excavate until the Owner has received and acknowledged properly certified excavation safety drawings. Contractor shall comply with all other applicable requirements of Labor Code Section 6705 and, as therein provided, no requirements of that Section shall be construed to impose tort liability on Owner or Owner's representatives, including Owner's Engineer.

C. Trench and Bell Hole Sloping or Shoring

Trenches and bell holes shall be adequately sloped or shored so that earth will not slide or settle into trench, so that all existing improvements and utilities (above and below ground) will be fully protected from damage, and so that workers and individuals are protected from injury. At minimum, Contractor shall keep toe of trench spoil at least 5 feet from top of trench. Contractor shall assume full responsibility for all damages caused by inadequate sloping or shoring. Contractor shall make all necessary repairs or perform all reconstruction at his expense and he shall bear all other expenses resulting from such damages.

D. Trench Length, Width, and Depth

1. Unless specified otherwise, trenches shall be excavated not more than 1,000 feet in advance of pipe laying and open trenches shall be properly barricaded and signed as required for individual and property protection. Trenches shall not be excavated or left open nights, weekends, or holidays.
2. Unless specified otherwise, all pipeline trenches within pipe zone shall, wherever possible, have vertical sides and minimum widths as specified on the standard drawings, however, trenches shall be sloped or shored as required for worker, individual, and property protection.
3. Unless specified otherwise, maximum trench width for pipelines shall be pipe outside diameter plus 8". Whenever maximum allowable trench width is exceeded for any reason, the Owner may, at its discretion, require Contractor, at his expense, to cradle pipe (Class B Portland cement concrete) or to provide higher class bedding to support pipe as required to limit load on pipe to allowable supporting strength. The Owner shall approve method of support prior to its use.
4. Trenches shall be excavated to depths specified by or shown on construction drawings or as otherwise directed by the Owner. If trench excavation is carried below grade without direction or permission,

Contractor shall, at his expense, refill trench to proper grade with moist clean sand, sand and gravel, or other suitable material as approved by the Owner, tamped in place to 90 percent relative compaction minimum. Excess excavated material shall be incorporated in backfill or discarded at legal disposal site(s) by Contractor at his expense.

E. Excavated Materials

1. All material excavated from trench shall be placed for minimum obstruction to traffic (automobile and pedestrian). Roadways and gutters shall be kept clear and other provisions shall be made for street or road drainage. Excess excavated material, including material rejected by the Owner for use as backfill, shall be discarded at legal disposal site(s) by Contractor at his expense.
2. If pipe, fittings, or appurtenances belonging to the Owner are uncovered or removed during excavation, they shall be salvaged and deposited as directed by the Owner. If the Owner determines that certain materials need not be salvaged, said materials shall be discarded at legal disposal site(s) by Contractor at his expense.

F. Blasting

Blasting for excavation will be permitted only with approval of the Owner and only after proper precautions have been taken for protection of persons and property, provided Contractor has secured all necessary permits. Blasting shall be limited to specific periods as approved by the Owner. Any damage caused by blasting shall be repaired by Contractor at his expense. Contractor's blasting methods and procedures shall conform with State and local laws and County and municipal ordinances. Contractor shall post signs warning radio equipment operators that blasting operations are in progress and advising that radio transmissions are prohibited during blasting operations.

**3.03 Trench Bedding**

A. General

1. Trenches shall have flat bottoms conforming with grades to which pipe is to be laid. Trench bottoms shall be uniform and provide firm and uniform bearing for installed pipeline.
2. Pipe shall be laid so that pipe barrel bears evenly on trench bottom. Bell holes shall be excavated in trench bottom and sides as necessary to permit satisfactory construction and inspection of pipe joints.

B. Unsuitable Soil

1. Where unstable soil consisting of loose, soft, spongy, or organic earth is encountered, it shall be removed from trench bottom to depth determined in field by the Owner and trench shall be refilled to proper grade with moist clean sand, sand and gravel, or other suitable material as approved by the Owner, tamped in place to 90 percent relative compaction

minimum. Trench bottom shall be graded flat and prepared to provide firm and uniform bearing for pipe.

2. Where unyielding soil consisting of rock, rocky earth, or cemented earth is encountered, it shall be removed from trench bottom to at least 9 inches below grade and trench shall be refilled to proper grade with moist clean sand, sand and gravel, or other suitable material as approved by the Owner, tamped in place to 90 percent relative compaction minimum. Trench bottom shall be graded flat and prepared to provide firm and uniform bearing for pipe.
3. Unless specified otherwise, Contractor shall, at his expense, remove unsuitable soil, replace it with suitable soil, and discard unsuitable soil at legal disposal site(s). Contractor shall not deposit or store unsuitable soil on private or public property without written permission of property owner(s) and without applicable governmental permits pertaining to earthwork, including compaction, and the environment. Before placing any material on private or public property, Contractor shall provide the Owner with evidence of written permission to do so and he shall then obtain the Owner's written approval for same.

#### **3.04 Fill and Backfill (General)**

- A. Backfill shall not be placed until all work to be concealed has been inspected and approved by Owner. No fill or backfill material shall be deposited against concrete structures until the concrete has developed its design strength unless authorized by Owner.
- B. Backfill around structures shall be placed in uniform horizontal layers not exceeding 12 inches in loose thickness before compaction and shall be brought up uniformly on all sides of the structure. Regardless of the specified depth of the layers of material to be compacted, Contractor shall place the material at depths required to obtain the specified relative compaction. Each layer of material shall be moistened as required and thoroughly tamped, rolled, or otherwise compacted to the relative compaction specified.
- C. Backfill shall be made with clean, unclassified material excavated from site as approved by Owner. Unless permitted otherwise, said material shall consist of loose earth or sand free from stones, clods, or other deleterious materials larger than 8 inches in greatest dimension.
- D. Whenever permitted by Owner, rock may be placed in certain fills. Rock fragments or boulders up to 24 inches in greatest dimension may be utilized provided that the specified degree of compaction is obtained in the fill material surrounding the rock. The rock fragments or boulders shall be placed in rows on the fill surface so that they are not in contact with one another and fill material shall be placed between and over the rows of rock fragments or boulders and compacted with a sheeps foot or other suitable rollers. Ample water and compactive effort shall be applied so that the resulting fill is free of uncompacted material surrounding the rock. The rows of rock fragments or boulders shall be as specified with regard to spacing and location within any fill; however,

subsequent rows shall be staggered so that one row does not lie directly over another row.

### **3.05 Trench Backfill**

#### **A. General**

1. In addition to meeting backfill requirements specified herein, Contractor shall also comply with backfill requirements established through permits issued by jurisdictions (State, County, City) having control over rights-of-way in which construction is taking place. Whenever the separate requirements conflict with one another, the more stringent shall apply. Backfill shall not commence without prior approval of the Owner.
2. Backfill material shall be either select excavated material, screened or washed if necessary, or commercially processed material. Backfill material shall meet separate specific requirements for backfill within pipe zone and backfill above pipe zone. Backfill material meeting pipe zone requirements may be used for above pipe zone backfill material but not the reverse.
3. After sheeting, shoring, or shields have been removed, all backfill material including pipe zone backfill material shall be compacted to 90 percent relative compaction minimum except that the upper 12 inches of backfill material shall be compacted to 95 percent relative compaction minimum, as verified by field compaction tests. Relative compaction shall be based on maximum dry density determined in accordance with ASTM D-1557, latest. The Owner will specify where (number & location) compaction tests are to be taken.
4. Unless specified otherwise, the Owner will have all necessary compaction tests performed by soils engineer of its choosing. The Owner will pay for all passing tests; Contractor shall pay for all failing tests. Contractor shall notify the Owner when any segment of backfill has been compacted and is ready for compaction testing and the Owner will then have such tests performed.
5. Unless determined otherwise, compaction tests will be taken along the pipeline, in the pipe zone, above the pipe zone, and at ground surface or subgrade at 300 foot intervals maximum and along all service runs and fire hydrant runs. Contractor shall assist, at no additional cost to the Owner, soils engineer in taking all compaction tests. Contractor shall furnish all equipment (including shoring), labor, and materials needed for such assistance. Compaction testing shall be completed and accepted by the Owner prior to hydrostatic and leakage testing of pipelines and appurtenances.
6. Within highways, thoroughfares, and streets, Contractor shall, at the end of each work day and by 5:00 PM, unless permitted otherwise, completely backfill trenches with material sufficiently compacted to support traffic. Contractor shall then place 2 inch minimum thickness temporary asphalt concrete pavement over trench; it shall be compacted,

rolled smooth with a steel wheeled pavement roller and placed flush with adjacent pavement. Contractor shall maintain and repair backfilled and paved areas to prevent potholes or pavement failures. Highways, thoroughfares, and streets shall be completely open to traffic at night (after 5:00 PM), on weekends, on holidays, and whenever Contractor is not actively working in specific area.

7. Contractor shall not excavate trenches or install pipe in highways, thoroughfares, and streets on weekends and holidays. Holidays include union holidays, Owner holidays, and County and municipal holidays. Contractor shall not leave any excavation open overnight or on weekends or holidays.

**B. Backfill Within Pipe Zone**

1. Unless specified otherwise, select excavated material, screened or washed if necessary, shall be used and it shall consist of moist clean, loose earth, sand, or gravel (1 inch maximum size) free of clay and silt as well as brush, roots, and organic substances.
2. Initial backfilling shall be performed as soon as possible after pipe has been laid. Loose, moist backfill material shall be placed in trench simultaneously on each side of pipe to a depth not greater than pipe centerline (springline) or 12 inches (loose measurement), whichever is less, and it shall then be tamped under pipe so that all voids are eliminated and material is compacted to 90 percent relative compaction minimum.
3. Subsequent backfilling shall be performed immediately following initial backfilling. Loose, moist backfill material shall continue to be placed in trench simultaneously on each side of pipe in lifts not exceeding 12 inches in thickness (loose measurement), with each lift being tamped, until the pipe has been covered by at least 12 inches of well compacted material. Alternatively, backfill material may be densified by water settlement until the pipe has been covered by at least 12 inches of well densified material. Backfilled material shall be tamped or settled to 90 percent relative compaction minimum.
4. Regardless of compaction or densification technique, care in backfilling shall be exercised to avoid any damage to pipe, fittings, and appurtenances, to avoid any damage to persons or property, and to achieve relative compaction of backfilled material of at least 90 percent minimum.

**C. Backfill Above Pipe Zone**

1. Backfill material shall consist of moist clean loose earth, sand, gravel, or rock free of clay and silt as well as brush, roots, and organic substances. From the top of selected backfill in the pipe zone to within 1 foot of ground surface or pavement subgrade, backfill material shall be free of material exceeding 8 inches in greatest dimension. It shall also be compacted to 90 percent relative compaction minimum. Within 1 foot of

ground surface or pavement subgrade, backfill material shall be free of material exceeding 2 inches in greatest dimension and it shall be compacted to 95 percent relative compaction minimum. Rocks shall be mixed with suitable soil to eliminate voids; they shall not be nested. Backfill material shall be well graded.

2. Backfill material shall be placed in lifts not exceeding 12 inches in thickness (loose measurement) and each lift shall be compacted to 90 percent relative compaction minimum by hand tampers, pneumatic tampers, or mechanical compactors except that the upper 12 inches of backfill shall be compacted with mechanical compactors or compaction equipment, excluding stompers, to 95 percent relative compaction. Alternatively and except for the upper 12 inches of backfill, sandy, granular soils may be densified by water settlement. Trench to be backfilled by water settlement shall be diked at suitable intervals not exceeding 100 feet. Impounded water shall be of sufficient depth so that earth pushed or shoveled into trench will at all times fall into water, becoming completely saturated. If necessary, jetting may augment flooding. Backfill densified by water settlement shall be densified to 90 percent relative compaction minimum. Contractor shall use mechanical compactors or compaction equipment, excluding stompers, to achieve required compaction if required densification is not achieved by water settlement.

D. Imported Backfill Material

1. Whenever excavated material is unsuitable as backfill material and Contractor is unable to process or screen such material for backfill material or whenever excavated material is insufficient to accomplish backfill and Contractor must secure additional material, Contractor shall import such material and the material and its source shall be approved by the Owner.
2. Unless specified otherwise, imported backfill material shall be commercially processed and it shall be selected, clean, loose earth, sand, or gravel (1 inch maximum size). Said material shall be granular and it shall be free of clay, silt, and fine sand. It shall be suitable for compaction with minimum effort.

E. Backfill Completion

Where pavement is not required, trench backfill shall be brought to grade of existing surface and dressed to provide firm, stable, and even surface without ruts or irregularities. It shall conform with grades of existing surface. Where pavement is required, trench backfill shall be brought to subgrade for pavement structure. Pavement shall then be placed in accordance with paving requirements.

**END OF SECTION**

**SECTION 02700**  
**BASIC PAVING SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 General**

Contractor shall furnish all labor, materials, and equipment and perform all operations necessary for construction of pavement surfacing and resurfacing in all areas of construction as specified by the Owner or as shown by the Drawings. Drawings shall consist of construction drawings, standard drawings, and clarifying diagrams or sketches.

Whenever pavement surfacing or resurfacing is to be constructed in rights-of-way not under jurisdiction of the Owner (public highways, thoroughfares, streets), it shall be constructed in accordance with permits issued by the agency having jurisdiction (State, County, City).

Whenever pavement surfacing or resurfacing is to be constructed in rights-of-way over which the Owner has jurisdiction (pumping plants, reservoirs, service yards, access roads), it shall be constructed in accordance with the specifications.

Whenever the words "Standard Specifications" are used herein, they shall mean the Standard Specifications for Public Works Construction as published by Building News, Inc., Los Angeles, California, latest edition. The Standard Specifications shall augment, not supersede, these specifications. As used herein, the Standard Specifications shall not apply to measurement, payment, schedule, delays, or extra work.

**1.02 New Pavement Surfacing**

New pavement surfacing shall be asphalt concrete or Portland cement concrete placed on a prepared surface in accordance with the specifications and in conformance with the lines, grades, and dimensions as specified in the Drawings.

**PART 2 – PRODUCTS**

**2.01 Aggregate Base**

Aggregate base material shall consist of crushed aggregate base conforming to requirements of Subsection 200-2.2 of the Standard Specifications.

**2.02 Asphalt Concrete Pavement**

A. General

Asphalt concrete pavement shall be furnished, placed, and compacted at the locations and thicknesses specified.

B. Materials

1. Asphalt

Asphalt to be mixed with mineral aggregate shall conform to Subsection 203-6.2.1 of the Standard Specifications. The performance grade shall be PG-64-10 unless specified otherwise.

2. Aggregate

Aggregate shall conform to the requirements in Subsection 203-6.2.2 and of the Standard Specifications. Coarse aggregate shall be crushed rock.

The grading of combined aggregates and percentage asphalt shall be in accordance with Subsection 203-6.4.4 of the Standard Specifications. Unless otherwise specified the following asphalt concrete mixtures shall be used:

Base Course: B-PG64-10

Top Course and Overlays: C2-PG64-10

**PART 3 – EXECUTION**

**3.01 Subgrade Preparation**

Subgrade shall be brought to proper grade, prepared, and compacted in conformance with the requirements of Subsection 301-1 of the Standard Specifications. All organic material shall be removed and discarded at legal disposal site(s), at Contractor's expense. The top 12 inches of such subgrade material shall be scarified, cultivated and then compacted to not less than 95 percent relative compaction (ASTM D1557).

**3.02 Aggregate Base**

A. General

Aggregate base material shall be furnished, placed, and compacted at the locations and thickness as specified in the Contract Documents.

B. Placement of Aggregate Base

Aggregate base material shall be spread and compacted in conformance with the requirements of Subsection 301-2.3 of the Standard Specifications. Aggregate base material shall be compacted to a relative compaction of not less than 95 percent (ASTM D1557).



### 3.03 Placement of Asphalt Concrete

#### A. General

All construction methods shall conform to the requirements of Subsection 302-5 of the Standard Specifications. All paving shall be placed in two (2) lifts. Along all pavement edges which will not abut existing concrete paving, building foundations, curbs, gutters, or other similar structures, a firmly staked 2 inch x 4 inch redwood header shall be placed unless specified otherwise.

#### B. Weed Killer

Weed killer, "SPIKE" (manufactured by Dow Elanco) or equal shall be applied to the area to be paved at the rate of 100 gallons per 10,000 square feet. The mixture applied shall consist of 1 pound of chemical per 100 gallons of water or per manufacturer's recommendations. Contractor shall obtain a permit to use "SPIKE" weed killer prior to its application.

#### C. Prime Coat

A prime coat consisting of grade SC-250 liquid asphalt shall be applied at a rate between 0.10 and 0.25 gallons per square yard. Grade SC-70 liquid asphalt may be used when approved by the Owner. Unless otherwise specified prime coat shall be required on all aggregate base material or untreated subgrade on which asphalt concrete pavement is to be directly placed. The prime coat shall be allowed to cure 24 hours and any excessively oily areas shall be blotted with sand in preparation for application of asphalt concrete.

#### D. Tack Coat

A tack coat shall be required at all joints, overlays and overlaps. Tack coat shall conform to the requirements of Subsection 302-5.4 of the Standard Specifications and shall be Grade SS-1h emulsified asphalt. Tack coat shall be applied at approximate rates of 0.05 gallon per square yard for leveling courses and overlays, and 0.10 gallon per square yard for asphalt concrete roll berms and dikes.

#### E. Geotextile Fabric

Geotextile fabric shall conform to the requirements in Subsections 213 and 302-7 of the Standard Specifications. Geotextile fabric shall be placed such that wrinkles large enough to cause laps do not occur. Geotextile fabric shall be placed in accordance with manufacturer's recommendations.

#### F. Fog Seal Coat

A seal coat shall be applied to surface of all asphalt concrete no sooner than 24 hours nor later than 14 days after placement. Seal coat shall consist of an emulsion paving asphalt (Grade SS-1h) conforming to test requirements of Subsection 203-3.2 of the Standard Specifications. Seal coat shall be applied to provide a coverage of 0.10 gallon per square yard. Seal coat shall not be applied when weather conditions are unsuitable or when atmospheric temperature is below 40°F. Seal coat shall be applied to only one traffic lane at a time and the entire width of the lane shall be covered in one operation. The cut off of

asphaltic emulsion shall be made on building paper or similar suitable material spread over the surface. Traffic shall not be allowed on seal coat until emulsion breaks and seal coat is sticky to the touch and will not be picked up by traveling vehicles.

G. Rolling

Unless specified otherwise, at least 2 operational steel drum pavement rollers shall be present during all paving operations.

**3.04 Temporary Surfacing**

Unless permanent pavement is to be placed immediately, temporary surfacing 2 inches thick, or as otherwise specified, shall be placed and properly maintained as determined by the Owner until the permanent pavement is placed at locations specified. In any event, in paved streets where immediate access is required to provide for public or private use, Contractor shall place and maintain said temporary pavement. Temporary pavement shall be placed at all locations which are not barricaded and are open to traffic. When Contractor delays the placing or repairing of temporary pavement, Owner reserves the right to have such pavement placed or repaired at Contractor's expense.

Temporary resurfacing shall conform to Subsection 306-1.5.1 of the Standard Specifications and shall be placed as soon as trench backfill is 95% compacted and shall remain in place until permanent resurfacing is placed. Prior to permanent resurfacing, temporary resurfacing shall be removed and discarded at legal disposal site(s) at Contractor's expense. The cost of furnishing, placing, maintaining, removing and disposing of temporary resurfacing shall be included in the Contractor's bid price for related work if no bid item is specifically called out in the bid sheets.

At the end of each day, temporary striping shall be placed complying with the Drawings and State, County, or City requirements. Temporary striping shall conform with Section 214 of the Standard Specifications.

**3.05 Permanent Resurfacing**

Unless otherwise specified, all permanent resurfacing shall be 1" or greater in thickness than the original surfacing removed. Contractor shall remove all loose pieces of existing pavement prior to placing any pavement. Said pavement shall be replaced in accordance with requirements of the agency (State, County, City) having jurisdiction over the roadway.

**3.06 Portland Cement Concrete Pavement**

A. General

Portland cement concrete shall comply with the Basic Concrete Specifications unless specified otherwise. Construction methods shall comply with Subsection 302-6 of the Standard Specifications. Portland cement concrete shall be furnished and placed at the locations and thicknesses specified.

B. Concrete Design Mix

All concrete shall be 560-C-3250 concrete in accordance with Subsection 201-1.1.2 of the Standard Specifications. Design mix shall be approved by the Owner prior to purchase or placing of concrete.

C. Reinforcement

Replacement concrete pavement shall have equal or better reinforcement than original concrete pavement. Reinforcement shall be provided whenever and wherever specified. Grade 60 reinforcing steel shall be used unless specified otherwise.

D. Admixtures

Admixtures shall conform to Subsection 201-1.2.4 of the Standard Specifications. Unless otherwise specified, concrete mixtures shall have air entrainment of 5%  $\pm$  1%.

E. Placing Concrete

Concrete shall be placed on an aggregate base sufficiently dampened to ensure that no moisture will be absorbed from the newly placed concrete. Concrete shall be placed on the aggregate base to specified uniform depth.

F. Finishing

Concrete shall be distributed uniformly between forms as soon as it is placed, struck off, and tamped. Tamping shall continue until concrete is thoroughly consolidated into the specified cross-section and sufficient mortar for finishing purposes has been brought to the surface. After tamping, surface of concrete shall be floated and finished. Where the concrete placed is to abut existing concrete surfaces, it shall be finished to match existing concrete as nearly as practical. Vat black or other approved pigments shall be added to concrete to obtain required result. Edges which do not abut existing concrete shall be rounded to a 1/2 inch radius. Upon completion of final finishing, work surface shall be free of any unevenness greater than 1/8 inch when checked with a 10-foot straightedge placed on the surface.

G. Curing

Pavement shall be cured by a pigmented sealing compound method. Curing shall commence as soon as free water leaves the concrete surface but no later than 3 hours following initial placement of concrete upon aggregate base. Curing compound shall be applied to the entire surface by spraying at the rate of one gallon per 200 square feet. All curing compounds shall be approved by the Owner. Curing compound shall conform to the requirements of Subsection 201-4 of the Standard Specifications.

H. Temporary Striping

At the end of each day, temporary striping shall be placed complying with the Drawings and State, County, or City requirements. Temporary striping shall conform with Section 214 of the Standard Specifications.

### **3.07 Pavement Removal**

Pavement removal in trenches shall be limited to the maximum trench width as shown by the standard drawings plus a reasonable allowance for sloping sides of trench as required by appropriate safety standards or as otherwise specified.

Pavement shall be removed to clean straight lines. Pavement edges shall be saw cut unless an acceptable alternative method is permitted. Contractor shall discard all removed pavement at legal disposal site(s) at Contractor's expense. Removal and disposal of materials shall conform to the requirements of Subsection 300-1.3 of the Standard Specifications.

### **3.08 Finishing Pavement Surfaces**

#### **A. General**

Upon completion of all construction operations the entire roadway area or newly surfaced areas shall be finished, cleaned, and left in a neat, presentable condition.

#### **B. Shoulders**

The shoulders around paved surfaces shall be trimmed and shaped to produce a smooth uniform cross section. Shoulders shall be finished, graded, and compacted so as to match the finish grade of the newly paved surfacing. Excess earth, debris, or other waste material shall be removed and discarded at legal disposal site(s) at Contractor's expense.

#### **C. Paved Surfaces**

All finished paved surfaces shall be clean of all dirt, debris, and foreign material. All manholes, boxes, and covers, shall be raised to finished grade. All curbs, gutters, and cross gutters shall be broomed clean and flushed with water to insure proper drainage. All street signs and striping shall comply with the construction drawings, specifications, and Section 214 of the Standard Specifications.

#### **D. Survey Monuments**

Prior to construction, Contractor shall have a registered civil engineer or licensed land surveyor set at least 4 ties for each monument within the construction area. After construction, Contractor shall have the same civil engineer or licensed land surveyor use the aforementioned ties to replace any monuments which have been disturbed or destroyed. Contractor shall file a corner record for all replaced monuments. Contractor shall also place monument wells in compliance with City or County standards over all monuments in the construction area.

**END OF SECTION**

**SECTION 03100**  
**BASIC CONCRETE FORMWORK SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 General Requirements**

Contractor shall furnish all materials for concrete formwork, bracing, shoring, and supports and shall design and construct all falsework, all in accordance with the provisions of the Contract Document.

**1.02 Reference Specifications, Codes, and Standards**

A. Codes

The Building Code, as referenced herein, shall be the California Building Code (CBC) of the California Building Standards Commission, latest edition.

B. Commercial Standards

ACI 347            Guide to Formwork for Concrete, latest edition.

**1.03 Contractor Submittals**

All submittals shall be in accordance with Section 01300, Contractor Submittals and Requests Technical Specifications.

A. Falsework Calculations and Drawings

Contractor shall comply with the provisions of Section 1717 of the Division of Industrial Safety, Construction Safety Orders, as revised November 1973, which requires that all falsework or vertical shoring installations where the heights of the falsework or vertical shoring, as measured from the top of the sills to the soffit of the superstructure, exceeds 14 feet, or where individual horizontal span lengths exceed 16 feet, or provision for vehicular or railroad traffic through falsework or vertical shoring is made, shall be approved and signed by a Civil Engineer, registered in the State of California; provided further, that a copy of the falsework plan or shoring layout shall be available on the job site at all times.

B. Contractor shall submit detailed plans of the falsework proposed to be used. Such plans shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the falsework, and typical soil conditions.

**1.04 Quality Assurance**

Tolerances

The variation from established grade, line, plumbness, or thickness shall be as set forth in Part 1.04F of Section 03300, Basic Concrete Specifications, and there shall be no offsets or

visible waviness in the finished surface. All other tolerances shall be as specified in Chapter 3 of ACI 347.

## **PART 2 - PRODUCTS**

### **2.01 General**

Except as otherwise expressly accepted by the Engineer, all lumber brought on the job site for use a forms, shoring, or bracing shall be new materials. All forms shall be smooth surface forms and shall be of the following materials:

Walls	-	Steel or plywood panel
Columns	-	Steel, plywood, or fiber glass
Roof and Floor slabs	-	Plywood
All other work	-	Steel panels, plywood or tongue and groove lumber

### **2.02 Form and Falsework Materials**

- A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:
1. Lumber shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20, American Softwood Lumber Standard.
  2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1, Structural Plywood, for Concrete Forms, Class I, and shall be edge sealed.
  3. Form materials shall be metal, wood, plywood, or other approved material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.
- B. Unless otherwise shown, exposed edges and corners in concrete members shall be provided with 3/4-inch chamfers. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
- C. Forms and falsework to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 30 psf (minimum).

### **2.03 Form Ties**

- A. Form ties with integral waterstops shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed

1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming.

- B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when approved by the Engineer. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

## **PART 3 - EXECUTION**

### **3.01 General**

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. Contractor shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed from the work and replaced at the Contractor's expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state and federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by the Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- B. Concrete forms shall conform to the shape, lines, and dimensions of members as called for on the Contract Drawings, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

### **3.02 Form Design**

All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. Forms shall be tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the Engineer.

### 3.03 Construction

#### A. Vertical Surfaces

All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is shown. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

#### B. Construction Joints

Concrete construction joints shall not be placed at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

#### C. Form Ties

1. **Embedded Ties:** Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified in Part 3.12C of Section 03300, Basic Concrete Specifications. Wire ties for holding forms shall not be used. Form-tying devices or parts thereof, other than metal, shall not be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. Contractor shall not use snap-ties which cause spalling of the concrete upon form stripping or tie removal. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.
2. **Removable Ties:** Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.



### **3.04 Reuse of Forms**

Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

### **3.05 Removal of Forms**

Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. Contractor shall not apply heavy loading on green concrete. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28-day strength specified in Section 03300, Basic Concrete Specifications; provided, that no forms shall be disturbed or removed under an individual panel or unit before the concrete in the adjacent panel or unit has attained 75 percent of the specified 28-day strength and has been in place for a minimum of 14 days. The time required to establish said strength shall be as determined by the Engineer who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 14-day minimum, then that time shall be used as the minimum length of time. Forms for all vertical foundations, walls, and columns shall remain in place at least 48 hours after the concrete has been placed (commencing from the time the last concrete is placed for that day). Forms for all parts of the work not specifically mentioned herein shall remain in place for periods of time as determined by the Engineer.

### **3.06 Maintenance of Forms**

Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, forms shall be thoroughly cleaned. Form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the Engineer. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, Contractor shall perform the oiling at least two weeks in advance of their use. Oil shall be kept off the surfaces of steel reinforcement and other metal items to be embedded in concrete. If oil is inadvertently placed on said metal surfaces, Contractor shall remove oil by sandblasting.

### **3.07 Falsework**

- A. Contractor shall be responsible for the design, engineering, construction, maintenance, and safety of all falsework, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, the requirements of the Construction Safety Orders of the California Division of Industrial Safety, and the requirements specified herein.

- B. All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.
  
- C. Falsework shall be placed upon a solid footing, safe against undermining, and protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

**END OF SECTION**

**SECTION 03200**  
**BASIC CONCRETE REINFORCEMENT SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 General Requirements**

Contractor shall furnish, fabricate, and place all concrete reinforcement steel, welded wire reinforcement, couplers, and concrete inserts for use in reinforced concrete and masonry construction and shall perform all appurtenant work, including all the wires, clips, supports, chairs, spacers, and other accessories, all in accordance with the Contract Documents.

**1.02 Reference Specifications, Codes, and Standards**

A. Codes

The Building Code, as referenced herein, shall be the California Building Code (CBC) of the California Building Standards Commission, latest edition.

B. Commercial Standards

Where not covered in this specification, all work shall comply with the following standards, latest editions:

ACI 315	Details and Detailing of Concrete Reinforcement.
ACI 318	Building Code Requirements for Structural Concrete and Commentary.
WRI	Manual of Standard Practice for Structural Welded Wire Reinforcement.
AWS D1.4	Structural Welding Code - Reinforcing Steel.
CRSI	Manual of Standard Practice.

**1.03 Contractor Submittals**

All submittals shall be in accordance with Section 01300, Contractor Submittals and Requests Technical Specifications.

- A. Contractor shall furnish shop bending diagrams, placing lists, and drawings of all reinforcement steel prior to fabrication.
- B. Details of concrete reinforcement steel and concrete inserts shall be submitted by the Contractor at the earliest possible date after receipt by the Contractor of Notice to Proceed. Said details of reinforcement steel for fabrication and erection shall conform to ACI 315 and the requirements specified and shown. Shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. Shop

drawings shall include bar placement diagrams which clearly indicate the dimensions of each bar splice.

- C. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, Contractor shall submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and shop drawings which show the location of each coupler with details of how they are to be installed in the formwork.
- D. If reinforcement steel is spliced by welding at any location, Contractor shall submit mill test reports which shall contain the information necessary for the determination of the carbon equivalent as specified in AWS D1.4. Contractor shall submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; merely a statement that AWS procedures will be followed is not acceptable.

#### **1.04 Quality Assurance**

- A. If requested by the Engineer, Contractor shall provide samples from each heat of reinforcement steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.
- B. If reinforcement steel is spliced by welding at any location, Contractor shall submit certifications of procedure qualifications for each welding procedure used and certification of welder qualifications, for each welding procedure, and for each welder performing the work. Such qualifications shall be as specified in AWS D1.4.
- C. If requested by the Engineer, Contractor shall provide samples of each type of welded splice used in the work in a quantity and of dimensions adequate for testing. At the discretion of the Engineer, radiographic testing of direct butt welded splices will be performed. Contractor shall provide assistance necessary to facilitate testing. Contractor shall repair any weld which fails to meet the requirements of AWS D1.4. The costs of testing will be paid by the Owner; except, the costs of all tests which fail to meet specified requirements shall be paid by the Contractor.

### **PART 2 - PRODUCTS**

#### **2.01 Reinforcement Steel**

- A. All reinforcement steel for all cast-in-place reinforced concrete construction shall conform to the following requirements:
  - 1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, or as otherwise shown.
  - 2. Welded wire reinforcement shall conform to the requirements of ASTM A 185 and the details shown; provided, that welded wire reinforcement with longitudinal wire of W9.5 size wire shall be either furnished in flat sheets or in

rolls with a core diameter of not less than 10 inches; and provided further, that welded wire reinforcement with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 82.

**B. Hot-Dip Galvanized Reinforcing Bars**

When reinforcing bars are indicated on the Drawings to be hot-dip galvanized, they shall be galvanized in accordance with ASTM A767 and ASTM A143. The bars shall be galvanized in conformance with a Class 1 coating and shall be galvanized after fabrication and shearing.

**C. Accessories**

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Slab bolsters shall have gray plastic-coated legs.
2. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Where the concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

**2.02 Mechanical Couplers**

- A. Mechanical couplers shall be provided where shown and where approved by the Engineer. The couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.
- B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied. This shall apply to all mechanical splices, including those splices intended for future connections.
- C. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection.
- D. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, Contractor shall plug and seal couplers intended for future connections to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

### 2.03 Welded Splices

- A. Welded splices shall be provided where shown and where approved by the Engineer. All welded splices of reinforcement steel shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcement bars which are connected.
- B. All materials required to perform the welded splices to the requirements of AWS D1.4 shall be provided.

## PART 3 - EXECUTION

### 3.01 General

All reinforcement steel, welded wire reinforcement, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Building Code and the supplementary requirements specified herein.

### 3.02 Fabrication

#### A. General

Reinforcement steel shall be accurately formed to the dimensions and shapes shown, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than 1-1/2 inch for No. 3 bars, 2-inch for No. 4 bars, and 2-1/2 inch for No. 5 bars. Bends for other bars shall be made around a pin having a diameter not less than 6 times the minimum thickness, except for bars larger than 1 inch, in which case the bends shall be made around a pin of 8 bar diameters. Bars shall be bent cold.

- B. Contractor shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings.

#### C. Fabricating Tolerances

Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

1. Sheared length:  $\pm 1$  inch
2. Depth of truss bars: + 0, - 1/2 inch
3. Stirrups, ties, and spirals:  $\pm 1/2$  inch
4. All other bends:  $\pm 1$  inch

### 3.03 Placing

#### A. Placing

Reinforcement steel shall be accurately positioned as shown, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcement steel shall be supported by concrete, plastic or metal supports, spaces or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, Contractor shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.

B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Bars additional to those shown which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position shall be provided by the Contractor at its own expense.

#### E. Placing Tolerances

Unless otherwise specified, reinforcement placing tolerances shall be within the limits specified in Section 7.5, Placing Reinforcement, of ACI 318 except where in conflict with the requirements of the Building Code.

F. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.

G. Welded wire reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified in Part 3.03B herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane shown.

H. Welded wire reinforcement placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. Contractor shall not utilize the construction practice of placing welded wire reinforcement on the ground and hooking into place in the freshly placed concrete.

### 3.04 Spacing of Bars

- A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than 1 inch.
- B. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than 1 inch.
- C. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, not less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.
- D. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

### 3.05 Splicing

#### A. General

Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the Engineer.

#### B. Splices of Reinforcement

The length of lap for reinforcement bars, unless otherwise shown shall be in accordance with ACI 318, Section 12.15.1 for a Class B splice.

- C. Laps of welded wire reinforcement shall be in accordance with the ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

- D. Splices in column spiral reinforcement, when necessary, shall be made by welding or by a lap of 1-1/2 turns.

#### E. Bending or Straightening

Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the Engineer.

### 3.06 Cleaning and Protection

- A. Reinforcement steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.



- B. The surfaces of all reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be reinspected and, if necessary, recleaned.

**END OF SECTION**

[PAGE LEFT INTENTIONALLY BLANK]

**SECTION 03300**  
**BASIC CONCRETE SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 General Requirements**

- A. Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents.
- B. All cast-in-place concrete falls into one of the following categories and shall comply with all requirements of this basic specification.
  - 1. Prestressed Concrete (or Class "AA" Concrete). Concrete to be used for prestressed reservoir core walls.
  - 2. Structural Concrete (or Class "A" Concrete). Concrete to be used in all cases except where noted otherwise in the Contract Documents.
  - 3. Sitework Concrete (or Class "B" Concrete). Concrete to be used for curbs, gutters, catch basins, sidewalks, pavements, fence and guard post embedment, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise shown.
  - 4. Lean Concrete (or Class "C" Concrete). Concrete to be used for thrust blocks, pipe trench cut-off blocks and cradles, where the preceding items are detailed on the drawings as unreinforced. Concrete to be used as protective cover for dowels intended for future connection.
- C. Only one class of concrete shall be present at the job site at any one time.

**1.02 Reference Specifications, Codes, and Standards**

A. Specifications

Items specified elsewhere in these Contract Documents:

Concrete Formwork - See Section 03100, Basic Concrete Formwork Specifications.

Concrete Reinforcement - See Section 03200, Basic Concrete Reinforcement Specifications.

B. Codes

The Building Code, as referenced herein, shall be the California Building Code (CBC), of the California Building Standards Commission, latest edition.

C. Commercial Standards

Where not covered in this specification, all work shall comply with the following standards, latest editions:

ACI 214	Evaluation of Strength Test Results of Concrete
ACI 301	Specifications for Structural Concrete
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 347	Guide to Formwork for Concrete
ACI 318	Building Code Requirements for Structural Concrete and Commentary
ACI 350	Code Requirements for Environmental Engineering Concrete Structures and Commentary
ASTM C 494	Standard Specification for Chemical Admixtures for Concrete

**1.03 Contractor Submittals**

All submittals shall be in accordance with the Section 01300, Contractor Submittals and Requests Technical Specifications.

A. Mix Designs

Prior to beginning the work, Contractor shall submit to Owner, for review, preliminary concrete mix designs which shall show the proportions and gradations of all materials proposed for each class and type of concrete to be used on the job. The mix designs shall be designed by an independent testing laboratory acceptable to Owner. All costs related to such mix design shall be borne by the Contractor.

B. Certified Delivery Tickets

Where ready-mix concrete is used, Contractor shall provide certified delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the total quantities (by weight) of cement, sand, each class of aggregate, and admixtures, and the amounts of water (by gallons) in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

**1.04 Quality Assurance**

A. Tests on component materials and for compressive strength of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.

- B. The cost of all laboratory tests on concrete will be borne by the Owner. However, Contractor shall be charged for the cost of any additional tests and investigation on work performed which fails to meet specification.
- C. Concrete for testing shall be supplied by Contractor at no cost to the Owner, and Contractor shall provide assistance to the Owner in obtaining samples, and disposal and cleanup of excess material.

D. Field Compression Tests

1. Compression test specimens will be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Owner to insure continued compliance with these specifications. Each set of test specimens will be a minimum of 4 cylinders.
2. Compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall be 6" diameter by 12" high cylinders.
3. Compression tests shall be performed in accordance with ASTM C 39. One test cylinder will be tested at 7 days and two will be tested at 28 days.

The remaining cylinder will be held to verify test results, if needed.

E. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 350, Chapter 5, "Concrete Quality, Mixing, and Placing", and as specified herein.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
3. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at the cost of the Contractor.

F. Construction Tolerances

Contractor shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 347.

- G. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

<u>Item</u>	<u>Tolerance</u>
Variation of the constructed linear outline from the established position in plan	In 10 feet: 1/4 inch; In 20 feet or more: 1/2 inch
Variation from the level or from the grades shown	In 10 feet: 1/8 inch; In 20 feet or more: 1/4 inch
Variation from the plumb	In 10 feet: 1/8 inch; In 20 feet or more: 1/4 inch
Variation in the thickness of slabs and walls	Minus 1/4 inch; Plus 1/2 inch
Variation in the locations and sizes of slab and wall openings	Plus or minus 1/4 inch

Regardless of the tolerances listed herein, it shall be the responsibility of the Contractor to limit deviations in line and grade to tolerances which will permit proper installation and operation of mechanical equipment and piping.

## **PART 2 - PRODUCTS**

### **2.01 Concrete Materials**

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of Section 4.2.1 of ACI 301.
- C. Storage of materials shall conform to the requirements of Section 4.1.4 of ACI 301.
- D. Materials for concrete shall conform to the following requirements:
1. Cement shall be standard brand Portland cement conforming to ASTM C 150 for Type II or Type V. Portland cement shall contain not more than 0.60 percent alkalis. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the Owner. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Stacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the Owner if requested regarding compliance with these specifications.

2. Fly Ash or other pozzolans are not permitted as a component in the concrete mix.
3. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.
4. Aggregates shall be obtained from pits acceptable to the Owner, shall be non-reactive, and shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as specified in Part 2.07B herein. Lightweight sand for fine aggregate will not be permitted.
  - a. Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size greater than 3/4". When the aggregates are proportioned for each batch of concrete the two size groups shall be combined.
  - b. Fine aggregates shall be natural sand or a combination of natural and manufactured sand that are hard and durable.
  - c. Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.
5. Ready-mix concrete shall conform to the requirements of ASTM C 94.
6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent; provided that, when the mean daily temperature in the vicinity of the worksite falls below 40°F for more than one day, the total air content provided shall be 5 to 7 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the Contractor. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
7. Admixtures shall be required as stated herein and at the Owner's discretion or, if not required, may be added at the Contractor's option to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the Contractor's expense. The use of an admixture shall be subject to acceptance by the Owner. Concrete containing an admixture shall be first placed at a location determined by the Owner. If the use of an admixture is producing an inferior end result, Contractor shall discontinue use of the admixture. Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic

after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.

- a. Low range water reducer shall be used in all structural and sitework concrete and shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a hydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
- b. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80°F, a set retarding admixture such as Sika Chemical Corporation's Plastiment, BASF's Pozzolith 300R, or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40°F, a set accelerating admixture such as Sika Chemical Corporation's Plastocrete 161FL, BASF's Pozzolith 122HE, or equal shall be used.
- c. High range water reducer may be used if approved by Owner. If allowed it shall be sulfonated polymer conforming to ASTM C 494, Type F or G.

High range water reducing agent shall only be added to the concrete at the batch plant. It shall be second generation type, Daracem 100 as manufactured by W.R. Grace & Co., Rhedbuild 1000 as manufactured by BASE, or equal. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

Concrete shall be mixed at mixing speed for a minimum of 30 mixer revolutions after the addition of the high range water reducer.

8. Calcium Chloride shall not be added to or used in concrete.
9. Floor Hardener shall be provided where specified on the Drawings. Floor hardener shall be natural aggregate dry shake hardener for concrete. Hardener shall be composed of crushed, washed, and specially graded quartz silica aggregate, cementitious binders, plasticizers, dispersing agents and stable colorants. Contractor shall coordinate adjustments in concrete mix design necessary to accommodate proposed floor hardener, including air entrainment and admixtures. Unless specified otherwise, hardener color shall be natural light gray.

Floor hardener shall be ConColor by ChemMasters, Lithochrome by L.M. Scofield Co., Colorcron by Master Builders, or equal. Floor hardener shall be applied in strict accordance with the manufacturer's printed instructions.



## 2.02 Curing Materials

Materials for curing concrete shall conform to the following requirements:

- A. Concrete curing compound shall be Resi-Chem manufactured by Symons, or approved equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.
- B. Polyethylene sheet for use as concrete curing blanket shall be white, and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.
- C. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, having a nominal thickness of 2 mils and permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A (Int. Amd. 1). The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.
- D. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mil thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.
- E. Curing mats for use in Curing Method 6 as specified in Part 3.09G herein, shall be heavy shag rugs or carpets or cotton mats quilted at 4" on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.
- F. Evaporation retardant shall be a material such as Confilm as manufactured by BASF, Cleveland, OH; or equal.

## 2.03 Waterstop

- A. Contractor shall provide waterstops at all construction and expansion joints in all water holding structures. Waterstop shall be Greenstreak PVC Style 732, 6" wide, or Style 735, 9" wide, as specified on Drawings.
- B. Contractor shall heat fuse joints and connections in strict compliance with manufacturer's instructions using heating tools and devices recommended by same. Waterstops shall be continuous in joints, following offsets and angles in joint until spliced to waterstops at intersecting joints, completely sealing the structure. Waterstops shall be aligned and centered in joints. Contractor shall secure flanges of waterstops to reinforcing bars with 18 gauge wire ties spaced maximum 18" on center. Waterstop joints shall be properly heat-spliced at ends and crosses to preserve continuity. Contractor shall locate waterstops where shown on drawings and in all waterbearing walls and slabs where common to: earth-bearing or earth-support; occupied areas; or above-grade exposed surfaces.

- C. All joints with waterstops involving more than 2 ends to be jointed together, and all joints which involve an angle cut, alignment change, or the joining of 2 dissimilar waterstop sections shall be prefabricated by the Contractor prior to placement in the forms, allowing not less than 24" long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated waterstop joint assemblies shall be butt welded to the straight run portions of waterstop.
- D. Waterstop splices shall have a tensile strength of not less than 60 percent of the unspliced materials tensile strength.

#### **2.04 Expansion Joints**

- A. Contractor shall provide expansion joints where indicated on Construction Drawings. Expansion joints shall consist of joint filler material and joint sealant. Filler material shall be held down 1/2" for sealant unless otherwise shown.
- B. Expansion joint filler material shall be performed sponge neoprene or cork conforming to ASTM D 1752. Filler material containing asphalt shall not be used.

#### **2.05 Joint Sealant**

- A. Joint sealant for use in construction, control, and expansion joints shall be Sika-Flex 1a as supplied by the Sika Corporation, or approved equal.

Joint primer shall be as produced and/or recommended by sealant manufacturer.

- B. Contractor shall clean all locations where sealant is placed by sandblasting and be free from oil, foreign materials, and moisture. Lower surfaces of joints shall be isolated with a bond breaker such as polyethylene, polyethylene tape, or equal as recommended by sealant manufacturer.
- C. Sealant shall be placed in strict accordance with manufacture's recommendations by a firm specializing in this type of work, or by the Contractor under direct supervision of the manufacturer. If the Contractor chooses to apply sealant, manufacturer's technical representative shall be present at the beginning of sealant placement to observe and advise on methods for mixing, joint preparation, and application of sealant.

#### **2.06 Concrete Bond Breaker**

- A. Bond breaker shall be Spec Tilt WB Bond Breaker as manufactured by SpecChem; Tilt-EEZ WB Bond Breaker as manufactured by Conspec; or approved equal. It shall contain a fugitive dye so that areas of application will be readily distinguishable.
- B. Contractor shall strictly follow manufacturer's application guidelines. Just prior to application, joint shall be thoroughly soaked so that concrete contains approximately the same surface moisture as newly cast concrete. Bond breaker shall be brush applied with a minimum of two coats. Extreme care must be taken to prevent any bond breaker from contacting waterstops. If necessary, wrap waterstop during bond breaker application.

## 2.07 Concrete Design Requirements

### A. General

Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the work will be determined during the trial batch. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. Mix designs shall not contain more than 43 percent of sand of the total weight of fine and coarse aggregate. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be approved by Owner.

### B. Water-Cement Ratio and Compressive Strength

The minimum compressive strength and cement content of concrete shall be not less than that specified in the following tabulation.

Type of Work	Min. 28-Day Compressive Strength (psi)	Max. Size Aggregate (in.)	Min. Cement per cu yd (sacks)	Max. W/C Ratio (by wt.)
Prestressed Concrete (Class "AA")	5,000	1	7.0	0.40
Structural Concrete (Class "A"):				
Walls, floor slabs, columns, and footings of hydraulic (water or wastewater) bearing structures	4,000	1	6.2	0.42
Walls, roof slabs, floor slabs, columns, and footings and all other concrete items not specified elsewhere	4,000	1	6.2	0.48
Sitework concrete (Class "B"):	3,000	1	5.5	0.52
Lean concrete (Class "C"):	2,000	1	4.0	0.60

**Note:** One sack of cement equals 94 lbs.

### C. Adjustments to Mix Design

Mixes used shall be changed whenever such change is necessary or desirable to secure required strength, density, workability, and surface finish and Contractor shall be entitled to no additional compensation because of such changes. Approval shall be obtained from Owner prior to any changes.

## 2.08 Consistency

The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce concrete which can be worked properly into place without segregation, and which can be compacted by vibratory methods herein specified to give desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature of moisture content of the aggregates, to maintain uniform production of desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

<u>Part of Work</u>	<u>Slump</u>
Structural concrete	4" ( $\pm 1$ " )
Other work	4" ( $\pm 1$ " )
With high range water reducer added	8" max.

## 2.09 Ready-Mixed Concrete

- A. At Contractor's option, ready-mixed concrete may be used provided it meets all requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94, including the supplementary requirements specified in Parts 2.09B through 2.09F herein.
- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within 90 minutes after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather (ambient temperature above 95°F) or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85°F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes. Maximum concrete temperature at any time shall not exceed 95°F.
- C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.
- D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.
- E. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than 1" when the specified slump is 4" or less, or if they differ by more than 2" when the specified slump is more than 4", the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance

is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

- F. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a certified weighmaster delivery ticket furnished to the Owner in accordance with Part 1.03B herein.
- G. Non-agitating equipment for transporting ready-mixed concrete shall not be used. Combination truck and trailer equipment for transporting ready-mixed concrete shall not be used. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates may be subject to continuous inspection at the batching plant by the Owner.
- H. Transit mix trucks delivering concrete to the site shall have full water tanks upon arrival at the site. Any addition of water must be approved by Owner. Added water must be incorporated by additional mixing of at least 35 revolutions.
- I. When ambient temperatures are expected to exceed 95°F during concrete placement, concrete mix water shall be refrigerated or ice shall be added to the mix up to 100 percent of the water requirement. Ice, when introduced into the mixer, shall be in such form that it will be completely melted and dispersed throughout the mix at the completion of the mixing time. The mixing time shall be held to the minimum practicable consistent with producing concrete meeting the specified requirements.
- J. When ambient temperatures exceed 95°F, forms and reinforcing steel shall be cooled by fog spraying and evaporation immediately prior to placing concrete. Forms shall be free of standing water when concrete is placed.

## **PART 3 - EXECUTION**

### **3.01 Proportioning and Mixing**

#### A. Proportioning

Proportioning of the concrete mix shall conform to the requirements of Section 4.2.3 of ACI 301; provided, that the maximum slump for any concrete shall not exceed 4" except when the use of high range water reducer is permitted which increases the maximum slump to 8".

#### B. Mixing

Mixing of concrete shall conform to the requirements of Section 4.3.1 of ACI 301 specifications.

#### C. Slump

Maximum slumps shall be as specified in Part 2.08 herein.

D. Retempering

Concrete or mortar which has partially hardened shall not be retempered.

**3.02 Preparation of Surfaces for Concreting**

A. General

Earth surfaces shall be thoroughly wetted by sprinkling, prior to placing any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. These surfaces shall be free from standing water, mud, and debris at the time of placing concrete.

B. Joints in Concrete

The location of all construction joints not specifically noted or shown shall be approved by Owner. Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the Owner, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting or waterblasting to remove laitance and to provide a uniform surface texture with 1/4" of surface amplitude. Sandblasting shall be followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

C. Placing Interruptions

When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent work; provided that construction joints shall be made only where acceptable to the Owner.

D. Embedded Items

1. Concrete shall not be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the Owner at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
2. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on Contract Drawings and shall be acceptable to the Owner before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.
3. Anchor Bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.

4. Concrete anchor bolts and expansion anchors shall be ASTM type A-316 stainless steel and shall be inserted to the minimum depths listed below, unless noted otherwise:

<u>Size</u>	<u>Reinforced Concrete</u>
1/4"	3"
3/8"	4"
1/2"	5"
3/4"	6"

5. Expansion anchors shall be stainless steel Hilti Kwik Bolt TZ, or equal.
6. All smooth dowels shall have at least one side coated with a bond breaker. Dowel bond breaker shall be a heavy duty industrial grease hand applied. A wax paper or PVC sleeve may be used at the Contractor's option if specifically manufactured to create slip dowels. Paper tubing shall be multi-ply stock and heavily impregnated with paraffin. Maximum sleeve thickness shall be 1/16" and sleeve shall fit snugly over dowel.

E. Casting New Concrete Against Old

1. Where new concrete is to be cast against existing (old) concrete (concrete which is greater than 60 days of age), surfaces of old concrete shall be roughened by mechanical means to provide an aggregate-fractured surface with a 1/4" (min.) profile and cleaned of all loose concrete and dust. The remaining surface shall be saturated in advance of concrete placement but be free of standing water. A bonding agent such as Sika Armatec 110 shall be applied to the interface between old and new concrete just prior to concrete placement.
2. Overlays of existing concrete and repair of holes, cavities, and depressions in existing concrete due to removal of existing facilities or installation of new facilities shall be as follows:
  - a. Remaining concrete surfaces shall be prepared as specified in Part 3.02E.1 herein.
  - b. A bonding agent shall be applied to all concrete and metal surfaces to receive repair mortar or concrete. Bonding agent shall be Sika Armatec 110, or equal.
  - c. Overlays, holes, cavities, and depressions shall be filled with Sika Monotop 611 mortar, or equal. For placements greater than 1" in depth, 3/8" coarse aggregate shall be added to the mortar to create a repair concrete. Vertical surfaces shall be formed. Horizontal surfaces, including slab overlays, shall be hand trolled and finished to match adjacent concrete.
  - d. Bonding agent and repair mortar/concrete shall be mixed and installed in strict accordance with the manufacturer's printed instructions.

F. Concrete shall not be placed in any old or new structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. Concrete shall not be deposited underwater nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such a manner and at such velocity as to injure the surface finish of the concrete. Contractor shall provide pumping or other necessary dewatering operations for removing groundwater, if required, with methods subject to review by Owner.

G. Corrosion Protection

Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2" clearance between said items and any part of the concrete reinforcement. Contractor shall not secure such items in position by wiring or welding them to the reinforcement.

H. Cleaning

Surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before concrete is placed.

**3.03 Handling, Transporting, and Placing**

A. General

Placing of concrete shall conform to the applicable requirements of Section 5.3.2 of ACI 301 and the requirements of this Section.

B. Non-Conforming Work or Materials

Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.

C. Unauthorized Placement

Concrete shall not be placed except in the presence of duly authorized representative of the Owner. Contractor shall notify Owner at least 24 hours in advance of placement of any concrete.

D. Placement in Wall Forms

Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers



and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4' below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6' in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2'; and Contractor shall take care to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft.

E. Placement in Slabs

Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. As the work progresses, concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

F. Temperature of Concrete

Temperatures of concrete when it is being placed shall be not more than 90°F nor less than 40°F in moderate weather, and not less than 50°F in weather during which the mean daily temperature drops below 40°F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90°F, Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90°F. Contractor shall be entitled to no additional compensation on account of the foregoing requirements.

G. Cold Weather Placement

Earth foundations shall be free from frost or ice when concrete is placed upon or against them. Fly ash concrete shall not be placed when the air temperature falls below 50°F.

### **3.04 Pumping of Concrete**

A. General

If the pumped concrete does not produce satisfactory end results, Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment

Pumping equipment must have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, Contractor may have a standby pump on the site during pumping.

C. The minimum diameter of hose (conduits) shall be 4".

- D. Contractor shall replace pumping equipment and hoses (conduits) that are not functioning properly.
- E. Contractor shall not use aluminum conduits for conveying the concrete.
- F. Proportioning  
Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified in Part 2.07 herein.
- G. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible.
- H. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.
- I. Water and slump requirements shall conform to Parts 2.01D3 and 2.07B herein for water and Part 2.08 herein for slump.
- J. Cement and admixtures shall conform to Part 2.01D herein.

### **3.05 Order of Placing Concrete**

The order of placing concrete in all parts of the work shall be acceptable to the Owner. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured before the contiguous unit or units are placed, as follows:

#### **A. Foundations**

Foundation forms shall remain in place for a minimum of 48 hours after the end of a placement. Thereafter, forms may be removed and construction of adjacent formwork or wall formwork may commence. Concrete for foundation sections shall not be placed until a minimum of 7 days have elapsed from the end of the adjacent placement. Concrete for walls above foundations may be placed after a minimum of 72 hours have elapsed, provided the footings have attained at least 50% of their design strength as demonstrated by testing of concrete cylinders.

#### **B. Walls**

Concrete for walls may be placed on top of foundations as described in Part 3.05A herein. Concrete for subsequent wall placements located vertically above new walls may be placed after a minimum of 72 hours have elapsed, provided the walls have attained at least 50% of their design strength as demonstrated by testing of concrete cylinders. Concrete for wall sections shall not be placed until a minimum of 7 days have elapsed from the end of the adjacent placement.

C. Roof Slabs, Decks, and Walkways

Concrete for roof slabs, decks, and walkways may be placed on top of walls after a minimum of 72 hours have elapsed, provided slabs, decks, and walkways are supported by formwork. Concrete for slab, deck, and walkway sections shall not be placed until a minimum of 7 days have elapsed from the end of the adjacent placement.

**3.06 Tamping and Vibrating**

- A. As concrete is placed in the forms or in excavations, Contractor shall insure it is thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Contractor shall take care in placing concrete around waterstops. Contractor shall carefully work concrete by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be inserted vertically into the concrete and pulled out slowly, penetrating 1/3 of the layer depth of the layer previously placed. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

**3.07 Finishing Concrete Surfaces**

A. General

Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown are defined as tolerances and are specified in Parts 1.04F and 1.04G herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Edges

All exposed edges of columns, beams, walls, roof slabs, elevated walkways, and foundations shall have a 3/4" chamfer, unless noted otherwise.

C. Formed Surfaces

Upon removal of forms, all surfaces shall be cured in accordance with Part 3.09 herein. After the curing period, all surfaces shall be sandblasted to expose air pocket voids and surface defects, and then repaired in accordance with Part 3.12 herein. After repairs are completed, surfaces shall be given an architectural finish in accordance with Part 3.08 herein.

D. Unformed Surfaces

After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. The classes of finish specified for unformed concrete surfaces are designated and defined as follows:

1. Class "1". After the floated surface (as specified for Class "3") has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of all irregularities.
2. Class "2". Steel trowel finish (as specified for Class "1") without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.
3. Class "3". After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Contractor shall not excessively float concrete surfaces while the concrete is plastic or dust concrete surfaces with dry cement and sand to absorb excess moisture. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4". Joints and edges shall be tooled where shown or as determined by the Owner.
4. Class "4". Contractor shall provide sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8". No further special finish is required.

Contractor shall finish unformed surfaces according to the following schedule unless otherwise shown or specified:

Unformed Surface Finish Schedule

<u>Area</u>	<u>Finish</u>
Grade slabs and foundations to be covered with concrete or fill material	Class "4"
Floors to be covered with grouted tile or topping grout	Class "3"
Slabs which are water bearing with slopes 10 percent and less	Class "1"
Sloping slabs which are water bearing with slopes greater than 10 percent	Class "2"
Slabs not water bearing	Class "2"
Slabs to be covered with built-up roofing	Class "3"
Interior slabs and floors to receive architectural finish/flooring	Class "3"

**3.08 Architectural Finish**

A. Smooth Sacked Finish

Contractor shall provide architectural finish for exposed to view concrete surfaces. Exposed concrete surfaces include the exterior of structures beginning 1' below grade, the tops of walls, and the interior of water holding structures from the floor to the top of the walls. Architectural finish shall also be provided for interior exposed to view concrete surfaces. All other incidental exposed to view concrete surfaces shall be provided with an architectural finish such as concrete stairways, concrete containment facilities around chemical storage tanks, elevated walkways, and the like. Architectural finish (i.e., smooth sacked finish) shall also be provided where shown.

B. Immediately after the forms have been stripped, the concrete surface shall be inspected by Owner and treated and cured in accordance with in Parts 3.09 and 3.12 herein.

C. After the concrete has cured at least 14 days, Contractor shall sandblast the surfaces and repair same in accordance with Part 3.12 herein. Thereafter, the surfaces shall be wetted, and a grout shall be applied with a brush. The grout shall be made by mixing one part Portland cement and one part of fine sand that will pass a No. 16 sieve with sufficient water to give it the consistency of thick paint. The cement used in said grout shall be 1/2 gray and 1/2 white Portland cement, as determined by the Owner. White Portland cement shall be Atlas white, or equal, furnished by the Contractor. The freshly applied grout shall be vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all the surface grout had been removed with a steel trowel, the surface shall be allowed to dry and, when dry, shall be vigorously rubbed with burlap to remove completely all surface grout so that there is no visible paint-like film of grout on the concrete. The entire cleaning operation for any area shall be completed the day it is started, and grout shall not be left on the surface overnight.

D. Surface Overnight

Cleaning operations for any given day shall be terminated at panel joints. Contractor shall insure that the various operations be carefully timed to secure the desired effect which is a light-colored concrete surface of uniform color and texture without any appearance of a paint or grout film.

E. In the event that improper manipulation results in an inferior finish, Contractor shall rub such inferior areas with carborundum bricks.

F. Before beginning any of the final treatment on exposed surfaces, Contractor shall treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the Owner and shall preserve said trial area undisturbed until the completion of the job.

G. All architecturally-treated concrete surfaces shall conform to the accepted sample in texture, color, and quality. It shall be the Contractor's responsibility to maintain and protect the concrete finish.

**3.09 Curing and Dampproofing**

A. General

All concrete shall be cured for not less than 14 days after placing in accordance with the methods specified herein for the different parts of the work as follows:

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
Unstripped forms	1
Wall sections with forms removed	4
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Part	4
Floor slabs on grade in hydraulic structures	5
Roof and slabs not on grade	6

B. Method 1

Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within

14 days of placing the concrete, curing shall be continued in accordance with Method 4, Part 3.09E herein.

C. Method 2

The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3

The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

E. Method 4

The surface shall be sprayed with a liquid curing compound.

1. Curing compound shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 175 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly. Two spray coats shall be applied, with the second coat sprayed at right angle direction from first coat.
2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, Contractor shall repair break immediately by the application of additional curing compound over the damaged portion.
3. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.
4. Where curing compound is specified, it shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as specified herein.

F. Method 5

Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each work operation as necessary to prevent drying shrinkage cracks.

1. Immediately after each square foot of the concrete has been finished, it shall be given a coat of curing compound in accordance with Method 4, Part 3.09E herein. Not less than one hour nor more than 4 hours after the coat of curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2" wide strips of sealing tape or with edges lapped not less than 3" and fastened together with a waterproof cement to form a continuous watertight joint.
2. Curing blankets shall be left in place during the 14 day curing period and shall not be removed until after concrete for adjacent work has been placed. Should the curing blankets become torn or otherwise ineffective, Contractor shall replace damaged sections. During the first 3 days of the curing period, Contractor shall not allow traffic of any nature or depositing, temporary or otherwise, of any materials on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8" minimum thickness, laid over the curing blanket. Contractor shall add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

G. Method 6

Concrete slabs shall be treated with an evaporation retardant as specified in Method 5. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 14 consecutive days beginning immediately after the concrete has been placed or forms removed. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held in place to prevent being dislodged by wind or any other causes. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. Curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed and curing compound immediately applied in accordance with Method 4, Part 3.09E herein. Contractor shall dispose of excess water from the curing operation to avoid damage to the work.

### 3.10 Protection

Contractor shall protect all concrete against injury until final acceptance by the Owner. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. Contractor shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring. Immediately following the first frost in the fall, Contractor shall be prepared to protect



all concrete against freezing. After the first frost, and until the mean daily temperature in the vicinity of the worksite falls below 40°F for more than one day, the concrete shall be maintained at a temperature not lower than 50°F for at least 72 hours after it is placed.

### **3.11 Curing in Cold Weather**

- A. Water curing of concrete may be reduced to 6 days during periods when the mean daily temperature in the vicinity of the worksite is less than 40°F; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.
- B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50°F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise, concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours of protection at 50°F. Concrete cured by water curing shall be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50°F.
- C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40°F in 24 hours. In the spring, when the mean daily temperature rises above 40°F for more than 3 successive days, the specified 72 hour protection at a temperature not lower than 50°F may be discontinued for as long as the mean daily temperature remains above 40°F; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.
- D. Where artificial heat is employed, Contractor shall take special care to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these specifications.

### **3.12 Treatment of Surface Defects**

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined by Owner and any irregularities shall be immediately rubbed or ground by the Contractor in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Contractor shall not plaster or coat surfaces to be smoothed. Concrete shall then be cured for the specified curing period in accordance with Part 3.09 herein. After the curing period, all surfaces shall be sandblasted to remove curing compound (if utilized), concrete paste film, and laitance, and to expose all air pocket voids and surface defects. Repairs shall not be made until after inspection by the Owner. Contractor shall not in any case perform extensive patching of honeycombed concrete. Concrete containing minor voids, holes, or similar depression defects with a maximum depth of 1/4" may be filled with the grout used for the architectural finish, or if below grade on the exterior, may be left unfilled. Concrete containing minor voids, holes, honeycombing, or similar depression defects deeper than 1/4" with a maximum depth of 3/4" and/or a maximum surface area of 2 square inches shall be repaired as specified in Part 3.12B. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be repaired utilizing a repair material specifically manufactured for such use (such as Sikatop 121) subject to approval by Owner,

or completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.

- B. Defective surfaces to be repaired as specified in Part 3.12A herein, shall be cut back from true line a minimum depth of 1/2" over the entire area. Edges shall not be feathered. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32" depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of applying cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The concrete shall then be patched as follows:

A bonding material such as acryl 60 shall be applied to the surface of the area to be repaired just prior to application of the repair mixture. The repair mixture shall consist of one part of Type II, low alkali, Portland cement to 3 parts concrete sand. Mix solution shall contain 1/3 bonder, such as acryl 60, to 2/3 water and added in quantities sufficient to allow placement but not cause hairchecking or slippage. Quantities prepared should be limited to that able to be completed within 30 minutes. Areas repaired shall be compacted with a wood ramming device and cured with the water/acryl 60 solution. Repair mixture shall be applied in maximum 1" lifts.

For exposed walls, the cement shall contain such a proportion of Atlas white Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired as described in Part 3.12B herein.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of Part 3.08 or 3.09 herein, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures.

### **3.13 Joint Sealant in Hydraulic Structures**

Joint sealant shall be placed in all horizontal and vertical joints of all cast-in-place walls exposed to water. Provide 1" wide x 1/2" deep formed groove for joint sealant. Sealant strip material and installation procedure shall be per Part 2.05 herein.

### **3.14 Installation of Epoxy Rebar Dowels and Anchor Bolts**

Epoxy rebar dowels and anchor bolts shall be bonded with the Hilti Hit-RE 500-SD System, or equal. Unless noted otherwise, rebar dowels shall be ASTM A615 Grade 60 steel and anchor bolts shall be 316 stainless steel threaded rod. Rebar dowels and anchor bolts shall be installed to the depths shown on the Drawings or equipment manufacturer's shop drawings. Prior to injecting epoxy, each drilled hole shall be cleaned out with a nylon brush. Contractor shall install dowels and anchor bolts in strict accordance with the manufacturer's printed instructions.

### 3.15 Backfilling Against Concrete Structures

All curing shall be in accordance with Part 3.09 herein.

#### A. Foundations

Minimum time to begin backfilling against foundations is 72 hours from completion of placement.

#### B. Walls

For non-hydraulic structures, backfilling may commence after 7 days and 75% of design strength have been reached, as demonstrated by testing of field cured concrete cylinders. Backfill height shall not exceed one half of wall height until wall has attained 100% of design strength. Hydraulic structures shall not be backfilled until after hydrostatic leak testing has been completed and accepted.

#### C. Shear Rings and Thrust Blocks

Shear rings and thrust blocks shall be cured 24 hours minimum prior to backfilling. No pipeline pressure testing shall be performed until 7 days after the last concrete placement.

### 3.16 Testing of Hydraulic Structures

#### A. General

Contractor shall water test all concrete tanks, hydraulic channels, sumps, basins, and other structures designed to contain water prior to backfilling. Testing shall be accomplished by filling the structure with water. Testing shall not be performed until roof is in place (if applicable) and all concrete has attained full design strength. Contractor shall provide the following:

1. All pumps, power, piping, and any other equipment required to fill tanks for testing.
2. Necessary provisions to dispose of test water after testing, including pumping if necessary. At completion of tests all temporary piping and connections shall be removed. Waste water shall be disposed of without creating a nuisance or damage to adjacent property.

#### B. Test Procedure

The structure shall be full to high water level at beginning of test. Contractor may elect to keep the tank full of water for as long as 48 hours prior to the test to allow for water absorption by the concrete. Test period shall be 5 consecutive 24 hour periods totaling 5 consecutive days. Liquid level shall be accurately measured at the beginning and end of test to determine amount of leakage. All visible leaks shall be marked for repair after draining. Permissible leakage from the structure shall not exceed 0.5 gpm per million gallon storage capacity in each 24 hour period over a period of 5 consecutive days after allowance is made for evaporation. If the leakage exceeds the permissible amount, the structure shall be emptied, leaks shall be repaired (in a manner acceptable to the Owner),

and the test rerun. Even if structure passes water loss test, all visible leakage shall be repaired and the test rerun to demonstrate all visible leakage has been repaired.

C. Leak Repair

All visible leaks shall be repaired from the structure interior utilizing epoxy injection. The hydraulic structure shall be drained, and a surface seal shall be applied to the area where leak commences; thereafter, the crack(s) and voids shall be injected with epoxy in accordance with the manufacturer's recommendations. After injection process is completed, the structure shall be refilled and checked for visible leakage. If structure continues to leak, this process shall be repeated until no visible leaks are present.

**3.17 Care and Repair of Concrete**

Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance of the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, fails to conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

**END OF SECTION**

**SECTION 05100**  
**STRUCTURAL STEEL AND MISCELLANEOUS METAL WORK**  
**TECHNICAL SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 General Requirements**

Contractor shall furnish all labor, equipment, and material and perform all operations necessary for fabrication, construction, and installation of structural and miscellaneous metal work as indicated on the Drawings and specified herein.

Where miscellaneous metal and equipment items are required to fit spaces previously constructed, measurements for the fabrication of such items shall be made at the site so that items fit as required. Standard commercial products which meet general requirements, and vary only in nonessential detail, will be acceptable, subject to Owner's approval.

All work shall be executed and finished in accordance with Contract Document requirements and accepted shop drawings, and shall conform with the best practice required to produce the highest-grade construction. Contractor shall be solely responsible for errors of fabrication and correct fitting of structural members shown on the Drawings, and shop drawings.

**1.02 Reference Codes, Specifications, and Standards**

The Work covered under this Section, including all design, materials, fabrication, erection, and workmanship, shall comply with all applicable requirements of the current editions of the following codes, specifications, and standards:

- A. Aluminum Association: Aluminum Design Manual
- B. American Institute of Steel Construction (AISC)
  - 1. Steel Construction Manual
  - 2. AISC 303 - Code of Standard Practice for Steel Building and Bridges
  - 3. AISC 360 - Specification for Structural Steel Buildings
  - 4. AISC 341 - Seismic Provisions for Structural Steel Building
- C. American Iron and Steel Institute (AISI)
  - 1. AISI S100 – Standard for the Design of Cold-Formed Steel Structural Members.
  - 2. AISI S201 – Standard for Cold-Formed Steel Framing – Product Data.
- D. American Society for Testing and Materials (ASTM) Standard Specifications
  - 1. ASTM A36 – Carbon Structural Steel
  - 2. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - 3. ASTM A108 - Steel Bar, Carbon and Alloy, Cold-Finished
  - 4. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 5. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware

6. ASTM A276 - Stainless Steel Bars and Shapes
7. ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates
8. ASTM A307 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
9. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
10. ASTM A385 - Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
11. ASTM A490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
12. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
13. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
14. ASTM A563 - Carbon and Alloy Steel Nuts
15. ASTM A572 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel
16. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
17. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
18. ASTM A786 - Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
19. ASTM A793 - Rolled Floor Plate, Stainless Steel
20. ASTM A992 - Structural Steel Shapes
21. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
22. ASTM B210 - Aluminum and Aluminum-Alloy Drawn Seamless Tubes
23. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bar, Rods, Wire, Profiles, and Tubes
24. ASTM B241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
25. ASTM B308 - Aluminum and Aluminum-Alloy 6061-T6 Standard Structural Profiles
26. ASTM B483 - Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications
27. ASTM B632 - Aluminum-Alloy Rolled Tread Plate
28. ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel.
29. ASTM D6386 - Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
30. ASTM E165 - Practice for Liquid Penetrant Examination for General Industry
31. ASTM E709 - Guide for Magnetic Particle Testing
32. ASTM F436 - Hardened Steel Washers
33. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs
34. ASTM F594 - Stainless Steel Nuts
35. ASTM F844 - Washers, Steel, Plain (Flat), Unhardened for General Use
36. ASTM F1554 - Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
37. ASTM F2329 - Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
38. ASTM F3125 - High Strength Structural Steel Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength

E. California Building Code (CBC)

- F. American Welding Society (AWS)
1. D1.1 - Structural Welding Code - Steel.
  2. D1.2 - Structural Welding Code - Aluminum.
  3. D1.3 - Structural Welding Code - Sheet Steel.
  4. D1.6 - Structural Welding Code - Stainless Steel.

### 1.03 Quality Assurance

Unless otherwise specified, all work specified in the Contract Documents shall comply with requirements of the following specifications and codes:

A. Steel Work

Fabrication and erection of structural steel shall be in accordance with Chapter 22 of the CBC, and the AISC and ASTM Specifications, Codes, and Provisions referenced herein.

B. Aluminum Work

Fabrication and erection of aluminum shall be in accordance with the applicable requirements of Chapter 20 of the CBC, and the Aluminum Association and ASTM Manuals, Specifications, Provisions referenced herein.

C. Welding Inspection

Unless specified otherwise, all welding of structural steel assemblies shall be performed under continuous inspection of an independent (third party) "Special Inspector" approved by the Owner. All costs for the third party "Special Inspector" shall be paid for by the Contractor. Should such fabrication be performed in the shop of a licensed fabricator approved by the Owner, only the field welding of structural steel assemblies will be required to be performed under continuous inspection of the "Special Inspector". Contractor shall notify Owner at least 24 hours in advance of needed inspections. Contractor shall provide copies of Inspection Reports for Owner.

D. Shop Coating Inspection

All ferrous metal surfaces specified to receive a protective coating shall be field sand blasted, primed, and coated, unless shop priming is requested in writing by the Contractor and approved by the Owner. Where shop priming has been approved by the Owner, all shop priming work shall be inspected by an independent NACE certified inspection firm retained and paid for by the Contractor. Said firm shall be selected by the Contractor and approved by the Owner prior to commencing work. Inspector shall submit daily field reports directly to the Owner by electronic mail each work day. Prior to shipment of shop primed materials to the project site, the independent inspection firm shall submit a certified report to the Owner containing results of all shop inspections and tests for surface preparations, coating thickness, including a summary of any deficiencies and corrective action for same. Test results shall be correlated to a letter/numbered diagram of all ferrous metal members and components. In addition, the report shall include a certification statement from the inspection firm stating that all shop blasting and priming was performed in compliance with the Contract Documents.

## 1.04 Submittals

All submittals shall be in accordance with Section 01300, Contractor Submittals and Requests Technical Specifications. Submittals shall include, but shall not be limited to, the following:

### A. Shop Drawings

Contractor shall submit shop drawings for review by Owner prior to fabrication of any of the work. Shop drawings shall show complete fabrication details with material lists, including all welds, fabrication and finish details, and shop painting. In review of shop drawings, the Owner does not assume responsibility for accuracy of the work relative to other components as constructed. All dimensions shall be field verified by the Contractor prior to fabrication.

### B. Test Reports

Contractor shall furnish notarized certified physical and chemical mill test reports for material used for structural members. All tests shall be performed in accordance with applicable ASTM Standards.

### C. Material Product Data

Contractor shall submit product data sheets of proposed shop prime coating, which shall be compatible with all field coatings per Specification Section 09900. Material product data sheets shall provide the maximum time period for top coating with the specified field coating system, and any surface preparation requirements prior to top coating.

## PART 2 - PRODUCTS

### 2.01 Materials - General

Materials shall be new, sound, and shall comply with the following, unless indicated otherwise on the Drawings or specified otherwise in individual equipment and/or component Specification Sections:

#### A. Steel

Rolled shapes, plates, and bars shall conform to AISC "Steel Construction Manual".

##### 1. Carbon Steel

- a. Wide flange sections shall conform to ASTM A992,  $F_y = 50$  ksi.
- b. Channels, angles, miscellaneous shapes, and plates shall conform to ASTM A36,  $F_y = 36$  ksi.
- c. Pipe columns shall be Schedule 40 (minimum) and shall conform to ASTM A53, Type E or S, Grade B,  $F_y = 36$  ksi.



- d. Hollow structural rectangular or square sections (tubes) shall conform to ASTM A500, Grade B,  $F_y = 46$  ksi.

2. Stainless Steel

Material shall be Type 316L stainless steel alloy conforming to ASTM A167 and ASTM A276, for plates and bars.

B. Cast Iron

Material shall conform to ASTM A48, Class 30.

C. Ductile Iron

Material shall conform to ASTM A536 using Grade 60-40-18 or better.

D. Aluminum

1. All plate, pipe, and structural shapes shall be new and shall conform to ASTM B209 (Plate), B308 (Shapes), B429 (Pipe and Tubing), B211 (Bar Stock), and applicable Federal Specifications for 6061-T6 alloy, unless indicated otherwise on the Drawings.
2. Aluminum pipe rail shall be of 6061-T6 alloy and be Schedule 40 or greater.
3. Alloys and tempers for various members where not otherwise designated, shall be as required for proper forming and fabrication to meet or exceed structural requirements, and shall be of alloys specially produced to best achieve specified color anodized finishes. Contractor shall provide supporting printed recommendations from parent aluminum producer. For sheet fabricated members Contractor shall use only homogenous aluminum products and no clad products.
4. Contingent upon alloys being welded, Contractor shall use only inert gas shielded arc or resistance welding process with filler alloys as specified in the CBC. Contractor shall not use any process requiring a welding flux.

E. Checkered Plate

Raised lugs shall be diamond shaped and have an angled and opposed pattern. Contractor shall use 6061-T6 alloy aluminum, except where steel is specified. Steel shall be of ASTM A36 carbon steel, hot dip galvanized.

F. Manhole Covers

Castings for manhole covers and frames shall be of tough gray iron free from cracks, holes, and swells, and of workmanlike finish. They shall conform to ASTM A48, latest, Class 30, and shall be of the type specified.

G. Common Bolts

Common bolts shall be standard commercial quality steel units conforming to ASTM A307; galvanize where used with galvanized work.

H. High Strength Bolts & Studs

High strength bolts shall conform to ASTM A325; studs shall conform to ASTM A449; nuts shall conform to ASTM A194, 2H heavy hex; washers shall conform to ASTM F436. They shall be galvanized where specified or where used with galvanized steel.

I. Stainless Steel Bolts

Stainless steel bolts, cap screws, and studs shall be Type 316L conforming to ASTM F593; nuts shall conform to ASTM F594.

J. Deferred Bolting Devices (Noted D.B.D. or Expansion Anchor on Contract Drawings)

Deferred bolting devices shall be used in lieu of anchor bolts only where specifically noted or detailed; they shall be installed in accordance with current ICC-ES Evaluation Reports and shall consist of the following:

1. D.B.D. shall be Red Head Trubolt Wedge Anchors, Hilti HSA Anchors, or approved equal.
2. D.B.D. shall not be used for anchorage of any vibrating machinery or equipment.

K. Galvanizing

1. Iron and Steel

Unless specified otherwise, galvanizing shall conform to ASTM A123, with minimum weight per square foot of 1.25 ounces. Galvanizing shall be performed upon completion of all fabrication processes, including welding.

2. Ferrous Metal Hardware Items

Unless specified otherwise, galvanizing shall conform to A153, with average coating weight of 1.25 ounces per square foot. Galvanizing shall be performed upon completion of all fabrication processes, including welding.

3. Repair of Galvanized Coatings

Galvanized coatings marred or damaged during transport, erection, or field welding shall be repaired as specified in Part 3 herein.

L. Welding Electrodes

1. Carbon Steel Electrodes

Contractor shall use E70XXX rod for shielded metal arc welding conforming to AWS A5.1 or A5.5 and F7X-EXXX for submerged arc welding conforming to AWS A5.17. For steel alloys other than ASTM A36 and A53, Contractor shall use electrodes recommended in writing by AWS and by the parent steel manufacturer.

2. Aluminum Electrodes

Contingent upon alloys being welded, Contractor shall use only inert gas shielded arc or resistant welding process with filler alloys conforming to AWS D 1.2 Structural Welding Code - Aluminum. Contractor shall not use any process requiring a welding flux.

3. Stainless Steel Electrodes

Contractor shall weld stainless steel with electrodes and by techniques specified in pertinent AWS A5 Series Specification, and as recommended in Welded Austenitic Chromium-Nickel Stainless Steel Techniques and Properties as published by the International Nickel Company, Inc., New York, N.Y.

M. Shop Prime Paint

To assure compatibility with field-applied paint or coating systems, for ferrous metals other than stainless steel, galvanized steel, and cast iron, Contractor shall use same shop prime paint product and manufacturer as painting or protective coating system intended for field application specified in Specification Section 09900. Contractor shall not shop prime portions of work immediately adjacent to intended field welds or portions intended for embedment in concrete.

N. Storage of Materials

Structural material, either plain or fabricated, shall be stored above ground upon platforms, skids, or other supports. Material shall be kept free from dirt, grease, and other foreign matter and shall be protected from corrosion.

## **PART 3 - EXECUTION**

### **3.01 Fabrication**

A. General

Work shall conform to the Contract Documents and approved shop drawings. Work shall be performed by Fabricator with a minimum of 5 years experience in furnishing, fabricating, and erecting structural steel and miscellaneous metal work for water and wastewater facilities. Fabricator shall be certified by governing Code Authorities. All fabricated components shall be fitted and pre-assembled in the shop prior to shipments to the project site.

B. Steel

Steel work (ferrous metal and stainless steel) shall conform to the applicable requirements of the AISC Specifications, latest edition. Unless otherwise indicated, shop connections shall be welded or bolted.

C. Aluminum

Aluminum work shall conform to the applicable requirements of the "Aluminum Design Manual" and "Specifications for Aluminum Structures, Aluminum Construction Manual" of the Aluminum Association. Unless specified otherwise, shop connections shall be welded or bolted

D. Stainless Steel

1. All stainless steel products (including austenitic, ferritic, martensitic, duplex and super-duplex corrosion resistant steels) shall be fabricated in the shop. All stainless steel products shall be cleaned, pickled (descaled), and passivated at the point of manufacture or at a separate location that specializes in cleaning, descaling, and passivation of stainless steel. Field fabrication or field cleaning, descaling and passivation will not be permitted. Cleaning, descaling, and passivation shall be performed as specified herein.
2. Descaling is the removal of heavy, tightly adhered oxide films resulting from hot-forming, heat-treatment, welding and other high temperature operations by means of chemical or mechanical methods. Passivation is the removal of exogenous (not inherent in the base metal) iron or iron compounds from the surface of stainless steel by means of a chemical dissolution, by a treatment with an acid solution that shall completely remove the surface contamination but will not significantly affect the stainless steel itself. All welds, heated areas of stainless steel parts, and heat affected zones of welds shall be cleaned, descaled, and passivated per ASTM A380 "Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems" and ASTM A967 "Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts" to prevent corrosion rates in excess of unwelded and unheated stainless steel base material. Descaling and passivation by use of pastes or sprays will not be permitted. Unless specified otherwise, passivation by means of electrochemical treatment, including electropickling or electropolishing, will not be permitted. As a minimum, descaling and passivation shall include the following:
  - a. The surfaces of all stainless steel products shall be thoroughly degreased and cleaned per ASTM A380. Surfaces shall be free of foreign material contamination (i.e. markers, chalk, paint, soil, grease, or oil). Cleaning solvents shall be non-chlorinated. Water-break testing per ASTM A380 shall be performed after cleaning to ensure all foreign material is removed prior to descaling. No break shall be permitted in the film as it drains from the vertical surface.

- b. Upon successful completion of the cleaning process, all stainless steel products shall be mechanically descaled by means of glass-bead blasting with clean glass that contains no ferrous materials. All surfaces shall be uniformly blasted and shall be free of rust, free iron, weld scale, heat tint oxides, arc strikes, tool marks, gouges, and scratches that occurred in the procurement or fabrication stage. The finish of all stainless steel surfaces shall be of a high quality and as a minimum, equal to the milled or hot rolled condition specified by the material specification. Blasted surfaces shall be scrubbed and rinsed per ASTM A380.
- c. Upon successful completion of the descaling process, all stainless steel products shall be acid passivated for corrosion resistance and to provide a superior surface finish. All stainless steel products shall be completely immersed in a nitric acid solution bath or a citric acid solution bath with additives at the proper concentrations, temperature, and duration as presented in ASTM A967. After each descaling and passivation treatment, stainless steel products shall be thoroughly washed with a high pressure wash of clean cold potable water and allowed to air dry. Immediately, after first water rinse, the parts shall be thoroughly rinsed with a second potable water rinse. Finally, the parts shall be thoroughly rinsed with de-ionized water to remove residual halogens from all surfaces. The passivated parts shall exhibit a chemically clean surface and shall not show any pitting, etching, or frost. No heat tint or discoloration is allowed.
- d. All stainless steel products shall be tested to ensure corrosion resistance prior to shipment to site. As a minimum, the testing shall include the water immersion test and the salt water spray test or the potassium ferricyanide-nitric acid test per ASTM A967. Testing procedures shall follow ASTM A967 and shall be safe for potable water applications. Each test shall be recorded and presented in a report by an independent third party inspector paid for by the Contractor. Prior to shipment, a letter of certification and inspection reports from the third party inspection firm shall be provided to the Owner indicating the cleaning, descaling, and passivation procedures performed; test procedures performed including test results; and statements of certification that all work was performed in accordance with ASTM A380, A967, and as specified herein.

### **3.02 Shop Priming**

Ferrous metal members and components specified to receive a protective coating shall be field sand blasted and primed, unless shop priming is requested in writing by Contractor and approved by Owner.

When shop priming of ferrous metal is allowed by Owner, Contractor shall shop prime all ferrous metal surfaces as follows:

#### **A. Surface Preparation**

All surfaces shall be cleaned to "near-white", all in accordance with the Contract Documents.

B. Application

Application of prime coat shall be immediately follow surface preparation; it shall be completed within the period of 8 hours. Any such cleaned areas not receiving prime coat within said 8 hour period shall be re-cleaned prior to application of prime coat. All cleaned areas shall be approved by the Coating Inspector prior to application of any coating or paint. Any areas coated without the Coating Inspectors approval shall be re-cleaned to remove all coating, inspecting, and then recoated.

Upon completion of cleaning and priming, all coated or painted components shall be cured for a minimum of two hours at 60° F prior to stacking or handling components.

C. Materials

All ferrous metal surfaces shall be primed with Tnemec 94-H20 Hydro-Zinc Organic Zinc Rich Primer, or approved equal to a minimum dry film thickness of two and one half (2.5) mils (unless noted otherwise).

D. Transportation

1. In transit, spacers shall be used to separate all members and components. In addition, all shop primed steel shall be completely covered to protect the steel and prevent deposition of road salts, fuel residue, and containments.
2. Loaded steel shall be bound with padded chains or ribbon binders.

E. Field Application

1. If damage to primer in a specific area exceeds 50% of the total surface of that specific area as determined by Owner, Contractor shall blast clean entire said area and reapply the primer in accordance with the Contract Documents.
2. Primed surfaces which have been exposed to excessive sunlight or have exceeded the manufacturer's recommended recoat time shall be scarified and a second coating of paint shall be applied. Procedures for the surface preparation shall be determined by the Owner.
3. Upon completion of erection, all surfaces shall be thoroughly scrubbed and washed with a detergent cleanser and rinsed with high pressure water until all surfaces are free from dirt, grease, oil, and all other surface contaminants.
4. After surfaces are clean and prior to application of intermediate coat, surfaces shall be inspected and approved by Owner. Any areas not approved by Owner shall be repaired as follows:

All areas uncoated in the shop (weld hold back areas) or damaged during shipping, erection, and exposure shall be spot blast cleaned to "near-white" in accordance with the Contract Documents. All said blast cleaned areas shall be approved by the Owner and then receive prime coat. Thereafter, all surfaces shall receive prime, intermediate, and finish coats in accordance with the Contract Documents.

5. Field repair shall extend beyond the heat affected zone of any welds.
6. After blast cleaning of defective or damaged areas, edges shall be feathered to provide a smooth transition between shop primed and field primed surfaces.

### **3.03 Installation**

#### **A. Members**

1. All members shall be free from twists, kinks, buckles, or open joints. Members shall be straight and true. Members shall not vary from centerline by more than 1/8" in 20'. Member flanges shall be flat and undamaged. Members not straight or having bent or warped flanges shall be replaced prior to erection.
2. All members, holes, and their spacing shall be so accurately made that, when assembled, the parts shall come together and bolt without distortion.
3. Parts assembled with bolts shall be in close contact, except where separators are required. Where unlike metals are in contact, Contractor shall insulate as necessary to prevent corrosion.
4. Bearing surfaces shall be planned to true beds. Abutting surfaces shall be closely fitted. Steel requiring accurate alignment shall be provided with slotted holes and/or washers for aligning the steel members.

#### **B. Welding**

1. Welding in shop and field shall be done by operators who have previously been qualified by tests, as prescribed in the American Welding Society, "Standards Qualifications Procedure". All welds shall exhibit characteristics required by AWS D1.0.
2. All welds shall be made with E70-XX classification mild or low-alloy steel covered arc-welding electrodes conforming to AWS A5.1 and A5.5 Specifications for filler metal, except as otherwise designated on Structural Drawings and except as otherwise recommended by AWS and AISC for welding high strength steel alloys other than ASTM A36 and A53 Steels.
3. All steel, before being fabricated, shall be thoroughly wire brushed, cleaned of all scale and rust, and thoroughly straightened by approved methods that will not injure the materials being used. Welding shall be continuous along the entire line of contact except where tack or intermittent welding is permitted by Owner. Where exposed, welds shall be cleaned of flux and slag and ground smooth.
4. Welding of aluminum shall conform to the applicable requirements of California Building Code, Chapter 28 and to the detail requirements of "Welding Aluminum" by the American Welding Society and the Aluminum Association.

C. Stainless Steel Products

Contractor shall preserve the appearance and finish of stainless steel products by providing suitable protection during handling and installation, and until final acceptance of the work.

1. All pickled and passivated parts shall be packaged in a manner which shall afford protection of the part from excess exposure during transit.
2. Handling methods and equipment used shall prevent damage to metal surfaces and shall include the use of wide canvas slings and wide padded skids.
3. Bare cables, chains, hooks, metal bars, or narrow skids shall not be used.
4. After installation, stainless steel parts shall be thoroughly washed with a high pressure wash of potable water. All surfaces shall be free of dust and contaminants.
5. All stainless steel products shall be covered during work performed in the vicinity of said components to maintain surfaces free of dust and contaminants.

**3.04 Erection**

- A. Erection shall include the installation and erection of all steel referred to in this Basic Specification. Contractor shall verify correctness before starting erection. Erection shall be performed in accordance with the latest edition of AISC Code of Standard Practice.
- B. As erection progresses, Contractor shall securely bolt up all members to take care of all dead-load, wind, and erection stresses.
- C. Contractor shall not perform final bolting or welding until each portion of the structure has been properly aligned and plumbed.
- D. Unless specifically shown otherwise on the Drawings, all metal work shall be installed plumb, square, and level. The maximum differential length, radius, or elevation in any erected structure, frame, support, or the like, shall be 1/16" (horizontally and vertically) within any 10' distance (ratio for shorter or longer distances).
- E. Contractor shall insure bolts are drawn up tight and threads set so that nuts cannot become loose.
- F. During erection, members which are bent, twisted, or damaged shall be straightened or replaced by Contractor as directed. If heating is required in straightening, heating shall be done in the presence of the Inspector and a heating method shall be used which will ensure uniform temperature throughout the entire member. Members, which, in the opinion of the Owner, are damaged to an extent impairing their appearance, strength, or serviceability, shall be removed and replaced with new members by Contractor.



G. Repair of Galvanized Coating

1. Galvanized coatings marred or scraped during erection or fabrication shall be repaired by the zinc-rich paint method in accordance with ASTM A780. Zinc-rich paint shall contain greater than 92% metallic zinc by weight in dry film. Zinc-rich paint shall be Z.R.C. Cold Galvanizing Compound, or equal. Surface preparation and paint application shall be in accordance with the manufacturer's instructions and ASTM A780 requirements. Repair thickness for the paint shall be 50% more than the surrounding coating thickness, but not greater than 4.0 mils.
2. Galvanized coatings damaged by cutting or field welding shall be repaired by the zinc-based solder method in accordance with ASTM A780 and the following:
  - a. Remove any welding slag with a chipping hammer and clean weld or damaged area by power wire brushing.
  - b. Soldering shall be performed with zinc-based alloys in stick form, Gal-Viz by Harris, ReGalv by Rotometals, or equal.
  - c. Preheat the region to be repaired by means of an oxyacetylene torch or other method to approximately 600°F.
  - d. Wire brush repair area again.
  - e. Apply zinc-based alloy by rubbing stick of alloy over the heated area while it is hot enough to melt the alloy.
  - f. Uniformly spread molten alloy by wire brushing with a clean wire brush or rubbing with a flat edge strip of steel or palette knife.
  - g. Remove flux residues by wiping with a damp cloth or rinsing with water.
  - h. Repair coating thickness shall meet the specification requirement for hot-dip galvanizing of the part or assembly and ASTM A123 requirements.
  - i. Brush apply two coats of zinc rich paint, Z.R.C Cold Galvanizing Compound, or equal (cold galvanize repair coating).

H. Anchor Bolts and Anchors

Anchor bolts and anchors shall be properly located and built into connection work in accordance with the Contract Documents. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately. Embedded anchor bolts that are submerged in process water or sludge, or are in enclosed tanks or spaces exposed to process gas or moisture, shall be Type 316 stainless steel with nuts of the same material. To such stainless steel bolts, Contractor shall apply a non-oxidizing lubricant grease before bolting using a molybdenum disulphide grease compound or a NO-OX-10 type compound. Specialty anchoring systems shall be as specified or shown on Construction Drawings.

Anchor bolt and anchor nuts shall fully engage anchor bolt or anchor threads. Anchor bolts or anchors shall not extend above the anchor nuts by a distance that is more than the bolt or anchor diameter. Anchor bolts or anchors that exceed the projection limits shall be neatly cut to the specified height with any burrs removed, and threads shall be re-dressed to match a factory machined bolt end of the same size and pitch.

I. Steel and Aluminum Pipe Rails and Railings

Pipe rail shall be painted steel or anodized aluminum as specified in Contract Documents. Steel and aluminum pipe rails and railings, complete with stanchions, toe plates, welded and bolted fittings, and attachments shall be fabricated true to size configurations and detail shown on Construction Drawings. Grind and polish welds flush and smooth. Curves, where indicated or necessary, shall be bent on a radius of not less than six (6) inches.

1. All pipe materials shall be Schedule 40 steel or aluminum.
2. If proprietary substitutions are proposed for railings and attachments, submittals shall be accompanied by acceptable test data by an independent testing laboratory showing that: the fitting and attachment will withstand the bending moment induced by a 200 lb. force applied at the top of the stanchion in any direction; and the railings will safely resist forces as required by Cal/OSHA and the California Building Code. Test data shall be for attachments in similar materials as the field condition.
3. Safety chains shall be 5/16 inch carbon steel minimum grade 30 link chain with common swivel bolt harness type snap, all hot dip galvanized.
4. Contractor shall isolate aluminum from dissimilar metals and concrete for protection from galvanic deterioration. Aluminum shall be mill finished and free of damage and detracting appearance flaws. Contractor shall provide uniform AA-KA41 Architectural Class I clear anodic finish.
5. Contractor shall not provide attachments which require the post to be embedded in concrete or grout.

J. Bearing Plates

Contractor shall provide bearing plates under beams and columns resting on walls or footings. Bearing plates may be attached or loose and aligned on steel wedges or shims. After the supported members have been plumbed and properly positioned and the anchor nuts tightened, Contractor shall solidly dry-pack entire bearing area under the plate with approved bedding mortar. Wedges and shims shall be cut off flush with edge of bearing plate, and shall be left in place.

K. Flame Cutting

Contractor shall not flame cut with a gas cutting torch in the field to correct fabrication errors on any major member in the structural framing. Contractor may flame-cut on minor members, when the member is not under stress, and then only following Owner's approval.

L. Dissimilar Metals

Contractor shall isolate aluminum from contact with dissimilar metals and materials, other than stainless steel, as follows:

1. Metals

Contractor shall apply on contact surfaces a heavy brush coat of approved zinc chromate primer made with a synthetic resin vehicle, followed by two brush coats of approved aluminum metal and masonry paint or a heavy coat of approved alkali-resistant bituminous paint. Alternatively, Contractor may separate surfaces with a non-absorptive tape or gasket.

2. Masonry, Concrete, or Plaster

Contractor shall apply a heavy brush coat of approved, alkali-resistant bituminous paint, or separate surfaces with non-absorptive tape or gasket.

3. Moisture-Absorbent Materials and Preservative Treated Wood

Contractor shall paint such absorbent materials with two coats of approved aluminum house paint and protect aluminum contact surfaces with bituminous paint.

**END OF SECTION**

[PAGE LEFT INTENTIONALLY BLANK]

**SECTION 09900**  
**BASIC COATING AND PAINTING SPECIFICATION**  
**FOR WATER AND WASTEWATER FACILITIES**

**PART 1 - GENERAL**

**1.01 Scope**

- A. The work included in this section consists of furnishing all labor, materials, apparatus, scaffolding and all appurtenant work in connection with coating and painting, as indicated on the drawings and as specified herein.
- B. In general, the following surfaces are to be coated or painted:
  - 1. Exposed piping and other metal surfaces, interior and exterior.
  - 2. All submerged and intermittently submerged metal surfaces, except stainless steel.
  - 3. All structural and miscellaneous steel, including tanks.
  - 4. The interior of wet wells, manholes, junction structures, headworks, and similar structures.
  - 5. All exterior above ground concrete and masonry.
  - 6. The interior of certain structures as specified in the Painting and/or Coating Schedule.
  - 7. Equipment furnished with and without factory finish surfaces.
  - 8. Doors, frames, woodwork and architectural trim work.
- C. The following surfaces shall not be coated or painted unless shown or specified herein, or elsewhere in the Contract Documents.
  - 1. Stainless steel.
  - 2. Equipment nameplates, machined surfaces and grease fittings.
  - 3. Non-ferrous and galvanized ferrous metal, including: (a) floor gratings, plates and frames, (b) handrailing, (c) stair treads, stringers and supports, (d) ladders and supports, (e) chain link fencing and appurtenances, (f) conduits.
- D. In no case shall any concrete, wood, metal or any other surface requiring protection be left uncoated or unpainted, even though not specifically defined herein.

**1.02 Reference Specifications and Standards**

Without limiting the general aspects of other requirements of these specifications, all surface preparation, coating and painting of surfaces shall conform to the applicable requirements of the

American Society for Testing and Materials (ASTM), AMPP (The Association for Materials Protection and Performance), the National Association of Corrosion Engineers (NACE), the Society of Protective Coatings (SSPC), the American Concrete Institute (ACI), the Forest Products Research Society (FPRS), the International Concrete Repair Institute (ICRI), National Science Foundation (NSF), American National Standards Institute (ANSI), and the manufacturer's printed instructions.

In the event of a conflict between codes, reference standards, drawings, and these specifications, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Owner for clarification and direction prior to ordering or providing any materials or labor.

### **1.03 Painting Subcontractor**

Where protective coatings are to be performed by a subcontractor, said subcontractor must possess a valid state license as required for performance of the painting and coating work called for in this specification and shall have a minimum of five years practical experience and successful history in the application of specified products to surfaces and facilities of water and wastewater treatment facilities. Upon request, he shall substantiate this requirement by furnishing a list of references.

### **1.04 Shop Drawing Submittals**

Contractor shall submit manufacturer's data sheets for proposed products to be used in accordance with Section 01300, Contractor Submittals and Requests Technical Specifications. Owner shall approve products prior to Contractor's use. For each coating system to be used, the Contractor shall submit for Owner's review and approval the following data:

1. Paint manufacturer's data sheet for each product used, including statements on the suitability of the material for the intended use.
2. Paint manufacturer's instructions and recommendations on surface preparation and application.
3. Samples of colors and finishes available for each product. Where custom mixed colors are specified (e.g. to match colors of existing coated surfaces), the submitted color samples shall be made using color formulations prepared to match the color samples furnished or specified by the Owner. The color formula shall be provided with each color sample.
4. Compatibility of shop and field applied coatings (where applicable).
5. Material safety data sheet for each product used.

### **1.05 Quality Assurance**

#### **A. Surface Preparation**

Surface preparation will be based upon comparison with "Pictorial Surface Preparation Standards for Painting Steel Surfaces", SSPC-Vis 1 ASTM Designation D220; "Standard Methods of Evaluating Degree of Rusting on Painted Steel Surfaces", SSPC-Vis 2 ASTM Designation D610; Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive", NACE Standard TM-01-70; and as described below. Anchor profile for

prepared surfaces shall be measured by use of a non-destructive instrument such as a Keane-Tator Surface Profile Comparator.

To facilitate inspection, the Contractor shall on the first day of sandblasting operations, sandblast metal panels to the standard specified. Plates shall be 1/8" (3.75 mm) plate stock and shall measure a minimum of 8-1/2" x 11" (216 mm x 280 mm). After mutually agreeing a specific panel meets the requirement of the specification, it shall be initialed by the Contractor and Inspector and securely sealed in clear plastic with desiccant to prevent rusting. Panels shall be prepared for each type sandblasting specified and shall be utilized by the Inspector throughout the duration of sandblasting operations.

**B. Coating and Painting Application**

No coating or paint shall be applied: when the surrounding air temperature or the temperature of the surface to be coated or painted is below 5°F greater than the material manufacturer's minimum temperature; when the surrounding air temperature or the temperature of the surface to be coated or painted exceeds 10°F less than the material manufacturer's maximum temperature; to wet or damp surfaces or in rain, snow, fog, or mist; when the temperature is less than 5°F (2.8°C) above the dew point; when it is expected the air temperature will drop below 5°F greater than the material manufacturer's minimum temperature, exceed 10°F less than the material manufacturer's maximum temperature, or drops below less than 5°F (2.8°C) above the dew point within 8 hours after application of coating or paint. Dewpoint shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables.

If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

**C. Inspection**

Concrete, non-ferrous metal, plastic and wood surfaces shall be visually inspected to insure proper and complete coverage has been attained. A destructive testing instrument, such as a Tooke Gage, shall be used if deemed necessary. Thickness of coatings and paint on ferrous metal surfaces shall be checked with a non-destructive, magnetic type dry film thickness gauge. Coating integrity of Systems A and C surfaces shall be tested with an approved inspection device. Holiday detectors shall not exceed the voltage recommended by the manufacturer of the coating system. For film thicknesses between 10 and 20 mils (0.25 mm and 0.50 mm) a non-sudsing type wetting agent such as Kodak Photo-Flo, shall be added to the water prior to wetting the detector sponge. All pinholes shall be marked, repaired in accordance with the manufacturer's printed instructions and retested. No pinholes or other irregularities will be permitted in the final coating.

In cases of dispute concerning film thickness or "holidays", the Owner's calibrated instruments and measurements shall predominate. Wide film thickness discrepancies shall be measured and verified with a micrometer or other approved measuring instrument.

Contractor shall give the Owner a minimum of 3 working days advance notice of the start of any field surface preparation work or coating application work, and a minimum of 7 working days advance notice of the start of any shop surface preparation work or coating application work.

D. Inspection Devices

The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates to test the accuracy of dry-film thickness gauge and certified instrumentation to test the accuracy of holiday detectors.

Dry-film thickness gauges shall be made available for the Owner's use at all times until final acceptance of application. Holiday detection devices shall be operated by the Contractor in the presence of the Owner. Acceptable devices for ferrous metal surfaces include, but are not limited to K-D "Bird-Dog" holiday detector for coatings to 20 mils (0.50 mm) dry film thickness, Tinker-Razor Models AP and AP/W holiday detectors for coatings in excess of 20 mils (0.50 mm) dry-film thickness, and "Owner" units for dry-film thickness gauging. Non-ferrous metal surfaces shall be checked with an instrument such as an Elcometer "Eddy Current" Tester. Concrete surfaces shall be checked with a Tinker-Razor Model AP/W. Inspection devices shall be operated in accordance with the manufacturer's instructions.

E. Warranty Inspection

Warranty inspection shall be conducted during the eleventh month of the Contract warranty period. The Contractor and a representative of the coating material manufacturer shall attend this inspection. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Owner.

## 1.06 Safety and Health Requirements

A. General

Surface preparation and application of coatings shall be performed by the Contractor in compliance with all applicable federal, state, and local occupational safety, health, and air pollution control regulations. The Contractor shall obtain and comply with all safety precautions specified by the paint manufacturer in printed instructions or special bulletins. The Contractor shall provide and require use of personnel protective lifesaving equipment for persons working in or about the project site.

B. Head and Face Protection and Respiratory Devices

Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air-purifying, half-mask or mouthpiece respirator with appropriate filter.



C. Ventilation

Where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist.

D. Sound Levels

Whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

E. Illumination

Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Owner, the Contractor shall provide additional lighting and necessary supports to illuminate all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Owner.

F. Temporary Ladders and Scaffolding

All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Owner to facilitate inspection and be moved by the Contractor to locations requested by the Owner.

**1.07 Extra Stock**

Upon completion of all coating and painting work, Contractor shall deliver to the Owner a minimum of two 1-gallon cans of each type and color of finish paint and coating used on the project and two 1-gallon cans of each primer. Each container shall be unopened and properly labeled for identification and have a manufacture date within two months of the date of delivery to the Owner.

**PART 2 - PRODUCTS**

**2.01 General**

- A. Products specified are those which have been evaluated for the specific service and are listed to establish a standard of quality. Requests for product substitution are subject to the requirements of the Contract Documents/Specifications.
- B. All materials shall be brought to job site in original sealed containers. Contractor shall provide coating material name, formula or specification number, batch number, color and date of manufacture to the Owner. Coating materials shall not be used until the Owner has inspected contents and checked information on containers or label. Materials exceeding storage life specified by the manufacturer shall be rejected.
- C. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paints must be stored to conform with city, county, state, and federal safety codes for flammable coating or paint materials. Water based coatings or paints shall be protected from freezing.

- D. Protective coatings shall be as manufactured by PPG Protective and Marine Coatings (PPG PMC), Carboline Company, or Tnemec Company, or approved equal. Contractor shall use products of same manufacturer for all coating systems unless approved in writing by the Owner.
- E. It is the intent of this specification that all coatings used meet local, state, and federal air pollution control regulations. These regulations change frequently. If a listed coating does not meet local, state, and federal air pollution control regulations at the time the work is actually performed, the Contractor shall provide the manufacturer's compliant, recommended substitute coating at no additional cost to the Owner. All coatings shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1113.
- F. In conditions where coating system is in contact with potable water, coating system shall be certified by the National Sanitation Foundation to be in accordance with ANSI/NSF Standards 61 and 600 for potable water contact.

**2.02 Service Condition A**

Ferrous metals subject to corrosive moisture or atmosphere and condensation such as outside of tanks, out-of-doors piping, valves, and equipment, bridges over process units, etc. shall receive the following surface preparation and coating:

A. Surface Preparation

Unless noted otherwise, all surfaces shall be field sandblasted in conformance with SSPC-SP10 (Near-White Blast Cleaning) to achieve a 2.0-3.0 mils (50-75 micron) angular surface profile.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum required times between coats shall be per the manufacturer's requirements. Written requests for shop surface preparation and application of the prime coat shall be reviewed and approved by Owner on a case-by-case basis. If approved by Owner, shop applied prime coat surface shall be field scarified by brush-blasting prior to application of intermediate coat.

C. Coating System

Unless otherwise noted, the prime coat shall have a minimum dry film thickness (min. DFT) of 4.0 mils and a maximum dry film thickness (max. DFT) of 6.0 mils. The intermediate coat(s) shall have a min. DFT of 4.0 mils and a max. DFT of 6.0 mils. The finish coat(s) shall have a min. DFT of 3.0 mils and a max. DFT of 5.0 mils. The total dry film thickness of the complete system shall be a minimum of 11.0 mils and a maximum of 17.0 mils.

Carboline System	Primer - Carboguard 890 VOC
	Intermediate - Carboguard 890 VOC
	Finish - Carbothane 133MC

PPG PMC System	Primer - Amerlock 2VOC or 400VOC Intermediate - Amerlock 2VOC or 400VOC Finish - Amershield VOC
Tnemec System	Primer - Hi-Build Epoxoline II Series L69 Intermediate - Hi-Build Epoxoline II Series L69 Finish - Endura-Shield Series 1095 (Semi-Gloss)

### 2.03 Service Condition B

Ferrous metals not subject to corrosive moisture or atmosphere and condensation; normal indoor or outdoor exposure such as metal doors, other architectural items; piping, valves, and pumps indoors, etc. shall receive the following surface preparation and coating:

#### A. Surface Preparation

Unless noted otherwise, all surfaces shall be field sandblasted in conformance with SSPC-SP6 (Commercial Blast Cleaning) to achieve a minimum 2.0 mils (50 micron) angular surface profile.

#### B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum times required between coats shall be per the manufacturer's requirements. Written requests for shop surface preparation and application of the prime coat shall be reviewed and approved by Owner on a case-by-case basis. If approved by Owner, shop applied prime coat surface shall be scarified by brush-blasting prior to application of finish coat.

#### C. Coating System

Unless otherwise noted, the prime coat shall have a min. DFT of 4.0 mils and a max. DFT of 6.0 mils. The finish coat (one or more) shall have a min. DFT of 3.0 mils and a max. DFT of 5.0 mils. The total dry film thickness of the complete system shall be a minimum of 7.0 mils and a maximum of 11.0 mils.

Carboline System	Primer - Carboguard 890 VOC Finish - Carbothane 134MC
PPG PMC System	Primer - Amerlock 2VOC or 400VOC Finish - Amershield VOC
Tnemec System	Primer - Hi-Build Epoxoline II Series L69 Finish - Endura-Shield Series 1095 (Gloss)

## 2.04 Service Condition C

Ferrous metals submerged or intermittently submerged in sewage or similar corrosive liquid, shall receive the following surface preparation and coating:

### A. Surface Preparation

All surfaces shall be field sandblasted in conformance with SSPC-SP5 (White Metal Blast Cleaning) to achieve a 3.0 mils (75 micron) minimum angular surface profile.

### B. Application

Application shall be in strict accordance with manufacturer's printed instructions. If recoating is required to correct pinholes, holidays or insufficient coating thickness; surfaces shall be scarified by brush-blasting prior to recoat.

### C. Coating System

Unless otherwise noted, one coat shall be applied at a min. DFT of 24.0 mils and a max. DFT of 30.0 mils.

Carboline System      Finish - Plasite 4500 S

PPG PMC System      Finish - NovaGuard 890

Tnemec System      Finish - Perma-Glaze Series 435

## 2.05 Service Condition D

Buried metal surfaces shall receive the following surface preparation and coating:

### A. Surface Preparation

All surfaces shall be cleaned in conformance with SSPC-SP10 (Near-White Blast Cleaning) to achieve a 3.0 mils (75 micron) minimum angular surface profile.

### B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum time required between coats and prior to backfilling shall be per the manufacturer's product data sheets.

### C. Coating System

Unless otherwise noted, one coat shall be applied to a min. DFT of 24.0 mils and a max. DFT of 30.0 mils.

Carboline System      Finish - Plasite 4500 S

PPG PMC System      Finish - NovaGuard 840

Tnemec System      Finish - Epoxoline Series 22



finish coats per the Service Condition specified in the Finish and Protective Coating Schedule.

Carboline System	Pre-Treatment Coat – Sanitile 120
PPG PMC System	Pre-Treatment Coat - Amerlock 400VOC
Tnemec System	Pre-Treatment Coat - Uni-Bond DF Series V115

## 2.08 Service Condition G

Metals finished with asphalt, coal tar, or other bleeding type finish, specifically identified in the Contract Documents as not requiring removal prior to field coating, shall receive the following surface preparation and coating prior to the primer and finish coats:

### A. Surface Preparation

All surfaces shall be cleaned in conformance with SSPC-SP1 (Solvent Cleaning).

### B. Application

Application shall be in strict accordance with manufacturer's printed instructions.

### C. Coating System

Unless otherwise noted, one barrier coat shall be applied to a min. DFT of 4.0 mils and a max. DFT of 6.0 mils. The barrier coat shall be followed by primer and finish coats per the Service Condition specified in the Finish and Protective Coating Schedule.

Carboline System	Barrier Coat - Carboguard 890 VOC
PPG PMC System	Barrier Coat - Amerlock 2VOC or 400VOC
Tnemec System	Barrier Coat - Hi-Build Epoxoline II Series L69

## 2.09 Service Condition H

Concrete subject to continuous or intermittent submergence of potable water or treated waste water (secondary or tertiary effluent) where specified shall receive the following surface preparation and coating:

### A. Surface Preparation

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous surface. The remaining dressed surface shall be light shotblasted, ICRI-CSP3 (Light Shotblast), to provide the necessary minimum surface profile acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids shall be filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the coating and tested for the presence

of moisture per ASTM D 4263. In general, the concrete surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

B. Application

Application and curing shall be in strict accordance with manufacturer's printed instructions. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Coating System

In potable water applications, coating system shall be certified by the National Sanitation Foundation to be in accordance with ANSI/NSF Standards 61 and 600 for potable water contact.

Filler shall be applied to the entire surface and at the specified DFT per the manufacturer's requirements. Prior to coating, the concrete must be Saturated Surface Dry (SSD) and free of all standing water. All construction joints shall be coated by brush. Other surfaces shall be coated by brush or spray. Unless noted otherwise, the finish coat shall be one coat for the system.

Carboline System	Filler – Carboguard 510 Primer - Plasite 4500 S Finish - Plasite 4500 S
PPG PMC System	Filler – Raven 760 (up to ½") Raven 755 (over ½") Primer - Novaguard 840 Finish - Novaguard 840
Tnemec System	Filler - MortarClad Series 218 Primer - Epoxoline Series 22 Finish - Epoxoline Series 22

## 2.10 Service Condition I

Concrete subject to continuous or intermittent submergence in sewage, scum, sludge or other corrosive liquid where specified shall receive the following surface preparation and coating:

A. Surface Preparation

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous surface. The remaining dressed surface shall be medium shotblasted, ICRI-CSP5 (Medium Shotblast), to provide the necessary minimum surface profile acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids (and similar surface defects) shall be filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the

coating and tested for the presence of moisture per ASTM D 4263. In general, the concrete surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum required times between coats shall be per the manufacturer's product data sheet. If recoating is required to correct pinholes or insufficient system coating thickness, surfaces shall be brush-blasted prior to recoat. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Coating System

The filler/surfacer shall be applied to the entire surface. Unless noted otherwise, the total dry film thickness of the coating system (excluding the filler/surfacer) shall be a minimum of 125 mils.

Carboline System	Filler – Carboguard 510 (up to ½") Carbocrete 4010 (over ½") Lining – Plasite 5371 Finish - Plasite 4550 S
PPG PMC System	Filler/Surfacer - Raven 760 (up to ½") Raven 755 (over ½") Primer - Raven 155 or Raven 175 Finish - Raven 405
Tnemec System	Filler - MortarClad Series 218 Resurfacer for Deteriorated Concrete - MortarCrete Series 217 Lining - Perma-Shield H2S - Series 434 Trowel Applied Finish - Perma-Glaze Series 435

**2.11 Service Condition J**

Concrete and masonry surfaces subject to corrosive spillage shall receive the following surface preparation and coating:

A. Surface Preparation

All concrete and masonry surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous surface. The remaining dressed surface shall be light shotblasted, ICRI-CSP3 (Light Shotblast), to provide the necessary minimum surface profile for acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids shall be filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the coating and tested for the



presence of moisture per ASTM D 4263. In general, the concrete and masonry surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum required times between coats shall be per the manufacturer's product data sheet. If recoating is required to correct pinholes of insufficient system coating thickness, surfaces shall be brush-blasted prior to recoat. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Non-Skid Finish

Where coating system is specified or shown on the Drawings for finished floor surfaces that include pedestrian traffic, the coating system shall include a non-skid finish. Non-skid finish shall consist of coarse sand, or other compatible material as specified by the manufacturer, and shall be evenly spread onto primer coat while still wet and followed with finish coat after required drying time.

D. Coating System

Filler shall be applied to the entire surface and at the specified DFT per the manufacturer's requirements. Two finish coats are required. Unless otherwise noted, the finish coat shall be applied at a coverage rate not to exceed 70 square feet per gallon.

Carboline System	Filler – Dudick Scratch Coat 300 Primer – Dudick Steri Prime DTO Finish – Dudick Sealer 30
------------------	--

PPG PMC System	Filler - ICO Gel Primer - Primer LV Finish - Fibercoat
----------------	--

Tnemec System	Filler - MortarClad 218 Primer - ChemTread Series 239 Finish - Tneme-Glaze Series 282
---------------	---

## 2.12 Service Condition K

Interior and exterior concrete surfaces exposed to view, not subject to immersion and not subject to pedestrian traffic, and concrete block and masonry without integral color or architectural treatment, shall receive the following surface preparation and coating:

A. Surface Preparation

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in

accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous surface. The remaining dressed surface shall be light shotblasted, ICRI-CSP3 (Light Shotblast), to provide the necessary minimum surface profile acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids shall be filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the coating and tested for the presence of moisture per ASTM D 4263. In general, the concrete and masonry surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

**B. Application**

Application shall be in strict accordance with manufacturer's printed instructions. Minimum recoat times are dependent on topcoat and environmental conditions and shall be in strict accordance with the manufacturer's product data sheet. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

**C. Coating System**

Unless noted otherwise, prime and finish coat coverage rates shall be per manufacturer's requirements. A maximum DFT of two coats shall be applied per manufacturer's requirements.

Carboline System	Primer - Sanitile 100 Finish – Carbocrylic 3359 DTMC
PPG PMC System	Filler - ICO Gel Finish - ICO Floor
Tnemec System	Filler - Envirofill Series 130 Finish - Enduratone Series 1026

**2.13 Service Condition L**

Concrete floors subject to corrosive moisture and pedestrian traffic where specified shall receive the following surface preparation and coating:

**A. Surface Preparation**

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous ICRI-CSP3 (Light Shotblast) minimum surface profile acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids shall be filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the coating and tested for the presence of moisture per ASTM D 4263. In general, the concrete surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. Where a non-skid finish is specified, evenly spread #50 dry washed silica sand onto primer coat while still wet and follow with finish coat after required drying time. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Coating System

Filler shall be applied to the entire surface and at the specified DFT per manufacturer's requirements. Unless noted otherwise, coating coverage rates and number of coats shall be per manufacturer's requirements.

Carboline System	Filler – Dudick Scratch Coat 300 Primer - Dudick Steri Prime DTO Finish - Dudick Steri Flor GP Dudick Sealer 30 (when additional chemical resistance is required)
PPG PMC System	Filler - ICO Gel Primer - Primer LV Finish - ICO Floor
Tnemec System	Filler - Envirofill Series 130 Primer - Epoxoprime Series 201 Finish - Tneme-Glaze Series 280

**2.14 Service Condition M**

Concrete, concrete block, and masonry furnished with an approved architectural finish (e.g. integral color or architectural treatment) shall receive the following surface preparation and clear sealing system:

A. Surface Preparation

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces must be dry and shall be cleaned of all dirt, dust, grease, efflorescence, and other foreign matter before sealing.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Coating System

Unless noted otherwise, coating coverage rates and number of coats shall be per manufacturer's requirements.

Monopole System      Monochem Aquaseal ME12 (use ME7 for dense substrates)

**2.15 Service Condition N**

Interior and exterior architectural woodwork and interior gypsum board shall receive the following surface preparation and coating:

A. Surface Preparation

1. Interior and Exterior Woodwork

Sand new or bare wood to remove any surface contamination and surface cells. For previously coated surfaces sand loose paint to a tight, adherent surface. Cracks, nail holes, and other defects shall be filled with putty or plastic wood before priming. All knots shall be sealed with an approved knot sealer. Prior to coating, all surfaces shall have a moisture content below level specified by coating manufacturer and be thoroughly cleaned and free of all foreign matter.

2. Interior Gypsum Board

Tape new gypsum board joints and top with a total of three applications of joint compound. Sand joints after each coat. Spray gypsum board with a light texture coat. Owner shall approve a test section prior to texture coating.

Prior to application of coating system, new gypsum board shall be coated with a sealer recommended by the coating manufacturer and approved by the Owner, or an additional prime coat of the specified system shall be applied.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions.

C. Coating System

Unless noted otherwise, two or more coats shall be applied at a coverage rate not to exceed 250 square feet per gallon for each coat.

Carboline System      Primer - Semstone 120 (semi-gloss)  
Finish - Carbocrylic 3359 DTMC (semi-gloss)

PPG PMC System      Primer - Seal Grip 17-921  
Finish - Pitt-Tech Plus EP DTM (semi-gloss)

Tnemec System      Primer - Enduratone Series 1029 (semi-gloss)  
Finish - Enduratone Series 1029 (semi-gloss)

## 2.16 Service Condition O

Exposed plastic and fiberglass surfaces, specifically identified in the Contract Documents as requiring coating, shall receive the following surface preparation and coating (coating to be used for this category shall be certified by the plastic and fiberglass manufacturer to be completely acceptable and non-injurious to the material):

### A. Surface Preparation

Surface preparation shall consist of hand sanding to remove gloss. All remaining dust shall be removed with vacuum brushing or tack rag. Sanded surfaces shall not be washed with either solvent or water.

### B. Application

Application shall be in strict accordance with manufacturer's printed instructions.

### C. Coating System

Unless noted otherwise, two or more coats shall be applied at a coverage rate not to exceed 375 square feet per gallon for the system.

Carboline System      Finish - Carbocrylic 3359 DTMC

PPG PMC System      Finish - Amersfield VOC

Tnemec System      Finish - Endura-Shield Series 1095

## 2.17 Service Condition P

Manufactured items furnished with shop-applied coat of primer requiring field touch-up or with a shop applied primer which is not compatible with the required coating system shall receive the following surface preparation and coating system:

### A. Surface Preparation

All surfaces shall be cleaned in conformance with SSPC-SP2 (Hand Tool Cleaning), including hand sanding and feathering of damaged areas. If determined by the Owner that damage is too extensive for touch-up, item shall be recleaned and coated or painted as directed by Owner.

### B. Coating System

Prime and finish coats shall be the system specified for the specific Service Condition. Prime coat shall be compatible with the required system. If not (as determined by the Owner) the prime coat shall either be removed by sandblasting or coated with a suitable primer which is compatible with the shop primer utilized and the coating system required. Costs incurred for repair or replacement of shop-applied primers shall be the sole responsibility of the Contractor.

## 2.18 Service Condition Q

Manufactured items furnished with shop-applied primer and finish coats requiring field touch-up shall receive the following surface preparation and coating system:

### A. Surface Preparation

All surfaces shall be cleaned in conformance with SSPC-SP2 (Hand Tool Cleaning), including hand sanding and feathering of damaged areas. If determined by the Owner that damage is too extensive for touch-up, item shall be recleaned and coated or painted as directed by Owner.

### B. Coating System

Prime and finish coats shall be the system specified for the specific Service Condition. Costs incurred for repair or replacement of shop-applied coatings or finishes shall be the sole responsibility of the Contractor.

## 2.19 Service Condition R

Ferrous metal tanks, vessels, or equipment containing raw water or potable water shall receive the following surface preparation and coating:

### A. Surface Preparation

All interior surfaces, including miscellaneous accessories and components, submerged or unsubmerged, shall be field sandblasted in conformance with SSPC-SP10 (Near-White Blast Cleaning) to achieve a 2.0-4.0 mils (50-100 micron) angular surface profile.

All exterior surfaces, including miscellaneous accessories and components, shall be field sandblasted in conformance with SSPC-SP6 (Commercial Blast Cleaning) to achieve a 2.0 mils (50 microns) minimum angular surface profile.

### B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum required times between coats shall be per the manufacturer's requirements. Written requests for shop surface preparation and application of the prime coat shall be reviewed and approved by Engineer on a case-by-case basis. If approved by Engineer, shop applied prime coat surface shall be field scarified by brush-blasting prior to application of finish coat.

C. Coating System

Interior Surfaces:

Interior coating system shall be certified by the National Sanitation Foundation to be in accordance with ANSI/NSF Standards 61 and 600 for potable water contact.

Unless otherwise noted, the prime and finish coats shall have a min. DFT of 6.0 mils and a max. DFT of 10.0 mils. The prime coat shall have two coats. The total DFT of the complete system shall be 12.0 mils to 20.0 mils.

Carboline System      Primer - Carboguard 891 VOC  
                                    Finish - Carboguard 891 VOC

PPG PMC System      Primer - NovaGuard 840  
                                    Finish - NovaGuard 840

Tnemec System      Primer - Series L140F Pota-Pox II  
                                    Finish - Series L140F Pota-Pox II

Exterior Surfaces:

Unless otherwise noted, the prime coat shall be two coats or more with a min. DFT of 4.0 mils and a max. DFT of 6.0 mils per coat. The finish coat shall have a min. DFT of 3.0 mils and a max. DFT of 5.0 mils. The total DFT of the complete system shall be 11.0 mils to 17.0 mils.

Carboline System      Primer - Carboguard 890 VOC  
                                    Finish - Carbothane 134MC

PPG PMC System      Primer - Amerlock 2VOC or 400VOC  
                                    Finish - Amershield VOC

Tnemec System      Primer - Series L140F Pota-Pox II  
                                    Finish - Series 1095 Endura-Shield

**2.20 Service Condition S**

Concrete sealing and waterproofing shall receive the following surface preparation and surface treatment:

A. Surface Preparation

All concrete surfaces shall be aged for a minimum 28 days prior to application. All surfaces shall be prepared in accordance with SSPC-SP13 (Surface Preparation of Concrete) and cleaned of all dirt, dust, form oil, curing compounds, efflorescence, oils, waxes, and other deleterious compounds. All fins, form marks, protrusions, and rough edges shall be blast cleaned in accordance with SSPC-SP7 (Brush-Off Blast Cleaning) to provide a smooth, continuous surface. The remaining dressed surface shall be light shotblasted, ICRI-CSP3 (Light Shotblast), to provide the necessary minimum surface profile acceptable to coating manufacturer. All hollow areas, bug holes, honeycombs, large cracks, and voids shall be

filled in accordance with Section 03300 and manufacturer's specified filler product. All surfaces shall be completely dry before application of the coating and tested for the presence of moisture per ASTM D 4263. In general, the concrete surfaces shall have a slight texture, be free of pockets and cavities, and be tightly adherent, not powdery.

B. Application

Application and curing shall be in strict accordance with manufacturer's printed instructions. Application shall not begin until substrate pH, moisture content, and temperature are within acceptable limits per manufacturer's printed instructions.

C. Coating System

Prior to coating, the concrete must be Saturated Surface Dry (SSD) and free of all standing water. All construction joints shall be coated by brush. Other surfaces shall be coated by brush or spray. Unless noted otherwise, finish coat shall be one coat for the system.

Vandex System	Filler - Vandex Premix Finish - Vandex Super
---------------	---

Xypex System	Filler - Xypex Concentrate Dry-Pac Finish - Xypex Concentrate
--------------	--

**2.21 Service Condition T**

When specified on the Drawings, concrete slabs shall receive the following surface preparation and surface treatment:

A. Surface Preparation

All surfaces to receive surface treatment shall be clean and free of dust, oils, waxes, or any material detrimental to surface treatment.

Newly constructed concrete shall be allowed to dry a minimum of 7 days prior to application or per the surface treatment manufacturer's recommendation, whichever is longer.

Old concrete surfaces to receive surface treatment shall be prepared by chemical cleaning per the surface treatment manufacturer's written recommendations.

B. Application

Application shall be in strict accordance with manufacturer's printed instructions. The minimum and maximum required wetted time, number of applications, and time between applications shall be per the manufacturer's product data sheet. Care shall be taken to prevent other surfaces near the concrete being treated from damage by the treatment products.



C. Surface Treatment System

In general, surface treatment system shall be a water based chemical treatment consisting of silicates and surfactants designed to penetrate the concrete and densify and harden the surface. Surface treatment shall react with the lime in the concrete to create a gel that fills pores and micro cracks prior to hardening. The hardened surface shall be permanently resistant to stains, abrasion, and salt/chemical reactions. The treated surface shall not require future maintenance applications.

System shall be CreteDefender P2, as manufactured by CreteDefender or approved equal.

**2.22 Miscellaneous Coatings**

A. Aluminum Metal Isolation

1. Surface Preparation

Aluminum shall be thoroughly scarified first and cleaned per SSPC-SP1 (Solvent Cleaning), and brush blasted per SSPC-SP7 (Brush Off Blast Cleaning).

2. Application

Application shall be in strict accordance with manufacturer's printed instructions.

3. Coating System

Unless otherwise noted, all aluminum bearing on, or embedded in, concrete shall be coated with two isolation coats (DFT of 4.0 mils to 6.0 mils per coat) for a total DFT of 8.0 mils to 12.0 mils.

Carboline System      Barrier Coat - Carboguard 890 VOC

PPG PMC System      Barrier Coat - Amerlock 2VOC or 400VOC

Tnemec System      Barrier Coat - Hi-Build Epoxoline II Series L69

**PART 3 - EXECUTION**

**3.01 General**

A. All surface preparation, coating and painting shall conform to applicable standards of the National Association of Corrosion Engineers, the Society of Protective Coatings, the American Concrete Institute, the Forest Products Research Society, the International Concrete Repair Institute (ICRI), and the manufacturer's printed instructions. Material applied prior to approval of surface preparation by the Owner shall be removed and reapplied to the satisfaction of the Owner at the expense of the Contractor.

B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Owner.

- C. Unless otherwise specified, dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags.
- D. Coating and painting systems include surface preparations, prime coatings and finish coatings. Surface preparation for a specific Service Condition shall be as specified for that coating or painting system. Unless otherwise specified, prime coatings shall be field applied. Where prime coatings are shop applied, they shall be thoroughly cleaned and touched up in the field as specified. If shop coatings are deficient or damaged too extensively for adequate repair, they shall be removed and coated and painted as directed by the Owner. Contractor shall instruct suppliers to provide prime coats compatible with the finish coats specified. Any offsite work which does not conform to this specification is subject to rejection by the Owner.
- E. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval by the Owner.

### **3.02 Surface Preparation, Ferrous Metal**

#### **A. General**

The latest revision of the following surface preparation specifications of the Society of Protective Coatings and the National Association of Corrosion Engineers shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1). Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.
2. Hand Tool Cleaning (SSPC-SP2). Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wire brushing.
3. Power Tool Cleaning (SSPC-SP3). Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or power sanders.
4. White Metal Blast Cleaning (SSPC-SP5). Blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.
5. Commercial Blast Cleaning (SSPC-SP6 and NACE No. 3). Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.
6. Brush-Off Blast Cleaning (SSPC-SP7 and NACE No. 4). Blast cleaning to remove loose rust, loose mill scale and other detrimental foreign matter to degree specified.

7. Near White Blast Cleaning (SSPC-SP10 and NACE No. 2). Blast cleaning to nearly white metal cleanliness, until at least 95% of each element of surface area is free of all visible residues.
- B. Slag and weld metal accumulation and spatters not removed by the fabricator, erector, or installer shall be removed by chipping and grinding. All rough welds shall be ground smooth and sharp edges shall be ground to approximately 1/8" radius.
  - C. Field blast cleaning for all surfaces shall be dry sandblasting unless otherwise directed.
  - D. The Contractor shall comply with all applicable local, state, and federal, air pollution control regulations for blast cleaning.
  - E. All oil, grease, welding fluxes and other surface contaminants shall be removed by solvent cleaning per SSPC-SP1 prior to blast cleaning.
  - F. Maximum particle size of abrasives used in blast cleaning shall be that which will produce a surface profile in accordance with these specifications and the printed instructions of the manufacturer of the specified coating system to be applied.
  - G. Sand used in blast cleaning operations shall be washed, graded and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused.
  - H. Shop applied temporary coatings or shop applied coatings of unknown composition shall be completely removed before the specified coatings are applied.
  - I. During blast cleaning operations, caution shall be exercised to ensure that existing coatings or paint are not exposed to abrasion from blast-cleaning.
  - J. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities.
  - K. 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 application of specified coatings or paint. No coatings or paint shall be applied over damp or moist surfaces.
  - L. All welds shall be neutralized with a suitable chemical compatible with the specified coating materials.

### **3.03 Surface Preparation, Coated and Uncoated Galvanized Steel, Stainless Steel, and Non-Ferrous Metals**

Prior to application of specified pretreatment coating, coated and uncoated galvanized steel, stainless steel, and non-ferrous metals shall be brush-off blasted per SSPC-SP16 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used.

### **3.04 Surface Preparation, Ferrous Metal with Existing Coatings**

- A. 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. 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. 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. Coatings of unknown composition shall be completely removed prior to application of new coatings.

### **3.05 Surface Preparation, Concrete and Masonry**

- A. Surface preparation shall not begin until at least 28 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 and masonry surfaces and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned or equivalent in accordance with SSPC-SP13 to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface. The abrasive used should be dry and clean with the maximum particle size that will pass through a 16-mesh screen. Cracks and voids shall be repaired or filled with the specified filler and surfacer. Final surface shall be sound, firmly bonded, smooth, and free of voids, cavities, dirt, dust, oils, grease, laitance, or other contaminants.
- D. Residual abrasive, dust and loose particles shall be removed from the surface by vacuuming or blowing off with dry high-pressure air.
- E. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with an approved moisture detection device.

### **3.06 Surface Preparation, Wood and Composition Materials**

All surfaces shall be cleaned of dirt, oil, or other foreign substances with mineral spirits, scrapers, sandpaper, or wire brushes. Finished surfaces exposed to view shall, if necessary, be made smooth by planing or sandpapering. Small, dry, seasoned knots shall be surface scraped, sandpapered, and thoroughly cleaned, and shall be given a thin coat of WP-578 Western Pine Association knot sealer before application of the priming coat. Large, open unseasoned knots, and all beads or streaks of

pitch shall be scraped off, or if the pitch is still soft, it shall be removed with mineral spirits or turpentine and the resinous area shall be thinly coated with knot sealer. After priming, all holes and imperfections shall be filled with putty or plastic wood (colored to match the finish coat), allowed to dry, and sandpapered smooth. Existing surfaces shall be cleaned of all loose or flaking paint and sandpapered to a tight, adherent surface.

### **3.07 Coating and Painting Application, General**

- A. Coating and painting application shall conform to the requirements of the Society of Protective Coatings, Paint Application Specifications SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting", and recommended practices of the National Association of Corrosion Engineers, the American Concrete Institute, the Forest Products Research Society and the manufacturer of the coating and paint materials.
- B. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight-hour working day. Any cleaned areas not receiving first coat within an eight-hour period shall be recleaned prior to application of first coat. Cleaned surfaces and all coats of the specified system shall be inspected prior to application of each succeeding coat. Contractor shall schedule such inspection with Owner in advance.
- C. Prior to assembly, all surfaces made inaccessible after assembly, shall be prepared as specified herein and shall receive the coating or painting system specified.
- D. Thinning shall be permitted only as recommended by the manufacturer and approved by the Owner.
- E. Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application.
- F. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, and variations in color, texture and finish, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.
- G. Protective coverings or drop cloths shall be used to protect floors, fixtures and equipment. 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. Care shall be exercised to prevent coatings or paints from being spattered onto surfaces which are not to be coated or painted. 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 facilities or adjoining property occurring from blast cleaning or coating operations.
- H. When two or more coats of coating or paint are specified, each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat.
- I. Specified film thicknesses per coat for the Service Conditions are minimum required. Contractor shall apply additional coats as necessary to achieve the specified thickness.
- J. All material shall be applied as specified.

- K. All welds and irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.
- L. Cleaning and coating shall be coordinated so that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.
- M. Drying time between coats and surface curing shall be as recommended by the coating manufacturer depending upon field conditions of temperature and humidity. Times shall be submitted with the shop drawings based on 70°F and relative humidity of 50%.
- N. In the case of enclosed areas, the forced air ventilation system shall operate continuously to provide air circulation and exhausting of solvent vapors.

### **3.08 Shop Coating**

- A. All 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 specified or approved color. The methods, materials, application equipment and all other details of shop painting shall comply with these specifications. 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 shop primed and finish coated 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. Copies of applicable coating manufacturer's material data sheets shall be submitted with equipment shop drawings.
- 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. Primed surfaces shall not be exposed to the weather for more than 6 months before topcoated, or less time if specified by the coating manufacturer.
- F. Damage to shop-applied coatings shall be repaired in accordance with these specifications 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 these specifications.

### 3.09 Protective Coating and Painting Schedule

The protective coating and painting schedule provided herein or on the drawings shall indicate the coating system to be used. The schedule shall not be construed as a complete list of all surfaces to be coated but rather as a guide as to the application of the various coating systems. All surfaces shall be coated and painted except those specifically excluded herein or on the drawings.

### 3.10 Color Scheme

All colors and shades of colors of all coats of paint and protective coating material shall be as selected by the Owner, except as noted below under "Pipe Color Coating". The Contractor shall submit a current chart of the manufacturer's available colors to the Owner at least forty-five days prior to the start of coating and painting operations.

### 3.11 Pipe Color Coding and Labeling

All exposed piping shall be color coded and labeled to conform to all OSHA requirements and "Scheme for the Identification of Piping Systems" (ANSI A13.1). "State (10) Standards" color scheme shall be used to further identify specific commodity. As a guideline, the following color coding schedule is provided. Color codes shall be confirmed with Owner prior to commencing work.

#### A. Color Code Schedule

<u>Item</u>	<u>Color Code</u>
Aeration Air	Safety Green
Aftercooler Return	Safety Red
Aftercooler Supply	Safety Red
Air Scour	Safety Green
Alum	Safety Yellow/Red Bands
AWT Bypass	Safety Red
Belt Press Return Water	Gray
Caustic Soda	Safety Orange
Chemical Drain	Safety Orange
Chlorine Gas	Safety Yellow
Chlorine Liquid	Safety Yellow
Chlorine Solution	Safety Yellow
Chlorine Vacuum	Safety Yellow
Cold Sludge	Brown
Diesel Fuel	Safety Yellow
Diesel Emergency Vent	Safety Yellow
Diesel Normal Vent	Safety Yellow
Digested Sludge	Brown
Digested Sludge Exchange	Brown
Drain	Gray

Item	Color Code
Engine Cooling Water	Safety Red
Engine Exhaust	Safety Red
Filter Backwash	Safety Red
Filter Backwash Return	Safety Red
Filter Effluent	Safety Red
Filter Influent	Safety Red
Fire Water	Safety Red
Flotation Thickener Overflow	Brown
Flotation Thickener Return	Gray
Foul Air	White
Froth Spray	Safety Red
Fuel Oil	Black
Fuel Oil Return	Black
Fuel Oil Supply	Black
Gravity Thickener Overflow	Brown
Ground Water Drainage	Gray
Grit	Brown
Grit Chamber Influent	Brown
Grit Washer Overflow	Gray
Heat Recovery Return	Safety Blue/Orange Bands
Heat Recovery Supply	Safety Blue/Orange Bands
Heated Sludge	Brown/Yellow Bands
Holding Tank Overflow	Brown
High Pressure Digester Gas	Light Yellow
High Temperature Wash Water	Safety Blue/Orange Bands
Hydrogen Peroxide	Safety Orange
Industrial Water	Safety Red
Influent Force Main	Brown
Jacket Water Return	Safety Red
Jacket Water Supply	Safety Red
Liquid Propane Gas	Light Yellow
Low Pressure Digester Gas	Light Yellow
Lube Oil Return	Black
Lube Oil Supply	Black
Lube Oil Waste	Black
Methanol	Safety Yellow/Red Bands
Natural Gas	Light Yellow
Plant Air	Safety Green/Yellow Band
Plant Effluent	Safety Red
Polymer	Safety Yellow/Blue Bands



Item	Color Code
Potable Water	Safety Blue
Primary Influent	Brown
Primary Skimmings	Brown
Primary Sludge	Brown
Pumped Drainage Water	Gray
Raw Influent	Brown
Return Activated Sludge	Brown
Return Water	Safety Red
Sample	Safety Red
Sanitary Drain	Gray
Seal Water	Safety Red
Secondary Effluent	Safety Red
Secondary Skimmings	Brown
Secondary Sludge	Brown
Skimmings	Brown
Sludge Heater Bypass	Brown
Sludge Return	Brown
Sludge Transfer	Brown
Spray Wash	Safety Red
Storm Drain	Gray
Sulfer Dioxide Gas	Safety Orange
Sulfer Dioxide Liquid	Safety Orange
Sulfer Dioxide Solution	Safety Orange
Sulfer Dioxide Vacuum	Safety Orange
Tank Drain	Brown
Tertiary Effluent	Safety Red
Thickened Digested Sludge	Brown
Thickened Sludge	Brown
Thickened Waste Activated Sludge	Brown
Thickener Dilution Water	Safety Red
Vent	White
Ventilation Air	White
Wash Water	Safety Red
Waste Activated Sludge	Brown
Waste Sludge	Brown

**B. Label Coding**

Pipe labels (or markers) shall be pressure-sensitive, self-adhesive, vinyl film pipe markers as manufactured by Seton Name Plate Corporation, or equal. Background colors, letter colors, letter heights and spacing shall conform with ANSI A13.1. Pipe designation labels and direction-of-flow arrows shall be placed at 10-foot intervals (maximum) and at every change in direction. Pipe designation wordings shall be selected by the Owner and may not correspond to standard wordings available from the manufacturer.

### **3.12 Cleanup**

Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a manner approved the Owner. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the job site cleaned. All damage to surfaces resulting from the work of these specifications shall be cleaned, repaired or refinished to the satisfaction of the Owner and at no additional cost to the Owner.

**END OF SECTION**

**SECTION 15070**  
**PROCESS PIPING AND APPURTENANCES**  
**TECHNICAL SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 Description**

Pipe shall be furnished and installed as shown on the Drawings, and as specified herein. Where "Owner's Approved Materials List" is incorporated within the Contract Documents, only manufacturers listed therein shall be acceptable.

Contractor shall furnish and install piping specialties as shown and specified, complete, including carbon steel pipe; stainless steel pipe; ductile iron pipe; copper tubing; PVC pipe (C900); PVC and CPVC pipe (Schedule 40 and 80); brass pipe, mechanical and sleeve couplings; gaskets; bolts; insulating connections; and such other specialties as required for a complete and operable piping system in accordance with the requirements of the Contract Documents.

All piping, fittings, and appurtenances in contact with potable water, conveying water for a water treatment facility, or conveying chemicals for water treatment and/or disinfection, shall be certified per ANSI/NSF 61. All fittings and appurtenances in contact with potable water, conveying water for a water treatment facility, or conveying chemicals for water treatment and/or disinfection, shall be "lead-free" in compliance with Section 116875 of the California Health and Safety Code and lead content-certified per ANSI/NSF 372. .

**1.02 Reference Specifications, Codes, and Standards**

Commercial Standards (Latest Edition)

ANSI/ASME B16.1	Gray Iron Pipe Flanges and Fittings
ANSI/ASME B1.20.1	Pipe Threads, General Purpose, Inch
ANSI/ASME B16.3	Malleable Iron Threaded Fittings Class 150 & 300
ANSI/ASME B16.5	Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24
ANSI/ASME B16.9	Factory-Made Wrought Buttwelding Fittings
ANSI/ASME B16.11	Forged Fittings, Socket-Welding and Threaded
ANSI/ASME B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ANSI/ASME B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ANSI/ASME B16.47	Large Diameter Steel Flanges: NPS 26 Through NPS 60
ANSI/ASME B36.10	Welded and Seamless Wrought Steel Pipe
ANSI/ASME B36.19	Stainless Steel Pipe

ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
ASTM A105	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A106	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A182	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High Pressure Service and other Special Purpose Application Service
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both
ASTM A197	Standard Specification for Cupola Malleable Iron
ASTM A234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A312	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi, Minimum Tensile Strength
ASTM A351	Standard Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts
ASTM A380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
ASTM A403	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
ASTM A743	Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application
ASTM A744	Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service

ASTM A780	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A790	Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
ASTM A923	Standard Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels
ASTM A967	Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts
ASTM B32	Specifications for Solder Metal
ASTM B62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B88	Specifications for Seamless Copper Water Tube
ASTM D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D2464	Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2467	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2564	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM D2855	Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D4894	Standard Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials
ASTM F436	Standard Specification for Hardened Steel Washers
ASTM F437	Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F439	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

ASTM F441	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F493	Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
AWWA C104	Standards for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C105	Standards for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110	Standards for Ductile-Iron and Gray-Iron Fittings
AWWA C115	Standards for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C150	Standards for Thickness Design of Ductile-Iron Pipe
AWWA C151	Standards for Ductile-Iron Pipe, Centrifugally Cast
AWWA C205	Standards for Cement-Mortar Protective Lining and Coating for Steel Water Pipe 4 In. (100 mm) and Larger-Shop Applied
AWWA C606	Standards for Grooved and Shouldered Joints
AWWA C900	Standards for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In.
AWWA C905	Standards for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In., for Water Transmission and Distribution

### **1.03 Contractor Submittals**

Contractor shall submit shop drawings in accordance with the requirements of Specification Section 01300, "Contractor Submittals and Requests Technical Specifications". Contractor shall submit complete information and technical data for all material and components, including, but not limited to, the following:

- A. A complete list of all materials to be provided under this Section.
- B. Manufacturer's descriptive data, technical literature, and catalog cuts for each material item and appurtenance.
- C. Fabrication drawings for each shop fabricated pipe spool and fitting.
- D. Pipe laying drawings (fully dimensioned) for each piping system showing all pipe spools, fittings, valves, etc.

- E. Manufacturer data for flange gaskets showing pressure and temperature ratings for the actual flange/gasket configurations proposed for the project.
- F. Manufacturer product data sheets, specifications, and installation instructions for solvent cements and primers to be used for socket joints in PVC and CPVC piping, fittings, valves, and appurtenances. Written statement from the piping and fitting manufacturer certifying the suitability of proposed solvent cements and primers for the specified chemical applications, process pressures, and ambient temperature range of 0 to 120 degrees F.
- G. Where PVC or CPVC piping is specified, Contractor shall submit manufacturer's certification that pipe installers for PVC or CPVC piping systems are certified and trained in accordance with ASTM D2855 and the manufacturer's installation procedures.

## PART 2 - PRODUCTS

### 2.01 Carbon Steel Pipe

- A. Pipe

3 inch and smaller	ASTM A53 or A106, Grade B, Schedule 40, Seamless Pipe.
4 inch to 12 inch	ASTM A53 or A106, Grade B, Schedule 40, Seamless Pipe or Longitudinally Electro-Resistance Welded (ERW) Straight Seam Pipe.
14 inch to 24 inch	ASTM A53 or A106, Grade B, Standard Weight, Seamless Pipe or Longitudinally Electro-Resistance Welded (ERW) Straight Seam Pipe.
27 inch and larger	AWWA C200, Grade B, Standard Weight, Seamless Pipe or Longitudinally Electro-Resistance Welded (ERW) Straight Seam Pipe.
- B. Fittings

All sizes	Pressure rating no less than the connected pipe
3 inch and smaller	Malleable Iron ASTM A197, ANSI B16.3, Class 150 minimum, threaded
4 inch and larger	ASTM A234, ANSI B16.9, Standard Weight, smooth-flow (mitered fittings are not acceptable). Fittings shall be flanged, welded, or grooved as shown on the Drawings.
- C. Flanges

ASTM A105, ANSI B16.5 and B16.47 (Series A), Class 150, Slip-On or Weld Neck, flat face

D. Flange Bolting

Flange bolts shall conform to the requirements of ASTM A325, or SAE J429, Grade 5. Bolt length shall be such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194, Grade 2H, heavy hex pattern, or SAE J995, Grade 5. Washers shall comply with ASTM F436, Type 1. Bolt threads shall be lubricated with an approved anti-seize compound.

E. Grooved Pipe and Fittings

Where specified on the Drawings, carbon steel grooved pipe and fittings shall be provided with roll or cut grooved ends as appropriate for pipe material, wall thickness, pressures, sizes, and method of joining. Grooved couplings shall be Victaulic Style 77 and 770, unless specified otherwise on the Drawings. Grooved coupling gaskets shall be as recommended by the manufacturer for the proposed fluid or gas.

F. Galvanized Steel Pipe and Fittings

Where specified on the Drawings, galvanized carbon steel pipe and fittings shall conform to the requirements of this section, and shall be hot-dipped galvanized in accordance with ASTM A123. Flange bolting shall be hot-dipped galvanized in accordance with ASTM A153.

G. Joints

Unless shown otherwise on the Drawings, carbon steel piping 3 inch and smaller shall be joined by screwed joints and carbon steel piping 4 inch and larger shall be joined by welded, flanged, or grooved joints.

H. Cement Mortar Lining and Cement Mortar Coating

1. General

Cement mortar lining and cement mortar coating shall conform with AWWA C205, latest.

2. Surface Preparation

Prior to lining and coating, pipe shall be cleaned of all loose mill scale, moisture, rust, sand, dust, oil, grease, and other deleterious or objectionable matter both inside and outside.



3. Cement Mortar Lining

a. Mortar

Mortar shall consist of one part Portland cement to three parts (by weight) clean, sharp sand. Unless specified otherwise, cement used for cement mortar shall conform with ASTM C150, latest, Type II. Sand shall consist of clean, inert, sharp, durable material, maximum grain size being no more than one-half specified minimum lining thickness. Mortar shall be thoroughly mixed and made workable with clear, potable water. All cement mortar shall develop a minimum compressive strength of 2,600 psi minimum at seven days and 4,500 psi minimum at twenty-eight days.

b. Application and Treatment

Cement mortar shall be applied to interior surfaces of pipe with equipment specifically designed for that purpose. Said equipment shall have a retracting feed line that will provide uniform cement mortar distribution throughout pipe length. Pipe shall be slowly rotated in horizontal position while cement mortar is being applied. Each end shall be provided with suitable end dam during spinning operation to control lining thickness and provide square-finished lining end.

Following application of mortar, pipe shall be rotated at sufficient speed to compact lining mortar. Said speed shall be maintained until all excess water has been forced to lining surface. During the spinning operation, surplus water shall be expelled from pipe by blower or other suitable means. Peripheral speed and spinning time shall be sufficient to obtain dense, well compacted lining with smooth surface free from defects. Minimum lining thickness shall be as shown by the standard drawings.

Immediately after lining has been completed, pipe shall be water cured without being disturbed for at least one day. Moisture loss shall be prevented during the curing period.

4. Cement Mortar Coating

a. Mortar

Mortar shall consist of one part Portland cement to three parts (by weight) clean, sharp sand. Materials for cement mortar coating shall be the same as materials for cement mortar lining. All cement mortar shall develop a minimum compressive strength of 2,600 psi minimum at seven days and 4,500 psi minimum at twenty-eight days.

b. Application and Treatment

After pipe interior has been lined, cement mortar shall be applied to outside of pipe through fixed nozzles to form an even, dense, and tightly adhering coating. During coating operation, pipe shall be rotated and moved beneath said fixed nozzles to obtain uniform coating free from defects. Minimum coating thickness shall be as shown by the standard drawings.

Cement mortar coating shall be reinforced with spirally wound steel (reinforcing) wire embedded midway within coating. Reinforcing wire shall be bright basic wire comprised of low carbon, open hearth steel, unannealed after the last draw, with an approximate ultimate tensile strength of 80,000 psi. Said wire shall be No. 14 gage minimum and it shall be placed at a pitch of 1-1/2 inch maximum in the middle third of the coating.

Immediately after coating has been completed, each end of each section shall be cleansed to bare metal and cement mortar shall be troweled and shaped suitable for joint being used. All exposed bare metal shall be cleaned and coated and painted for protection against corrosion. Completed pipe shall then be water cured for at least four days without being disturbed.

## 2.02 Austenitic Stainless Steel Pipe

A. Pipe

All dimensions and material thickness shall be in accordance with ANSI B36.19. Unless otherwise shown, stainless steel pipe grade and schedule (thickness) shall be as follows:

3 inch and smaller                      ASTM A312, Grade 316L, Schedule 40

4 inch and larger                        ASTM A312, Grade 316L, Schedule 40

B. Fittings

All sizes                                      Pressure rating no less than the connected pipe

3 inch and smaller                        ASTM A351, Grade 316L, ANSI B16.11, Class 150 minimum, threaded

4 inch and larger                        ASTM A403 and A774, Grade 316L, ANSI B16.9, B36.19, Standard Weight. Smooth-flow fittings (mitered fittings are not acceptable). Fittings shall be flanged, welded, or grooved as shown on the Drawings

C. Flanges

ASTM A182, Grade 316L, Slip-On or Weld Neck ANSI B16.5, Class 150, flat face

D. Flange Bolting

All machine bolts, washers, and nuts shall Type 316L stainless steel. Bolting shall conform to the requirements of ASTM A193, Grade B8M. Bolts shall be heavy hex head with length such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194 heavy hex pattern. Bolts shall be provided with washers of the same material as the bolts. Bolt threads shall be lubricated with an approved anti-seize compound.

E. Grooved Pipe and Fittings

Where specified on the Drawings, stainless steel grooved pipe and fittings shall be provided with roll or cut grooved ends as appropriate for pipe material, wall thickness, pressures, sizes, and method of joining. Grooved couplings shall be Type 316 stainless steel Victaulic Style 489, unless specified otherwise on the Drawings. Grooved coupling gaskets shall be as recommended by the manufacturer for the proposed fluid or gas.

F. Joints

Unless shown otherwise on the Drawings, stainless steel piping 3 inch and smaller shall be joined by screwed joints and stainless steel piping 4 inch and larger shall be joined by welded, flanged, or grooved joints.

**2.03 Duplex Stainless Steel Pipe**

A. Pipe

All dimensions and material thickness shall be in accordance with ANSI B36.19. Unless otherwise shown, duplex stainless steel pipe grade and schedule (thickness) shall be as follows:

12 inch and smaller	ASTM A790, Grade S31803 (Alloy 2205), Schedule 40S
14 inch and larger	ASTM A790, Grade S31803 (Alloy 2205), 0.250" pipe wall thickness (minimum)

B. Fittings

All sizes	Pressure rating no less than the connected pipe
2 inch and smaller	ASTM A182, Grade F51 (S31803), ANSI B16.11, Class 300 minimum, threaded
2-1/2 inch and larger	ASTM A182, Grade F51 (S31803), ANSI B16.9, B36.19, schedule/wall thickness matching the adjoining piping. Smooth-flow fittings (mitered fittings are not acceptable). Fittings shall be flanged, welded, or grooved as shown on the Drawings

C. Flanges

ASTM A182, Grade F51 (31803), Slip-On or Weld Neck ANSI B16.5, Class 150, flat face.

D. Flange Bolting

All machine bolts, washers, and nuts shall Type 316L stainless steel. Bolting shall conform to the requirements of ASTM A193, Grade B8M. Bolts shall be heavy hex head with length such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194, Grade 8M heavy hex pattern. Bolts shall be provided with washers of the same material as the bolts.

E. Grooved Pipe and Fittings

Where grooved type couplings are indicated on the Drawings, the ends of pipe and fittings shall be shoulder banded with Type D collared ends of the identical materials of construction as that of the pipe using double fillet welds per AWWA C606. Where pipe 12" diameter and smaller is furnished in Schedule 40 thicknesses, and where the wall thickness equals or exceeds the coupling manufacturer's minimum wall thickness, the pipe ends may be grooved. Fitting ends shall be provided 3" ± long pipe spools fully welded to the fitting ends for banding or cut grooving.

Grooved couplings shall be duplex stainless steel Victaulic Style 489DX, unless specified otherwise on the Drawings. Grooved coupling gaskets shall be as recommended by the manufacturer for the proposed fluid or gas.

F. Joints

Unless shown otherwise on the Drawings, duplex stainless steel piping 3 inch and smaller shall be joined by screwed joints and duplex stainless steel piping 4 inch and larger shall be joined by welded, flanged, or grooved joints.

Fabrication practices involving heating and welding of duplex stainless steel shall be carefully controlled to avoid adverse effects on mechanical properties or corrosion resistance. Unless specified otherwise, heat treatment shall be required after fabrication to ensure proper metallurgical conditions are maintained. Conduct testing to verify the absence of unfavorable intermetallic phases as required and in accordance with ASTM A923.

## 2.04 Ductile Iron Pipe

A. General

Ductile iron pipe and fittings shall conform with applicable provisions of AWWA C104, C105, C110, C111, C115, C150, and C151, latest, as modified herein, by the Drawings, or by the Owner.

All ductile iron pipe shall be manufactured by organizations which have had not less than ten years successful experience in the manufacture of the type of pipe specified. The Owner shall approve manufacturer's product before its use.

B. Pipe

All pipe shall be ductile iron and shall conform with AWWA C151 (ANSI A21.5, and applicable portions of ASTM A536, Grade 60-42-10), latest, as modified herein by the Drawings, or by the Owner.

1. Unless indicated otherwise on the Drawings, pipe, including standard and special short lengths, shall be Class 53 minimum. Minimum pipe wall thickness shall be as specified herein or indicated on the Drawings; it shall not be less than noted by the Standard Drawings. Pipe wall thickness shall be increased if necessary to accommodate threads or grooves. All pipe of any specific class and size shall be furnished in standard lengths, except special short lengths for makeup and connections.
2. Standard lengths shall have nominal lengths of 18 feet up to 36 inches in diameter and 20 feet above 36 inches in diameter, plus or minus 1 inch.
3. Pipe shall have an interior cement mortar lining of double thickness in accordance with AWWA C104 (ANSI A21.4), latest, except that interior mortar lining shall not be asphalt seal coated. Said lining shall be full thickness throughout pipe except for bell which shall be cleaned and lightly sprayed or brushed with an asphaltic or bituminous coating in accordance with AWWA C151 (ANSI A21.51). The interior cement mortar lining shall be moisture cured for at least two days before shipment. To prevent moisture loss during the curing period, ends of pipe shall be kept closed with plastic caps or covers which shall remain in place until installation.

Steam curing may be substituted for moisture curing, providing one hour of steam curing is equivalent to six hours moisture curing and ambient vapor is maintained at relative humidity of 85 percent with temperature ranging between 110 degrees Fahrenheit and 150 degrees Fahrenheit for minimum steam curing period of six hours, after which exterior coating may be applied. The lining shall then be cured for another twelve hours before shipment. Other methods of curing the cement mortar lining may be used providing they are acceptable to the Owner.

Temperature and shrinkage cracks in cement mortar lining less than 1/16 inch in width or 24 inches in length need not be repaired. Cracks wider than 1/16 inch or longer than 24 inches shall be repaired unless it can be demonstrated to the satisfaction of the Owner that the cracks will heal autogenously under continuous soaking in water.

4. Belowgrade pipe shall have an exterior asphaltic or bituminous coating in accordance with AWWA C151 (ANSI A21.51), latest. Unless specified otherwise, belowgrade pipe, fittings, and valves shall be encased with 8 mil (minimum) polyethylene per AWWA C105.

5. Abovegrade pipe shall be furnished bare or with an exterior asphaltic coating. All exterior pipe and fitting surfaces (including surfaces furnished with an asphaltic coating) shall be field sandblasted and coated in accordance with the Finish and Protective Coating Schedule on the Drawings and the Basic Coating and Painting Specifications for Water and Wastewater Facilities.
6. Each pipe shall be marked with the weight, class, and casting period. The manufacturers mark, year in which pipe was produced and the letters "DI" or "ductile" shall be cast or stamped on the pipe. All required markings shall be clear and legible.
7. Pipe shall be furnished with flanged, grooved, or mechanical joints, as indicated on the Drawings and specified herein. All pipe, fittings, and connections shall be constructed with restrained joints.
8. Belowgrade pipe and fittings shall be provided with mechanical joints, unless indicated otherwise on the Drawings. Belowgrade valves shall be flanged. Ductile iron flanged by mechanical joint adapter fittings shall be provided at connections to belowgrade valves.
9. Flanged pipe shall be fabricated in accordance with AWWA C115. Flanges, including drilling (bolt circles and holes), shall conform to ANSI 16.1, Class 125, unless indicated otherwise on the Drawings or where connecting to valves, flow meters, etc. with ANSI B16.1 Class 250 or ANSI B16.5 Class 300 flanges. Contractor shall coordinate pipe flange class with the class of the specified connecting components.
10. Mechanical joints shall be provided with rubber gaskets shall conforming AWWA C111 (ANSI A21.11) latest.
11. All pipe and fittings shall be constructed with restrained joints
12. Each mechanical joint shall be fully restrained. Restrained joints shall be accomplished with external restraining devices rated for a minimum working pressure of 250 psi with a minimum factor of safety of 2:1. Unless specified otherwise, restraining devices shall be full circumference mechanical joint glands with wedge-action cleats spaced equally around the gland (set screws will not be allowed). Restraining gland and wedges shall be constructed of ductile iron. Wedges shall be provided with break-off torque control nuts. Gland T-bolts shall be constructed of high strength low alloy steel per AWWA C111. Gland and wedges shall be fusion bonded epoxy coated. Mechanical joint restraining devices shall be Ebba Iron Megalug, Romac Romagrip, Star Stargrip Series 3000, or approved equal.

C. Fittings

1. All fittings shall be constructed of ductile iron. Fittings shall be full body conforming to AWWA C110 and C111. Compact fittings per AWWA C153 will not be allowed, unless specifically indicated on the Drawings.
2. Fittings shall be rated for a minimum working pressure of 250 psi.

3. Fittings shall have a cement mortar lining in accordance with AWWA C104 (ANSI A21.4), latest. Fittings shall have standard lining thickness and shall be seal coated with asphaltic material or other approved material. The lining process must produce a dense, compacted lining that shall be bonded to the interior of the fitting and have a smooth surface.
4. Belowgrade fittings shall have an exterior asphaltic or bituminous coating in accordance with AWWA C151 (ANSI A21.51), latest. Unless specified otherwise, belowgrade pipe, fittings, and valves shall be encased with 8 mil (minimum) polyethylene per AWWA C105.
5. Abovegrade fittings shall be furnished bare or with an exterior asphaltic coating. All exterior fitting surfaces (including surfaces furnished with an asphaltic coating) shall be field sandblasted and coated in accordance with the Finish and Protective Coating Schedule on the Drawings and the Basic Coating and Painting Specifications for Water and Wastewater Facilities.
6. Ductile iron fittings shall be flanged, grooved, or mechanical joints, as indicated on the Drawings and specified herein. Belowgrade fittings shall be provided with mechanical joints, unless indicated otherwise on the Drawings. Belowgrade valves shall be flanged. Ductile iron flanged fittings or flanged by mechanical joint adapter fittings shall be provided at connections to belowgrade valves.
7. Mechanical joints shall be provided with rubber gaskets shall conforming AWWA C111 (ANSI A21.11) latest.
8. Each mechanical joint shall be fully restrained. Restrained joints shall be accomplished with external restraining devices rated for a minimum working pressure of 250 psi with a minimum factor of safety of 2:1. Unless specified otherwise, restraining devices shall be full circumference mechanical joint glands with wedge-action cleats spaced equally around the gland (set screws will not be allowed). Restraining gland and wedges shall be constructed of ductile iron. Wedges shall be provided with break-off torque control nuts. Gland T-bolts shall be constructed of high strength low alloy steel per AWWA C111. Gland and wedges shall be fusion bonded epoxy coated. Mechanical joint restraining devices shall be Ebba Iron Megalug, Romac Romagrip, Star Stargrip Series 3000, or approved equal.

D. Flange Bolting

Flange bolts shall conform to the requirements of ASTM A325, or SAE J429, Grade 5. Bolt length shall be such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194, Grade 2H, heavy hex pattern, or SAE J995, Grade 5. Washers shall comply with ASTM F436, Type 1. Bolt threads shall be lubricated with an approved anti-seize compound.

## 2.05 Polyvinyl Chloride (PVC) Pipe (PVC C900)

### A. General

PVC pipe furnished and installed under these Specifications shall conform to applicable AWWA Standards (latest), as modified herein, by the Drawings, or by Owner.

All pipe furnished shall be manufactured by an organization which has had not less than 10 years successful experience in the manufacture of the type of pipe specified. Owner shall approve manufacturer's product before its use.

### B. Pipe

All pipe furnished shall conform to AWWA C900 (latest) and the following additional requirements:

1. Unless otherwise specified or shown on Drawings, AWWA C900 pipe (4" through 36" diameter) shall be minimum Class 235 (maximum dimension ratio of 18). Polyvinyl chloride pipe shall have same dimensions as ductile iron pipe and pipe bell and pipe spigot shall have same thickness as pipe barrel.

Standard lengths of pipe shall have nominal length of 20 feet, 0 inches, plus or minus 1 inch. Standard lengths of pipe shall be furnished with integral bells and spigots and with rubber gaskets.

Pipe shall have sufficient strength to withstand an internal hydrostatic pressure of four times rated operating pressure for its class per AWWA C900 (latest).

2. All pipe, fittings, and connections shall be constructed with restrained joints.
3. Each bell and spigot pipe joint shall be fully restrained. Restrained joints shall be accomplished with external restraining devices rated for a minimum working pressure of 150 psi for pipe sizes 4" through 12" and 235 psi for pipe sizes 14" through 36", with a minimum factor of safety of 2:1. Unless specified otherwise, bell and spigot joint restraining devices shall consist of split rings installed on the spigot connected to a back-up ring seated behind the bell. The restraint rings shall apply even pressure around the pipe and provide 360° contact. Restraint device rings shall be constructed of ductile iron with Type 316 stainless steel clamp bolts, rods, nuts, and washers. Restraint device rings shall be fusion bonded epoxy coated. Bell and spigot restraining devices shall be Star Pipe Products Series 1100, or equal.

### C. Fittings

1. All fittings shall be constructed of ductile iron. Fittings shall be full body conforming to AWWA C110 and C111. Compact fittings per AWWA C153 will not be allowed, unless specifically indicated on the Drawings.
2. Fittings shall be rated for a minimum working pressure of 250 psi.



3. Fittings shall have an asphaltic outside coating in accordance with AWWA C110 or C153 (ANSI A21.10 or A21.53), latest, and cement mortar lining in accordance with AWWA C104 (ANSI A21.4), latest. Fittings shall have standard lining thickness and shall be seal coated with asphaltic material or other approved material. The lining process must produce a dense, compacted lining that shall be bonded to the interior of the fitting and have a smooth surface.
4. Unless specified otherwise, belowgrade fittings, restraints, and valves shall be encased with 8 mil (minimum) polyethylene per AWWA C105.
6. Fittings shall be provided with mechanical joints, unless specified otherwise. Belowgrade valves shall be flanged. Ductile iron flanged by mechanical joint adapter fittings shall be provided at connections to belowgrade valves.
7. Mechanical joints shall be provided with rubber gaskets shall conforming AWWA C111 (ANSI A21.11) latest.
8. Each mechanical joint shall be fully restrained. Restrained joints shall be accomplished with external restraining devices rated for a minimum working pressure of 150 psi for pipe sizes 4" through 12" and 235 psi for pipe sizes 14" through 36", with a minimum factor of safety of 2:1. Unless specified otherwise, restraining devices shall be of split ring design providing even pressure around the pipe with 360° contact. Restraining devices with wedge-action cleats or set screws will not be allowed. Restrainers and joint glands shall be constructed of ductile iron. Restrainer and gland T-bolts shall be constructed of high strength low alloy steel per AWWA C111. Restrainer and gland shall be fusion bonded epoxy coated. Mechanical joint restraining devices shall be Star Series 1000, or approved equal.

D. Flange Bolting

Flange bolts shall conform to the requirements of ASTM A325, or SAE J429, Grade 5. Bolt length shall be such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194, Grade 2H, heavy hex pattern, or SAE J995, Grade 5. Washers shall comply with ASTM F436, Type 1. Bolt threads shall be lubricated with an approved anti-seize compound.

## 2.06 Copper Tubing

- A. Copper tubing shall conform to the requirements of ASTM B88 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 cast bronze or forged brass containing 85 percent copper. Joints shall be constructed with lead-free solder, 95-5 tin-antimony or tin-silver and shall conform to ASTM B32. For oxygen service, joints shall be made with silver solder. Material composition shall conform to California AB 1953.
- B. Belowgrade copper tubing 2" in diameter and smaller shall be provided with an integral polyethylene coating. Polyethylene coating shall be extruded directly onto the tubing and shall have a minimum thickness of 25 mils.
- C. Belowgrade copper tubing larger than 2" in diameter shall be encased with 8 mil (minimum) polyethylene (lapped 6" minimum). Ends of polyethylene encasement shall be

sealed with two (2) full circumference wraps of 20 mil PVC tape. Polyethylene sleeves shall extend 3" abovegrade and ends shall be sealed with two (2) full circumference wraps of 20 mil PVC tape.

- D. All belowgrade copper fittings shall be wrapped with two (2) layers of 20 mil PVC tape.
- E. Polyethylene coated copper tubing shall be Mueller Streamline, Kamco Aqua Shield, or equal.

## **2.07 Polyvinyl Chloride (PVC) Pipe (Schedules 40 and 80)**

- A. PVC Schedule 40 and 80 pipe shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact (Type I) to conform to the requirements of ASTM D1785, unless otherwise shown. Schedule 40 fittings shall conform to ASTM D2466, Schedule 80 socket fittings to ASTM D2467 and ASTM D2464 for threaded Schedule 80 fittings. Unless otherwise shown, joint design shall be for solvent-welded. Solvent cement shall conform to ASTM D2564 and primer shall conform to ASTM F656. Manufacturer shall confirm suitability of solvent cement and primer used for chemical applications. Where required for chemical applications, special chemical resistant primer and solvent cement shall be used (such as Weld-On P70 primer and 724 Orange solvent cement). Both pipe and fittings shall be the product of one manufacturer.
- B. PVC Flanges shall be ANSI B16.5, Class 150, two-piece (Van-Stone style), socket conforming to ASTM D2467. Where required for higher pressure ratings, flanges shall be one-piece socket with corrosion resistant steel backing ring assembly. Flange bolts shall conform to the requirements of ASTM A325. Bolts shall be heavy hex head with length such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM A194, Grade 2H, heavy hex pattern. Washers shall comply with ASTM F436, Type 1. Bolt threads shall be lubricated with an approved anti-seize compound.

## **2.08 Chlorinated Polyvinyl Chloride (CPVC) Pipe (Schedules 40 and 80)**

- A. CPVC Schedule 40 and 80 pipe, for hot, corrosive solutions and where shown, shall be made from all new rigid unplasticized chlorinated polyvinyl chloride, Type IV, Grade 1 compound as stated in ASTM D1784, and shall be Schedule 40 (as minimum thickness) unless otherwise shown, and shall conform to ASTM F441. Fittings shall be the same schedule as the pipe. Schedule 80 socket fittings shall conform to ASTM F439 and ASTM F437 for threaded Schedule 80 fittings. Unless otherwise shown, joint design shall be for solvent welded construction. Solvent cement shall conform to ASTM F493 and primer shall conform to ASTM F656. Manufacturer shall confirm suitability of solvent cement and primer used for chemical applications. Where required for chemical applications, special chemical resistant primer and solvent cement shall be used (such as Weld-On P70 primer and 724 Orange solvent cement). Both pipe and fittings shall be the product of one manufacturer.
- B. CPVC Flanges shall be ANSI B16.5, Class 150, two-piece (Van-Stone style), socket conforming to ASTM F439. Flange bolts shall conform to the requirements of ASTM A325. Bolts shall be heavy hex head with length such that after installation, end of bolt projects 1/8-inch to 3/8-inch beyond outer face of nut. Nuts shall comply with ASTM

A194, Grade 2H, heavy hex pattern. Washers shall comply with ASTM F436, Type 1. Bolt threads shall be lubricated with an approved anti-seize compound.

## **2.09 Brass Pipe**

Unless otherwise shown, brass pipe shall be seamless, Schedule 40, red brass pipe conforming to ASTM B43 and ASTM B687. Fittings shall be threaded, Class 125, cast red brass conforming to ASTM B584 and shall have a minimum copper composition of 85 percent. Flanges shall be ANSI B16.5, Class 150, threaded conforming to ASTM B43 and ASTM B687. Material composition shall conform to California AB 1953.

## **2.10 Sleeve, Flexible, And Adapter Type Couplings**

- A. Couplings shall be of steel with steel bolts, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. 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. Bolts and nuts for exposed couplings shall be hot-dip galvanized. Bolts and nuts for buried or submerged couplings shall be of Type 316 stainless steel. Buried sleeve-type couplings shall be epoxy-coated at the factory as specified. Continuity bonds shall be provided as shown.
- B. Where specified on the Drawings, couplings shall be harnessed to provide restraint. Harnesses shall conform to the requirements of AWWA Manual M11.
- C. Lug material shall conform to ASTM A36 or ASTM A283 Grade C. Lug dimensions shall be as shown in AWWA Manual M11. Lugs shall be Type P for pipe sizes, 6-inch to 10-inch diameter, and Type RR for pipe sizes 12-inch diameter and greater.
- D. Couplings shall be provided where shown on the drawings and shall be Rockwell (Smith-Blair), Dresser, or equal.

## **2.11 Grooved Couplings**

### **A. Carbon Steel and Ductile Iron Pipe**

Where specified, mechanical grooved coupling shall be self-centering and shall engage and lock the grooved pipe and pipe fitting ends in place in a positive watertight couple. Coupling housing clamps shall be fabricated in two or more parts of malleable iron castings conforming to ASTM A47, or ductile iron castings conforming to ASTM A536. Coupling assemblies shall be securely held together by two or more steel bolts and nuts of heat-treated carbon steel. Bolts and nuts shall be in accordance with ASTM A183 and A194, Grade 2. Couplings shall hold in place a gasket designed so that internal pressure serves to increase the seal's watertightness. Unless otherwise specified, gaskets shall be Grade "E" (EPDM) in accordance with ASTM D2000. Fittings shall be of grooved-end design to accept grooved mechanical couplings without field preparation.

Couplings for grooved steel pipe shall be Victaulic Style 77 or 770, or approved equal. Couplings for ductile iron pipe shall be Victaulic Style 31, or approved equal.

Unless shown otherwise on the Drawings, grooved couplings shall not be installed belowgrade.

B. Stainless Steel Pipe (Austenitic)

Couplings 2 inches and larger shall be grooved end, rigid joint, Type 316 stainless steel, ASTM A351, ASTM A743, and ASTM A744. Gaskets shall be EDPM per ASTM D 2000 for water (NSF61 approved for potable water) and oil-free air to 230 degrees F, and nitrile for oil vapor in air and oil services to 108 degrees F. Bolting shall be stainless steel, ASTM A193, Grade B8M Type 316. Nuts shall be stainless steel, ASTM A194, Grade B8M, Type 316, Class 2, special anti-galling coating. Couplings shall be pressure rated for the maximum pressure indicated on the Drawings.

Couplings for grooved stainless steel pipe shall be Victaulic Style 489, or approved equal.

Unless shown otherwise on the Drawings, grooved couplings shall not be installed belowgrade.

**2.12 Unions**

Unless specified otherwise, unions shall be constructed of the same material as the adjoining piping. Union pressure rating shall not be less than the connected pipe. Union seal material shall be compatible with the process fluid being conveyed by the piping, and shall be the same material as seal materials for valves specified for the same piping service.

**2.13 Flange Gaskets**

Unless indicated otherwise on the Drawings, or included in the "Owner's Approved Materials List, flange gaskets shall be provided in accordance with the following requirements.

A. Water and Sewer Service

Flat face flanges shall be provided with full faced gaskets for pipe sizes 12 inch and smaller, and ring gaskets for 14 inch and larger. Raised face flanges shall be provided with ring gaskets. Gaskets shall be non-asbestos, NSF 61 certified for potable water use, 1/8 inch thick, rated for 250°F (minimum) continuous maximum temperature, rated for 250 psig (minimum) water operating pressure at 100 °F, and manufactured by Garlock, Tripac, or equal.

B. Process Air Service

Flat face flanges shall be provided with full faced gaskets for pipe sizes 12 inch and smaller, and ring gaskets for 14 inch and larger. Raised face flanges shall be provided with ring gaskets. Gaskets shall be non-asbestos, EPDM, 1/8 inch thick, rated for 400°F (minimum) continuous maximum temperature, rated for 150 psig (minimum) air operating pressure at 200 °F, and manufactured by Garlock, Tripac, or equal.

Documentation shall be submitted demonstrating pressure and temperature ratings for actual flange/gasket configurations proposed for the project.

Wherever blind flanges are shown, the gasket material as specified herein shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange.

## **2.14 Flexible Expansion Joints**

Flexible expansion joints shall be constructed of ductile iron per ANSI/AWWA C153 and shall consist of a center expansion joint with double ball-and-socket fittings, one on each side of the expansion joint. Each ball-and-socket fitting shall be capable of a minimum of 15 degrees of deflection and 4" of expansion and/or contraction, and additional expansion sleeves shall be added so that a 24" flex-tend has a total expansion of 16" (+12", -4"). Expansion joints shall be pressure tested to 350 psi minimum. Internal surfaces shall be epoxy-coated in accordance with ANSI/AWWA C213. Flexible expansion joints shall be Flex-Tend as manufactured by EBAA Iron, or equal.

## **2.15 Insulating Connections**

### **A. General**

Insulating bushings, unions, couplings or flanges, as appropriate, shall be used for joining pipes of dissimilar metals, and for piping systems where corrosion control and cathodic protection are involved, or where specified on drawings. Insulating flanges shall be provided with full-faced gaskets, and insulating sleeves and washers for flange bolts.

### **B. Material**

Insulating connections shall be of nylon, polytetrafluoroethylene (PTFE, trade name Teflon) polycarbonate, polyethylene or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

## **2.16 Pipe Insulation (Fiberglass Fabric Exterior Shell)**

Where specified or shown on the Drawings for pipe to be insulated, insulation shall be vitreous silicate fiber thermal insulation mat with asbestos free PTFE resin impregnated woven fiberglass fabric exterior shell. The exterior shell shall be top coated with pigmented PTFE. Insulation for valves, instrumentation, and appropriate appurtenances shall be as specified herein and shall be independent of the adjacent piping insulation to allow for easy access. Insulation shall be suitable for outdoor installation in ambient temperature ranges of 0° to 120°F, weather proof, and UV resistant. Insulation cover shall completely cover piping and shall be capable of preventing process water from freezing. Insulation covers shall be provided with stainless steel lacing hooks and tie wire or stainless steel buckles with Velcro straps to provide simple installation and removal. Insulation material shall be Treo as manufactured by Tritex, or approved equal, and exterior shell shall be 1650T as manufactured by Lewco Specialty Products, Inc., or approved equal. Insulation covers shall be factory pre-fabricated and shall be Fluor-O-Flo as manufactured by Insultech, or approved equal.

## **2.17 Pipe Insulation (Aluminum Sheet Metal Exterior Shell)**

Where specified or shown on the Drawings for pipe to be insulated, insulation shall be a molded-type pipe covering, made of fibrous glass with a minimum K-factor of 0.23 at 75°F. Unless specified otherwise, insulation shall be a minimum of 1" thick and shall completely cover all pipe, fittings, and appurtenances, including pipe and fitting flanges. Insulation shall have a factory-applied white fire-retardant vapor barrier of Kraft paper and aluminum foil laminated together and reinforced with fiberglass yarn. All insulation shall be weatherproofed with minimum 0.020 inch thick stucco-embossed aluminum jacketing. Jacketing shall be manufactured from ASTM B-209,

Temper H-14 aluminum alloy. The jacketing for fittings shall consist of precision formed, stucco-embossed aluminum sections which shall be sized to cover and protect the insulated fitting. All joints shall be sealed with a silicone mastic to provide a continuous weather-tight joint. Strapping shall be 1/2" wide aluminum or stainless steel. Pipe insulation shall be as manufactured by Owens-Corning Fiberglass Corporation, Manville, or equal. Aluminum jacketing shall be as manufactured by Childers, RPR Products, Inc., or equal.

## **2.18 Locator Wire**

Unless specified otherwise, locator wire shall be 14-1 solid insulated copper wire, Type UF, in a continuous strand (no splices).

## **2.19 Chemical Piping Detectable Marker Tape**

Detectable marker tape shall consist of a 3" wide tape with a solid aluminum foil core, 5 mils overall thickness, and encased warning message to prevent ink rub-off. Warning description shall state "CAUTION: CHEMICAL/HAZARDOUS MATERIAL PIPELINE BELOW" (label with specific chemical as shown on the Drawings). Marker tape background color shall be safety yellow and warning message text shall be black. Marker tape shall be as manufactured by Seton, or equal.

# **PART 3 - EXECUTION**

## **3.01 General**

In fabricating and installing pipe specified herein, a sufficient number of break-out connections consisting of unions (3 inch and smaller pipe), or flanged/grooved joints (4 inch and larger pipe) shall be installed to allow any section or run of pipe to be disconnected and removed without removing adjacent runs. In addition, at least one break-out connection shall be installed at every change in direction (horizontal and vertical) and adjacent to each valve. Unless shown otherwise on the Drawings, grooved joints will not be allowed in buried piping.

## **3.02 Fabrication**

### Stainless Steel Piping Systems

- A. All stainless steel piping systems shall be shop fabricated. Field fabrication of stainless steel piping will not be permitted. Piping layout and fabrication shall be as long as possible, while still allowing shipment.
  - 1. Piping design indicated on the Drawings does not indicate the location of every joint and coupling that may be needed to connect piping sections fabricated in the shop.
  - 2. Add joints and couplings in a manner that achieves intent of maximizing size of individual piping sections and meets requirements for break-out connections as specified herein.
  - 3. All joints shall be fully restrained. Joints shall be welded, flanged, or Victaulic grooved couplings.

4. Weld seams with full penetration, free of oxidation, crevices, pits, and cracks and without undercuts. Provide weld crowns of 1/16 inch with tolerance of plus 1/16 inch and minus 1/32 inch. Where internal weld seams are not accessible, use gas tungsten-arc procedures with internal gas purge. Where internal weld seams are accessible, weld seams inside and outside using manual shielded metal-arc procedures.
- B. All stainless steel piping systems, sections, spools, fittings, and appurtenances shall be cleaned, pickled (descaled), and passivated at the point of manufacture or at a separate location that specializes in cleaning, descaling, and passivation of stainless steel. Field cleaning, descaling, and passivation will not be permitted. Stainless steel piping systems, sections, spools, fittings, and appurtenances shall include austenitic, ferritic, martensitic, duplex and super-duplex corrosion resistant steels. Cleaning, descaling, and passivation shall be performed as specified herein.
- C. Descaling is the removal of heavy, tightly adhered oxide films resulting from hot-forming, heat-treatment, welding and other high temperature operations by means of chemical or mechanical methods. Passivation is the removal of exogenous (not inherent in the base metal) iron or iron compounds from the surface of stainless steel by means of a chemical dissolution, by a treatment with an acid solution that shall completely remove the surface contamination but will not significantly affect the stainless steel itself. All welds, heated areas of stainless steel parts, and heat affected zones of welds shall be cleaned, descaled, and passivated per ASTM A380 "Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems" and ASTM A967 "Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts" to prevent corrosion rates in excess of unwelded and unheated stainless steel base material. Descaling and passivation by use of pastes or sprays will not be permitted. Unless specified otherwise, passivation by means of electrochemical treatment, including electropolishing or electropolishing, will not be permitted. As a minimum, descaling and passivation shall include the following:
1. The surfaces of all stainless steel piping shall be thoroughly degreased and cleaned per ASTM A380. Surfaces shall be free of foreign material contamination (i.e. markers, chalk, paint, soil, grease, or oil). Cleaning solvents shall be non-chlorinated. Water-break testing per ASTM A380 shall be performed after cleaning to ensure all foreign material is removed prior to descaling. No break shall be permitted in the film as it drains from the vertical surface.
  2. Upon successful completion of the cleaning process, all stainless steel piping shall be chemically descaled by complete immersion in a nitric-hydrofluoric acid solution bath. All surfaces shall be free of rust, free iron, weld scale, heat tint oxides, arc strikes, tool marks, gouges, and scratches that occurred in the procurement or fabrication stage. The finish of all stainless steel surfaces shall be of a high quality and as a minimum, equal to the milled or hot rolled condition specified by the material specification. Descaled surfaces shall be scrubbed and rinsed per ASTM A380.
  3. Upon successful completion of the descaling process, all stainless steel piping shall be acid passivated for corrosion resistance and to provide a superior surface finish. All stainless steel piping shall be completely immersed in a nitric acid solution bath or a citric acid solution bath with additives at the proper concentrations,

temperature, and duration as presented in ASTM A967. After each descaling and passivation treatment, stainless steel piping shall be thoroughly washed with a high pressure wash of clean cold potable water and allowed to air dry. Immediately, after first water rinse, the piping shall be thoroughly rinsed with a second potable water rinse. Finally, the piping shall be thoroughly rinsed with de-ionized water to remove residual halogens from all surfaces. The passivated piping shall exhibit a chemically clean surface and shall not show any pitting, etching, or frost. No heat tint or discoloration is allowed.

4. All stainless steel piping shall be tested to ensure corrosion resistance prior to shipment to site. As a minimum, the testing shall include the water immersion test and the salt water spray test or shall include the potassium ferricyanide-nitric acid test per ASTM A967. Testing procedures shall follow ASTM A967 and shall be safe for potable water applications. Each test shall be recorded and presented in a report by an independent third party inspector paid for by the Contractor. Prior to shipment, a letter of certification and inspection reports from the third part inspection firm shall be provided to the Owner indicating the cleaning, descaling, and passivation procedures performed; test procedures performed including test results; and statements of certification that all work was performed in accordance with ASTM A380, A967, and as specified herein.

- D. Assemble shop-fabricated piping in the field using the joints shown on the Drawings and designed into the piping layout.

### **3.03 Installation**

#### **A. General**

1. All piping and appurtenances shall be installed as specified herein, per the manufacturers printed instructions, and as shown on the Drawings.
2. Exposed piping shall be installed as shown on the Drawings. Exposed piping shall be installed plumb and level and shall be routed parallel or perpendicular to structure walls, members, or lines. Exposed piping and appurtenances shall be supported from structure walls, floors, ceilings, and roofs with pipe supports as specified on the Drawings and at intervals not exceeding maximum support spacing specified thereon.
3. Buried piping shall be installed as shown on the Drawings and the requirements specified herein. In the event of a conflict between requirements of the Technical Conditions, the most stringent requirements shall prevail. Buried piping shall be installed at the lines and grades shown on the Drawings. Where piping grades are not specified on the Drawings, buried piping shall be installed with a minimum of 30 inches of cover. Buried piping shall be installed in a trench condition with trench width not exceeding the pipe nominal diameter plus 6 inches. Unless specified otherwise, pipe zone backfill shall be clean imported commercial sand with a minimum sand equivalent of 30. The pipe zone shall extend from the bottom of the pipe trench to 12 inches over the top of the pipe. Unless specified otherwise, trench backfill above the pipe zone may be excavated trench material screened of debris and rocks greater than 3 inches in maximum dimension. Unless specified



otherwise, pipe zone and trench backfill shall be compacted to a minimum of 90% relative compaction.

4. Pipe and equipment openings shall be closed with temporary caps or plugs during installation. Piping and equipment shall be protected from debris, water, chemical, and mechanical damage at all times during installation.
5. Pipe manufacturer, fitting manufacturer, and material supplier, in addition to the Owner, shall have access to the Work during installation. Contractor shall use assistance provided by either manufacturer or supplier where required for proper installation of pipe, fittings, or materials; however, Contractor shall limit role of either manufacturer or supplier to advisory service.
6. Contractor shall not move pipe using dozer blades, backhoe buckets, or the like (sharp metal surfaces). Contractor shall use nylon chokers or straps, not steel slings, in moving, placing, or setting pipe. Nylon chokers or straps shall be placed at third points (one-third length of pipe from each end).
7. All out-of-round pipe shall be rejected and removed from the Work site immediately. Rejected pipe shall be replaced immediately. Contractor shall not use hammers, bars, wrenches, or other tools to modify pipe ends to accommodate installation.

**B. Carbon Steel Pipe**

1. Buried galvanized steel pipe shall be double wrapped with 20 mil PVC tape. Buried black steel pipe shall be coated with 32 mils of a bitumastic coating prior to double wrapping with 20 mil PVC tape.
2. Pipe and fittings shall be installed in accordance with applicable sections of AWWA Manual M11 "Steel Pipe-A Guide for Design and Installation".
3. All flanges shall be fully welded to pipe on both faces, one pass minimum on the inside and two passes minimum on the outside. Pipe linings shall extend to mating faces of flanges and pipe coatings shall extend to backs of flanges, tapered as necessary for installation of bolts and nuts. All exposed steel shall be field coated with an approved bitumastic material.
4. Special care shall be taken to avoid damaging lining or coating during lowering of pipe into trench and making of field joints.
5. For pipe less than 24 inches in diameter, sufficient quantities of moist cement mortar shall be placed on interior joining ends of pipe to completely fill space between respective mortar linings. Moist mortar shall be placed only after respective mortar linings have been properly wetted. Moist mortar shall not be placed against dry mortar linings. Excess mortar shall be removed by drawing an approved pipe cleaning tool through the pipe after joints have been made (pipe sections have been joined). For fully welded joints, pipe sections shall be pulled together and restrained with come-along devices, or hoists with chains and slings, and mortar shall be allowed to set for twenty minutes before welding joint. Once joint has been pulled closed and cleaning tool has been drawn through pipe

sections, pipe alignment shall not be adjusted, nor shall pipe be bounced or hammered. Come-along devices, or hoists with chains and slings, shall be removed only after joint has been fully welded.

6. For pipe 24 inches in diameter and larger, cement mortar shall be placed on interior joining ends from inside pipe after it has been set. Moist mortar shall be applied only after mortar linings have been properly wetted. Moist mortar shall not be placed against dry mortar linings. Excess mortar and debris shall be removed by hand or by other means acceptable to and approved by the Owner.
7. For cement mortar coated pipe, joint exteriors shall be coated with cement mortar utilizing a joint diaper. Said diaper shall be furnished by pipe manufacturer and shall be centered over joint and securely fastened to pipe. Cement mortar joint mix consisting of one part Portland cement to two parts (by weight) clean, sharp sand, shall contain just enough water to allow mix to be poured into diaper and flow around circumference of joint. Said mix shall be allowed to set prior to backfilling around joint.
8. Joints shall be completed to provide continuous interior lining and exterior coating. Field lining and coating must equal or exceed shop lining and coating when completed with respect to strength, uniformity, and density and there shall be no voids between lining or coating and steel cylinder.
9. If cement mortar lining has to be removed, Contractor shall scribe, chisel, and remove the lining using appropriate tools. If cement mortar coating has to be removed, Contractor shall first scribe, then saw cut said coating 3/4 of its thickness, and then remove coating using a chisel driven by a hammer, chipping gun, or other suitable tool. Impact shall be applied parallel with pipe barrel, not perpendicular thereto.
10. At the end of each day's work, all openings in the pipeline shall be plugged with watertight, expandable plugs or approved equal. Said plugs shall be secured in place so that they cannot be removed by children or animals.
11. Field Welding
  - a. Whenever field welding is required, Contractor shall attach welding machine ground to pipe only with clamps or other means acceptable to the Owner unless an alternative means is specified.
  - b. Unless specified otherwise, field welded or thrust restrained joints shall consist of flanged joints or fully welded joints. All flanges shall be fully welded to pipe on both faces, one pass minimum on the inside and two passes minimum on the outside. Welded joints shall be made with pipe having ends belled for welding, or alternatively, ends belled for rubber gasket joints, provided pipe manufacturer furnished filler rods of proper diameter, length, and curvature are installed in accordance with pipe manufacturer's recommendations, as approved by Owner. Belled ends shall not be deformed to accomplish fully welded joints. Full welds for all joints shall be accomplished with two welding passes (beads) minimum.

12. Field Cement Mortar Lining and Cement Mortar Coating

Whenever field cement mortar lining and cement mortar coating is permitted by the Owner for either repair or fabrication, Contractor shall comply with the following procedures:

a. Cement Mortar Lining

- 1) Contractor shall square the edge of the remaining lining, leaving no feather edge, and shall clean metal surfaces with a stiff wire brush.
- 2) Contractor shall apply approved bonding agent to both steel area and edges of adjacent lining. Cement mortar shall then be applied to the area being patched and worked and finished with a trowel (or by hand when a butt-strap connection is specified) until smooth. Contractor shall brush on approved curing compound over the surface of the patch to prevent rapid evaporation of moisture. Otherwise, Contractor shall keep the patched mortar moist by covering it with wet burlap. The pipe shall not be moved until the cement mortar achieves its initial set, not less than three hours.
- 3) Cement mortar shall consist of not less than one part cement to three parts sand, thoroughly mixed before any water addition. Cement mortar may be approved commercial, packaged dry mortar mix. Cement mortar shall be mixed separately for each area to be patched. Quantity of water shall be just sufficient so that when mortar is firmly compressed into a ball, it will hold its shape without slump.

b. Cement Mortar Coating

- 1) Exterior coating which requires removal around the complete circumference of the pipe shall be repaired by:
  - a) Removing the coating by chipping with a hammer or chisel, squaring the edges to accept repair patch.
  - b) Wrapping the area with 2 x 4 x 14 GA self-furring wire mesh or an approved stucco netting and guniting the area being patched.

Or

Wrapping the mesh as above and hand troweling mortar onto the area being patched.

- c) Applying an approved curing compound to the patched area.

- d) Avoiding movement and protecting the pipe until the cement mortar achieves its initial set, not less than three hours.
- 2) Exterior coating that does not extend around the entire circumference of the pipe shall be repaired by:
    - a) Removing the coating by chipping with a hammer and chisel, squaring the edges to accept repair patch.
    - b) Applying by brush an approved bonding agent to both the steel area and the edges of the remaining coating.
    - c) Applying cement mortar to the area being patched and thoroughly compacting it, with finished patch mounding up above and overlapping (at least 1 inch on all sides) the surrounding coating.
    - d) Applying an approved curing compound to the patched area. If the repair patch is made on pipe in the ditch, it shall be covered with wet burlap, heavy cloth, or similar material, and dirt shall be placed around and over the patched area by hand before proceeding with placing backfill material.
  - 3) The cement mortar mix proportions shall be the same as for lining repair.
  - 4) If the area to be patched exceeds over half of the pipe circumference, 2 x 4 x 14 GA self-furring wire mesh or an approved stucco netting shall be attached to the pipe prior to the application of the cement mortar.

c. Installation of Repaired Pipe

After the repaired area has achieved initial set, not less than six hours, the pipe section can be installed, providing the patched area of the coating is backfilled with water saturated or wetted soil.

C. Stainless Steel Piping Systems (Austenitic and Duplex)

Preserve appearance and finish of stainless steel piping by providing suitable protection during handling and installation and until final acceptance of the work.

1. The pickled and passivated piping shall be packaged in a manner which shall afford protection of the piping from excess exposure during transit.
2. Handling methods and equipment used shall prevent damage to the surfaces and shall include the use of wide canvas slings and wide padded skids.
3. Bare cables, chains, hooks, metal bars, or narrow skids shall not be used.

4. After installation, the stainless steel piping shall be thoroughly washed with a high pressure wash of potable water and shall be free of dust or containments.
5. All stainless steel piping shall be covered during work performed in the vicinity of said components.

D. PVC and CPVC Pipe (Schedules 40 and 80)

PVC and CPVC pipe joints shall be primed and solvent-welded in accordance with ASTM D2855 and the manufacturer's instructions. Expansion joints or pipe bends shall be provided to absorb pipe expansion over a temperature range of 100 degrees F, unless otherwise shown. Care shall be taken to provide sufficient supports, anchors, and guides, to avoid stress on the piping. Only clean, fresh primer and solvent-cement shall be used at any time. Contractor shall cure the solvent-cement in strict accordance with the manufacturer's requirements, including providing forced air ventilation.

Below grade PVC and CPVC piping shall be installed in a trench condition. Unless specified otherwise, pipe bedding and pipe zone backfill shall be clean imported sand with a minimum sand equivalent of 30.

PVC and CPVC piping specified to convey chlorine gas shall be installed in accordance with Chlorine Institute recommendations, including cleaning, drying and purging prior to the introduction of chlorine gas into the piping system. PVC and CPVC piping specified for sulfur dioxide gas shall follow similar methods and practices.

E. Unions

In erecting screwed pipe, a sufficient number of screwed unions shall be installed to allow any section or run of pipe to be disconnected without taking down adjacent runs. In addition, at least one union shall be installed at every change in direction (horizontal and vertical) and adjacent to each valve.

F. Couplings

Pipe couplings shall be installed in strict accordance with the manufacturer's printed recommendations. Buried couplings shall be polyethylene encased in accordance with AWWA C105/A21.5-99.

G. Gaskets for Flanged Joints

Unless specified otherwise, gaskets shall be full-faced and shall be constructed of cloth-rubber or fiber sheets (no asbestos allowed). Gaskets shall be certified per ANSI/NSF 61 and shall be rated for a minimum working pressure of 800 psi. Wherever blind flanges are shown, gaskets shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange.

H. Insulating Connections

All insulating connections shall be installed in accordance with manufacturer's printed instructions. Unless shown otherwise on the Drawings, all insulating connections shall be provided with cathodic protection test wires on both sides of the connection for monitoring

and testing purposes. Test wires shall be extended to the ground surface and terminated in a precast concrete meter box. Meter box shall be provided with a cast iron cover labelled "C. P. Test Station".

### **3.04 Continuity Bonds**

Where required by the Drawings, all joints, except field-welded joints and insulating joints, shall be continuity bonded. Bonds shall be welded to the pipe as shown, as well as all major parts of any couplings used. Upon completion of the project, the Contractor, at Contractor's own expense, shall have a qualified testing firm test the continuity of all bonds. All test data shall be submitted to the Owner for review and approval. Contractor, at Contractor's own expense, shall repair all bonds that fail the continuity test and shall retest those sections for continuity.

### **3.05 Insulation Covers**

Contractor shall field measure all piping and appurtenances required to be insulated prior to manufacturer constructing insulation covers. Manufacturer shall provide instruction to Contractor if field altering of insulation covers is required.

### **3.06 Field Hydrostatic Test And Leakage Test**

#### **A. Hydrostatic Test**

Upon completion of piping installation, piping and appurtenances shall be filled with water for twenty-four hours minimum. During filling, Contractor shall see that all air valves are open and operating. After piping has been completely filled, they shall be allowed to stand for twelve hours minimum under slight pressure for sufficient time to permit all air to escape. During that same period, Contractor shall examine all fittings, flanges, and connections for leaks. If any leaks are found, they shall be eliminated.

Unless specified otherwise, test pressure, 225 psi minimum for Class 150 pipe and 150 percent of pipe class or working pressure rating for other classes of pipe, shall then be applied to test sections as directed by the Owner. Test pressures shall be maintained for four hours minimum. Test sections will be selected which give, as nearly as possible, constant pressure throughout section being tested. Normally test pressures will be measured at lowest elevations.

#### **B. Leakage Test**

After hydrostatic pressure test has been satisfactorily completed, piping and appurtenances shall be tested for leakage at pressure equal to the pressure class of pipe or working pressure rating of pipe. Contractor shall test piping and appurtenances in test sections as designated by the Owner and required pressures shall be maintained for two hours minimum during which time leakage shall be monitored. No leakage will be allowed for exposed piping and appurtenances. Any leakage for buried piping shall be accurately measured, and shall not exceed the limits set by the following formula unless otherwise specified by the Drawings.

$$L = \frac{ND(P)^{1/2}}{5000}$$

L is the allowable leakage in gallons per hour for section of piping being tested; N is the number of joints (rubber gasket, flanged, or threaded joints, not welded joints) where leakage could occur in the section of piping being tested; D is the nominal diameter (inches) of the piping being tested; and P is the weighted average test pressure (psi gauge) within the section of piping being tested during the leakage test.

C. General Requirements

1. Required test pressures shall be applied by pump connected to piping sections being tested. The Owner shall approve pump connections to piping before testing begins. As part of the Work, and unless specified otherwise, Contractor shall install, at Contractor's expense, top outlets (service taps) required for testing.

Contractor shall provide calibrated meters for measurement of leakage, and all pumps, piping, fittings, bulkheads, plugs, valves, gages, power equipment, and manpower necessary for conducting all tests required, all at Contractor's expense. Contractor shall furnish the Owner three copies of all records of all tests performed.

2. Unless specified otherwise, Contractor shall pressure test pipelines against test plates. Contractor shall not remove said test plates until piping has been tested, disinfected (if applicable), and accepted by the Owner.
3. Contractor, at Contractor's expense, shall locate and repair leaks or other defects which may develop or become apparent during test. For buried piping, Contractor shall excavate, including removal of backfill already placed, and make all repairs necessary for required water tightness, and then replace all excavated material, after which Contractor shall retest repaired piping section. Piping sections shall be repeatedly repaired and tested until they meet requirements set forth herein.

**3.07 Disinfection of Piping and Appurtenances**

- A. Unless specified otherwise, all piping, fittings, and appurtenances in contact with potable water, conveying water for a water treatment facility, or conveying chemicals for water treatment and/or disinfection shall be properly disinfected prior to being placed into service or connected to existing piping. Contractor shall furnish all equipment, labor, and materials for the proper disinfection (chlorination and flushing) of all specified piping and appurtenances. As part of the Work, Contractor shall install, at Contractor's expense, top outlets (service taps) for required disinfection and sampling. Testing and disinfection must be completed before any piping is connected to an existing system.
- B. Contractor may disinfect piping and appurtenances either before or after they have been subjected to hydrostatic and leakage tests, unless specified otherwise. If Contractor elects to disinfect before hydrostatic and leakage tests, and he must repair or replace piping as a result of said hydrostatic or leakage tests, Contractor shall again disinfect all or portions of the previously tested piping.
- C. Disinfection shall conform with provisions of AWWA C651, latest. The chlorinating agent, liquid chlorine or chlorine gas, shall be applied or injected as approved by the Owner at locations no more than 10 feet from existing water system as selected by or designated

by the Owner. Concentration of the dosage applied to the water within the piping shall be at least 50 ppm and it shall not exceed 200 ppm.

- D. Chlorinated water must be retained in the piping long enough to destroy all non-spore-forming bacteria. Said period shall be at least 24 hours but not more than 72 hours. After the chlorine-treated water has been retained for the required time, the chlorine residual at the pipe extremities and at other representative locations shall be at least 25 ppm.
- E. Following chlorination, Contractor shall flush all piping and appurtenances in the manner and with the procedure prescribed or approved by the Owner. During flushing, all valves shall be in full open free discharge position. Flushing shall continue until all chlorine, debris, and foreign materials have been removed from piping and appurtenances.
- F. If so directed by the Owner, Contractor shall remove portions of certain appurtenances such as air valve installations, in order to accomplish complete flushing; Contractor shall replace same without adversely affecting disinfected piping and appurtenances.
- G. Following flushing, water shall be maintained in the piping for at least twenty-four hours, thereafter, bacteriological samples shall be taken and analyzed by a State of California certified independent laboratory as approved by the Owner. If initial treatment fails to produce satisfactory disinfection as evidenced by bacteriological analysis, chlorination and flushing shall be repeated until acceptable results have been obtained.
- H. Contractor shall arrange and pay for chlorine residual and bacteriological quality tests. Contractor shall obtain the Owner's prior approval of the times, places, locations, and numbers of samples or tests. The Owner shall witness all sampling. Contractor shall provide an Affidavit of Compliance (in triplicate) to the Owner evidencing satisfactory disinfection.
- I. Following disinfection, piping and appurtenances shall remain isolated from any operational water system facilities until evidence has been submitted to the Owner demonstrating that said piping and appurtenances have been adequately and properly disinfected. Said evidence shall consist of aforementioned Affidavits of Compliance together with said bacteriological test results, as submitted by the approved certified laboratory. Normally, said piping and appurtenances shall be isolated for at least 48 hours, longer if so determined by the Owner.

### **3.08 Chemical Piping Locator Wire and Detectable Marker Tape**

- A. All belowgrade chemical piping shall be installed with a locator wire and detectable marker tape.
- B. Locator wire shall be placed on top of the pipe and secured with tape. Locator wire shall be brought to the surface at maximum intervals of 600 feet in a precast concrete meter box. Meter box shall be Brooks Products No. 33. Meter box lid shall be marked "PIPE LOCATOR STATION". Contractor shall provide a 1" PVC conduit body (condulet), Type C with gasketed cover in meter box, with a 1" Schedule 80 PVC long radius 90-degree elbow connected to condulet and oriented vertically. An 18" long Schedule 80 PVC conduit shall be provided vertically connected to the elbow to accept the locator wire. Locator wire shall be coiled in meter box. Contractor shall provide a stainless steel tag chained to the conduit inside the meter box. The stainless steel tag shall be engraved with



the pipe size and description (e.g. 2" sodium hypochlorite solution). Meter box locations shall be determined in the field by the District's Inspector. Each Pipe Locator Station shall be provided with an abovegrade marker post per District Standard Drawing, with yellow colored marker post, labeled "CAUTION: CHEMICAL PIPELINE" (label with specific chemical as shown on the Drawings) and "PIPE LOCATOR STATION", in lieu of standard utility marker legend and facility type ID, respectively.

- C. In addition to the locator wire, Contractor shall furnish and install detectable marker tape above the belowgrade piping. Marker tape shall be installed in the pipe trench at a depth of 12" to 18" below grade.
- D. After all trench backfill operations are complete, Contractor shall perform a locatability test of all pipe locator wire to confirm that the wire is continuous. Contractor shall be responsible for all costs to confirm, locate, and repair any breaks in the location wire identified in the locatability test.

**END OF SECTION**

[PAGE LEFT INTENTIONALLY BLANK]

**SECTION 15100**  
**PROCESS VALVES**  
**TECHNICAL SPECIFICATIONS**

**PART 1 - GENERAL**

**1.01 Description**

Valves shall be as specified by these Specifications and as may be modified by the Special Requirements, other Technical Specifications, or the Drawings. Where "Owner's Approved Materials List" is incorporated within the Contract Documents, only manufacturers listed therein shall be acceptable. Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, interior epoxy coating, exterior coating, installing, adjusting, and testing of all valves, valve operators, and appurtenant work, complete and operable, as specified herein and shown on the Drawings. Where buried valves are shown, the Contractor shall furnish and install valve boxes to grade, with covers and extensions per Standard Drawings.

**1.02 Submittals**

A. Shop Drawings

Contractor shall submit shop drawings in accordance with the requirements of Specification Section 01300, Contractor Submittals and Requests Technical Specifications. Contractor shall submit complete information and technical data for all material and components, including, but not limited to, the following: fabrication, assembly, detailed specifications and data covering performance and materials of construction, parts, installation instructions, coatings, operators, valve boxes, extensions, and other pertinent data. Shop drawings shall clearly indicate size, end connections, and proposed service condition, as well as special features required for buried service.

B. Operation and Maintenance Manual

Contractor shall submit for each valve a detailed operation and maintenance manual in accordance with the requirements of Section 01300.

C. Contractor shall submit manufacturer's certification that installers for the E-CTFE valves are certified and trained in accordance with the manufacturer's installation procedures.

**1.03 Quality**

A. All valves furnished under this Section shall be of a design and manufacture that has been used in similar applications. Manufacturers specified herein manufacture valves with acceptable quality or experience.

Manufacturers must, however, provide written confirmation that valves to be supplied meet the performance requirements specified herein and are suitable for long term operation with the proposed fluid.

B. All valves of a particular type shall be by one (1) manufacturer. In addition, valve operators for a particular type of valve shall be by one (1) manufacturer.

- C. Contractor shall coordinate valves furnished with connecting piping or equipment to ensure compatible end connections and proper valve operation.

## **PART 2 - PRODUCTS**

### **2.01 Pressure Rating**

All process valves shall be rated for a working pressure equal to (or more than) the pressure rating of the connecting piping, minimum of 150 psi, or as specified otherwise herein or on the Drawings.

### **2.02 Valve Tags**

Each and every valve shall be provided with a 14 gauge brass indexing tag, 1-1/2" diameter, bearing 3/16" die-stamped lettering with pipe duty designation and valve number. Exact lettering and numbering shall be as approved by Owner. Each tag shall be securely attached to its valve with a #10 single-jack brass chain or with brass bolts or screws. Each tag shall be provided with two holes for securing tag with chain, bolts, or nails. Buried valves shall have tags attached to valve box.

### **2.03 Operators**

#### **A. General**

The operators shall be sized based on the maximum expected torque as per the valve manufacturer's recommendations. The responsibility for selection of proper operator and the valve operation therewith shall reside with the valve manufacturer/supplier.

#### **B. Manual Operators**

Manual operators, except where otherwise shown or specified, shall be worm-gear type, Limitorque T100, E-I-M Type MG, or equal and shall conform to AWWA C504, Section 3.8. The axis of the worm shaft shall remain fixed during operation. A visual OPEN/CLOSED indicator shall be an integral part of the operator. A handwheel shall be provided except where an extension stem and floor stand or valve box, tee wrench, and street box are required. Handwheels shall have OPEN and CLOSE directional arrows cast on the outer rim. Unless otherwise specified, handwheels shall have a minimum diameter of 8". Extension stems and accessories shall be sized for valve manufacturer's recommendations.

##### **1. Gate and Globe Valves**

All gate, globe, and angle valves shall be fitted with cast iron handwheels of suitable size or gear operators in accordance with AWWA C504, Section 3.8.

##### **2. Butterfly Valves**

All butterfly valves 3" and smaller in size shall be lever and locking ratchet operated and valves 4" and larger in size shall be equipped with enclosed gear and handwheel operators. The operators shall be furnished by the manufacturer of the valve, in accordance with AWWA C504, Section 3.8, who shall be responsible for

the compatibility and adequacy of both the valve and operator. Valve operators shall be sized for the maximum torque developed by the maximum pressure in the pipeline in which the valve is to be used. Buried or submerged valves shall conform to AWWA C504, Section 3.8.5.3 and have properly constructed actuators for the service.

3. Plug and Ball Valves

All plug and ball valves 3" and smaller in size shall be lever and locking ratchet operated and plug valves 4" and larger in size shall be provided with enclosed gear and handwheel operators unless otherwise shown or specified. Buried or submerged valves shall conform to AWWA C504, Section 3.8.5.3 and have properly constructed actuators for the service.

4. Chainwheel Operator

All valves 6' or more above the floor level shall be provided with chainwheel operators in lieu of the handwheel operator and shall be the valve manufacturer's standard, with galvanized chain to be furnished in the length required for operation. Chainwheel operators shall conform with AWWA C504, Section 3.8.5.2.

5. Wrench Nut Operation

An AWWA nut or shaft key, as applicable, shall be provided in lieu of handwheel where required for connection to extension stem and floor stand or for buried valves. Nut shall be 2" square and shall have a flanged base upon which shall be cast an arrow at least 2" long showing direction of opening. The word OPEN shall also be cast on the flange. No submerged or buried operator shall require maintenance following installation. Suitable gaskets, O-rings, and other features shall ensure permanent water tightness. Operator shall be designed to take the load of the shaft extension.

C. Electric Operators

Where electric type operators are specified, an electric motor-operated valve control unit shall be attached to the valve operation mechanism housing by means of a flange motor adapter piece. Operator unit shall include the motor, operator unit gearing, torque switches, limit switches, auxiliary handwheel, starter, mechanical position indicator and accessories to provide a complete and operable unit. Electric operators shall conform to AWWA C540. The valve actuator motor and all electrical enclosures shall be weatherproof, NEMA 4, as a minimum. When specified, motor and all electrical enclosures shall be available to meet NEMA 6 submersible, or NEMA 7 hazardous requirements. Valve manufacturer/supplier shall be responsible to ensure proper selection and operation of valve/operator assembly. Electric operator shall be designed for open-close operation or modulation, as specified, or as shown on the Drawings.

1. Gearing

The power gearing shall consist of spur or helical gears of hardened alloy steel and worm gear of alloy bronze. All power gearing shall be grease or oil lubricated, in a sealed housing. Ball or roller bearings shall be used throughout.

2. Non-Modulating

A lost-motion starting device independent of gear backlash shall be supplied as an integral part of the actuator gear train. This device shall allow the motor to attain full speed before the load is engaged. The lost-motion device shall not be incorporated in actuators supplied for modulating service.

3. Motor

The motor shall be of the totally-enclosed, non-ventilated, high-starting torque, low-starting current type for full voltage starting. Unless otherwise specified, motor shall be suitable for operation on 480 volt, 3 phase, 60 hertz current, and have Class H insulation. The motor shall have a running torque per valve manufacturer's recommendation, and be of sufficient horsepower to open or close a valve against the maximum specified differential pressure when voltage to the motor is  $\pm 10\%$  of nominal voltage with a factor of safety of 1.5. The motor shall be pre-lubricated and all bearings shall be of the anti-friction type. Motor rating shall be 30 minute duty.

4. Limit Switches

Limit switches and their gearing shall be an integral part of the valve operator. The limit switch compartment shall be totally enclosed and equipped with a heater and thermostat to prevent build-up of moisture and contamination. Switches shall be SPDT and rated 10A at 120 VAC or as specified. The actuating point shall be adjustable at any point of valve travel between fully open and fully closed.

5. Torque Limiting Switches

Torque limiting switches shall be provided and be responsive to the mechanical torque developed in seating, backseating, or by obstruction. The torque switch shall operate a calibrated dial integrally mounted and directly related to the torque output of the operator. Torque control accuracy shall be within  $\pm 5\%$ . The use of torque wrenches for calibration shall not be required. A calibration tag stating the maximum torque output of each torque switch at 100% setting shall be permanently affixed to the torque switch dial. The torque switch shall be calibrated by use of a dynamometer in order to accurately predict the output of the actuator.

6. Handwheel Operation

A permanently attached handwheel shall be provided for emergency manual operation. The handwheel shall not rotate during electrical operation. The maximum torque required on the handwheel under the most adverse conditions specified herein shall not exceed 60 lb-ft, and the maximum force required on the rim of the handwheel shall not exceed 60 lbs. An arrow and either the word OPEN or CLOSE shall be cast on the handwheel to indicate the direction to turn said handwheel. Unless otherwise specified, handwheels shall have a minimum diameter of 8".

Electric operators shall be as manufactured by Limitorque, EIM, AUMA, Pratt, Keystone, or equal.

D. Pneumatic Operators

Where pneumatic type operators are specified, a totally enclosed pneumatic rotary actuator shall be directly attached to the valve mounting flange or top plate, without the use of special brackets, linkage or couplings. The actuator shall be of the rack and pinion type, providing constant output torque throughout travel. All units shall be factory tested to insure proper operation, and factory lubricated for actuator service life. A smooth, self-draining body shall be provided to resist moisture. The actuator shall have integral porting to eliminate external tubing. Localized mechanical position indication shall be provided and be readable from a distance of 25' by use of contrasting colors. The standard operation shall be 0-90° reversible operation for air, gas or hydraulic oil. Actuator shall be capable of operating in any valve mounting attitude, and capable of being mounted either in line or transverse to the pipeline.

Spring return shall be available for fail-safe conditions. The spring return actuator shall be capable of providing "fail-open" or "fail-closed" as required. Standard actuators shall be designed so that the spring return option can be added at a later date. Valve manufacturer/supplier shall be responsible to ensure proper selection and operation of valve/operator assembly.

1. Materials of Construction

The actuator body, end caps, and spring cartridge housings shall be made of precision extruded, hard anodized aluminum. The pistons shall be a hard anodized aluminum alloy. The actuator drive shaft and pinion shall be of hardened and tempered alloy steel. All fasteners shall be electroless nickel-plated. The piston seals and "O" rings shall be made of nitrile rubber. The bushings shall be acetal plastic for maximum efficiency and elimination of galvanic action.

2. Service Requirements

The actuator shall be suitable for operation in temperatures ranging from -13° to 200°F. The actuator shall be designed for pneumatic operation up to a maximum pressure of 125 psi. Filtered air shall not be required for proper operation. The actuator design shall have been tested for a minimum 100,000 cycles under full load with no appreciable wear of parts.

3. Accessories

Where specified or shown, the following pneumatic operator accessories shall be provided:

a. Solenoid Valve

The solenoid valve shall be capable of being mounted directly over the actuator air ports. Unless otherwise specified, solenoid valves shall have a NEMA 4 enclosure. The solenoid valve shall be provided with a manual override (with automatic reset capability) which allows manual operation

in the event of power failure. An adjustable speed control shall be provided where specified. Solenoid housings shall be provided with a 1/2" NPT conduit entry. The solenoid valves shall operate at 120 volts AC, 60 hertz, single phase.

b. Limit Switches

The limit switches shall be single pole, double throw, cam operated, adjustable throughout the 90° travel range, and rated at 15 amps for 125 or 250 VAC. Limit switches shall be pre-wired to an internal terminal strip, and conduit entry shall be 3/4" NPT. Unless otherwise specified, limit switch housing shall be rated NEMA 4. The limit switch box shall be mounted directly to the upper actuator housing.

c. Spring Return

The spring return (fail safe) option shall be of the retained, or safety cartridge type, to allow convenient and safe disassembly. Springs shall be hard drawn and annealed tempered steel.

d. Positioner

The positioner shall mount to the top of the actuator housing, and be of the rotary type, with a standard input range of 3-15 psig and with an option of 3-9, 9-15, 15-3, 15-9 psig split-range operation. The positioner shall operate on a maximum supply of 150 psig. Air consumption shall not exceed 0.7 standard cubic feet per minute in balanced condition with 60 psig supply pressure. The positioner shall be furnished with three (3) pressure gauges and all necessary mounting hardware, as a complete package.

e. Travel Stops

Travel stops for the actuator shall consist of a mounting plate, with stop cam, fitted between the base of the actuator and the valve mounting flange, and shall be externally adjustable through the full 90° of valve travel.

Pneumatic operators shall be as manufactured by Keystone, DeZurik, or equal.

## 2.04 Protective Coatings

A. Interior

All interior non-working ferrous surfaces other than stainless steel shall be given an epoxy coating unless specified otherwise.

1. All valves shall be fusion bonded epoxy coated (8 to 12 mils) in accordance with AWWA C550 (latest). Owner shall approve epoxy coating materials and methods before application. Completed coating shall be free from all defects and shall be inspected by use of low voltage holiday detecting and non-destructive thickness gauges.



2. Where the manufacturer demonstrates in writing that it would be impossible to use the powder epoxy method without causing damage to the valve components, the use of a liquid epoxy will be permitted upon approval by the Owner.
3. If small local repairs are necessary, they shall be made using a liquid epoxy recommended by the manufacturer of the epoxy with which the item was initially coated. The surface shall first be hand tool cleaned in accordance with SSPC-SP2. The repair epoxy material shall be applied in accordance with the manufacturer's instructions.
4. Where factory hydrostatic testing of the valve is required the valve shall pass all tests prior to interior coating applications.

B. Exterior

All valves shall be given a shop prime coating which shall be compatible with the field applied coating system.

1. Buried Valve

Prior to coating, all surfaces shall be prepared in accordance with SSPC-SP3 and manufacturer's recommendations. The two coat system shall be Tnemec 46-450, Carbolite Bitumastic 50, or equal.

2. Nonburied and Immersed Valves

All valves shall be coated as specified in Section 09900, "Basic Coating and Painting Specification for Water and Wastewater Facilities", and as shown on the Drawings.

## 2.05 Eccentric Plug Valve

Eccentric plug valves shall be of the non-lubricated eccentric type with round or rectangular port design unless otherwise specified. The valve body and plug shall be constructed of cast iron meeting the requirements of ASTM A126, Class B. Valve bearing shall be constructed of corrosion resistant stainless steel. Unless otherwise specified on the Drawings, the entire plug shall be completely encapsulated with Buna N rubber. Unless otherwise shown or specified on the Drawings, the valves shall be flanged with dimensions, facing, and drilling in full conformance with ANSI B16.1, Class 125. With the plug in the full open position, valve shall have no cavities where debris can collect, have minimal head loss and be capable of passing a clean out pig with the same nominal diameter as the adjacent pipe. Valves shall be equipped with operators as shown on the Drawings and as specified herein. All eccentric plug valves shall have a pressure rating of not less than 150 psi, for bubble tight shut off. Valves shall be the product of a single manufacturer and shall be DeZurik or Pratt (no substitutes).

## 2.06 Flanged Butterfly Valves

### A. Ductile Iron Discs

All butterfly valves shall be short pattern, flanged, designed and manufactured in accordance with AWWA C504 (latest) unless otherwise specified herein or shown on the Drawings. Valve body, disc, and flanges shall be constructed of heavy duty ductile iron meeting the requirements of ASTM A536 Grade 65-45-12. Flanges shall be drilled in accordance with ANSI B16.1 standards (Class 125) and shall be of the short body design. The disc shall have a 316 stainless steel or NI Chrome edge and be securely attached to a 316 stainless steel shaft with stainless steel pins. Valves shall have sleeve-type nylon bearings and a resilient seat of Buna N (or equal) material mounted in the valve body. Valves shall be rated for a minimum working pressure of 150 psi unless otherwise shown on the Drawings. Valves shall be equipped with operators as shown on the Drawings and as specified herein. Butterfly valves shall be the product of a single manufacturer which shall be DeZurik, Pratt, or equal.

Unless otherwise shown on the Drawings, Class 250 valves shall be designed and manufactured in accordance with AWWA C504 (latest) and as specified above, and shall be furnished with Class 125 flanges.

### B. Stainless Steel Discs

All butterfly valves shall be short pattern, flanged, designed and manufactured in accordance with AWWA C504 (latest) unless otherwise specified herein or shown on the Drawings. Valve body and flanges shall be constructed of heavy duty ductile iron meeting the requirements of ASTM A536 Grade 65-45-12. Flanges shall be drilled in accordance with ANSI B16.1 standards (Class 125) and shall be of the short body design. The disc shall be 316 stainless steel and be securely attached to a 316 stainless steel shaft with stainless steel pins. Valves shall have sleeve type PTFE bearings, EPDM packing, and a resilient seat of EPDM material mounted in the valve body. Valves shall be rated for a minimum working pressure of 250 psi unless otherwise specified. Valves shall be equipped with operators as shown on the Drawings and as specified herein. Butterfly valves shall be the product of a single manufacturer which shall be DeZurik, Pratt, or equal.

Where Class 250 or Class 300 valves are specified on the Drawings, they shall be of similar construction to AWWA C504 butterfly valves specified above, but shall be furnished with Class 250 flanges.

## 2.07 Wafer and Lug Butterfly Valves (Aluminum-Bronze Discs)

All wafer and lug butterfly valves shall be heavy-duty, resilient seated, rated 250 psi WOG and suitable for installation between ANSI Class 125/150 flanges, unless otherwise specified herein or shown on the Drawings. Valves shall be capable of bidirectional, drip tight shut off, and dead end service to 250 psi. Valve body shall be of one piece ductile iron construction including an integrally cast top plate for direct, flush-mounting actuator and shall meet ANSI Class 125/150 flange standards with valve neck of sufficient length to allow for flange clearance and piping insulation.

Resilient seat shall be reinforced EPDM, fully isolating the valve body, stem, and journal areas from the flowing media, field replaceable, with molded-in O-rings requiring no gaskets between valve and flange face(s). Stem shall be one or two piece 316 stainless steel (or better). Disc

materials shall be aluminum-bronze. All wafer and lug butterfly valves shall be the product of a single manufacturer and shall be Keystone, Demco, or equal.

#### **2.08 Wafer and Lug Butterfly Valves (316 Stainless Steel Discs)**

Unless specified otherwise, all wafer and lug butterfly valves shall be designed for installation between 125 lb. flat face or 150 lb. raised face flanges. The valve shall be non-directional and of the dry stem journal design, providing bubble-tight shut off at 200 psi differential pressure.

Valve bodies shall be gray iron or cast iron in accordance with ASTM A48 or ASTM A126. Valve bodies shall be provided with an integrally cast top plate for direct, flush-mounting of actuator, and with valve neck of sufficient length to allow for flange clearance and piping insulation. Valve stems shall be 416 stainless steel of the non-wetted two piece design with the lower stem acting as a trunnion for the valve disc and the upper stem being the drive shaft.

The valve disc shall be of a high flow design and constructed of 316 stainless steel in accordance with ASTM A351 (CF8M). The valve disc to stem engagement shall have no mechanical fasteners, allowing the valve disc to float to a perfect seal in the valve seat. The valve seat shall have a rigid phenolic backup ring with Buna-N elastomer bonded to it, rendering the valve seat suitable for pressure or vacuum service. The valve seat shall incorporate its own flange seals and they shall mate with full face or raised face flanges. The valve seat shall fully isolate the valve body, stem, and journal areas from the flowing media and shall be field replaceable.

The valve body shall incorporate O-ring secondary seals to maintain lubricant in the stem journals and eliminate exterior moisture from the stem journals.

All wafer butterfly valves shall be the product of a single manufacturer, and shall be Keystone Series 60, Demco Series NE-C, or equal.

#### **2.09 Gate Valves (4" through 12")**

Gate valves shall be resilient seated gate valve designed and manufactured in accordance with AWWA C509 (latest) unless otherwise shown on the Drawings or specified herein. Valve shall have a non-rising bronze stem, cast ductile iron body and disc in conformance with ASTM A126, and flanges in full conformance with ANSI B16.1, Class 125. Valve disc shall be permanently bonded with resilient material to ensure drip tight shutoff. Valves shall have two stem seal O-rings of Buna N to prevent leakage through the stem. Valves shall be rated for a minimum working pressure of 200 psi unless otherwise specified. Valves shall have operators as shown on the Drawings and as specified herein. Gate valves shall be the product of a single manufacturer and shall be M&H, Stockham, Clow, Mueller, American Darling, or equal.

#### **2.10 Gate Valves (14" through 42")**

Gate valves shall be double disc, non-rising stem type designed and manufactured in accordance with AWWA C500 (latest) unless otherwise shown on the Drawings or specified herein. Valve bodies shall be cast iron meeting the requirements of ASTM A126, Class B, with flanges conforming to ANSI B16.1, Class 125. Disc shall be cast iron, bronzed faced. Stem shall be bronze and have O-ring seals to prevent leakage through the stem. Valves shall be rated for a minimum working pressure of 150 psi unless otherwise specified. Valves shall have operators as shown on the Drawings and as specified herein. Valve shall be the product of a single manufacturer and shall be M&H, Kennedy, Clow, Mueller, or equal.

### **2.11 Swing Check Valve (3" and Smaller)**

Swing check valves shall be minimum 125 lb. screwed ends and bronze construction. Valves shall have a bronze disk, stainless steel or bronze pin, and have a screwed cap to access disk. Swing check valves shall be the product of a single manufacturer and shall be by Milwaukee #509, Stockham #B-319, Crane #1707, Powell #578, or equal.

### **2.12 Swing Check Valves (3" and Larger)**

Swing check valves shall be of the flanged body, outside lever and spring type in accordance with AWWA C508, unless otherwise specified herein or shown on the Drawings. Valves shall be fully opening, have a flanged cover piece to provide access to the disc, and be designed for minimum water-working pressure of 150 psi, unless otherwise shown. The valve body and cover shall be cast iron conforming to ASTM A126, Class B, with flanges conforming to ANSI B16.1, Class 125, unless otherwise specified. The valve disc shall be cast iron, ductile iron, or bronze conforming to ASTM B62. Valve seat and rings shall be bronze conforming to ASTM B62 or of Buna N. The hinge pin shall be of bronze or stainless steel. Valves shall be delivered to the site with the lever arm and spring adjusted for the valves installed position (vertical or horizontal). Swing check valves shall be the product of a single manufacturer and shall be APCO by Valve and Primer Corporation, Clow, Mueller, M&H, or equal.

Where Class 250 swing check valves are shown on the Drawings, they shall be similar to Class 150 swing check valves specified above, but constructed with ductile iron body and disc and Class 250 flanges. Valves shall be rated for 250 psi working pressure and be as manufactured by APCO by Valve and Primer Corporation, or equal.

### **2.13 Silent Check Valves**

Silent check valves shall be globe-style with flanged ends, APCO Series 600, Val Matic Series 1800, Crispin Model GC, or equal. Check valves shall have a service pressure rating of not less than 300 psi and shall be provided with 250 lb flanges.

Check valve shall be of the silent operating type that begins to close as the forward flow velocity diminishes and be fully closed at zero velocity preventing flow reversal and resultant water hammer or shock. Valve design shall incorporate a center guided, spring loaded poppet, guided at opposite ends and having a short linear stroke that generates a flow area at least equal to the pipe. Operation of the valve shall not be affected by the position of installation. It shall be capable of operating in the horizontal or vertical position with the flow up or down.

All component parts shall be field replaceable without the need of special tools. A replaceable guide bushing shall be provided and held in position by the valve's spring. The spring shall be designed to withstand 100,000 cycles without failure and exert a force which allows the valve to start operating at a differential pressure of .5 psi and to fully open at a flow velocity of 4 fps.

The valve disc shall be concave to the flow direction providing for disc stabilization, maximum strength and a minimal flow velocity to fully open the valve. Valve interior shall be contoured and unrestricted to achieve maximum flow capacity with minimum pressure drop.

The valves disc and seat shall be field replaceable and have a seating surface finish of 32 micro-inch or better to insure positive seating at all pressures unless otherwise specified, a buna-n seal

shall be furnished to provide zero leakage. The seal design shall provide for both a metal to metal seal and a metal to buna-n seal to achieve resilient sealing at both low and high pressures without overloading or damaging the buna-n seal.

Valves shall be hydrostatically tested at 1.5 times their rated working pressure and suitable for field testing at this pressure. Factory testing of each valve supplied shall be required for any manufacturer not specified herein.

Valve shall be provided with cast or ductile iron body, bronze plug and seat, and stainless steel spring. Contractor shall furnish connecting pipe with flat face flange, full face gaskets and a rating internal diameter as recommended by the valve manufacturer.

## **2.14 Plastic Ball Valves**

Plastic ball valves shall be made of polyvinylchloride (PVC), chlorinated polyvinylchloride (CPVC), or polypropylene (PP) as specified, shown on Drawings, and recommended by the manufacturer for the service condition specified. All valves shall have manual operators, unless otherwise specified or shown. All plastic ball valves shall be Class 150 and shall have true union ends for easy removal. The balls shall have full size ports and polytetrafluoroethylene (PTFE, trade name Teflon) seats, unless otherwise specified on the Drawings or by Chemical Feed Systems Technical Specifications. Where sodium hypochlorite with a concentration greater than 1% is specified, vented-type plastic ball valves shall be used. Unless otherwise specified on the Drawings or by the Chemical Feed Systems Technical Specifications, all body seals, Union O-ring seals, and stem seals shall be Viton. Valves shall be the product of a single manufacturer and shall be Hayward, Chemtrol, Asahi/American, or equal.

Where specified, pneumatically actuated ball valves shall be provided with operators in accordance with Part 2.03D, herein. Pneumatically actuated ball valves shall be equipped with a multiport single solenoid, which shall open the valve when energized and close the valve when de-energized.

Where specified, electric motor operated ball valves shall be Electromni by Asahi/American, Hayward, Chemtrol, or equal and of construction specified herein. Valves shall be 120 VAC energize to open and energize to close. Valves shall be provided with open indicating light on motor operator, and NEMA 4 enclosure. Where specified, valves shall be provided with limit switches for position.

## **2.15 Plastic Air Release and Degassing Valves**

### **A. Air Release Valves**

Plastic air release valves for corrosives shall be made of PVC or CPVC as specified, shown on the Drawings, and recommended by the manufacturer for the service condition specified. All air release valves shall be installed vertically at high points of the piping system to vent large quantities of air during startup of the system and trace amounts of air during normal operation of the system. Air release valves shall be normally open valves that utilize a floating poppet or ball that rises and seats (valve closes) when liquid is present. The poppet or ball shall fall and unseat (valve opens) when air is present allowing the air to be released from the system. Air release valves shall be of single union (minimum) design and all seals shall be Viton.

Air release valves shall have a minimum working pressure rating of 175 psi at 110°F and shall be as manufactured by Hayward or equal.

B. Degassing Valves

Plastic degassing valves for corrosives shall be made of PVC or CPVC as specified, shown on Drawings, and recommended by the manufacturer for the service condition specified. All degassing valves shall be installed vertically at high points of the sodium hypochlorite piping system to continuously vent the trace amounts of gas produced. Gas shall be automatically released by a floating lever that opens when gas is present, and closes when liquid is present. All seals shall be EPDM. Degassing valves shall be able to function properly up to 100 psi operating pressure with minimal emission of system liquid prior to sealing. The outlet port shall be piped to a U-vent in a safe area to prevent contact with the sodium hypochlorite. Degassing valves shall be the product of a single manufacturer and shall be Plast-O-Matic or equal.

**2.16 Plastic Ball Check Valves**

Plastic ball check valves shall be constructed of PVC, CPVC, or PP, as specified, shown on Drawings, and as recommended by the manufacturer for the service condition specified. Valves shall be true union type for easy removal. All seals shall have PTFE O-rings. Valves shall be the product of a single manufacturer and shall be Hayward, Chemtrol, Asahi/American, or equal.

**2.17 Foam Spray Nozzles**

A. Quick Flush Foam Control Nozzle

Foam spray nozzles shall be furnished and installed at locations shown on the Drawings. The nozzles shall be counter balanced weighted, easy flush type. The nozzle shall be bronze construction with a neoprene rubber deflector for 2 gpm at 10 psig. A split eyelet shall be utilized on all pipes smaller than 4" in diameter. Split eyelet shall have zinc plated steel clamps and bolts with brass connector body and a Buna N clamp gasket to provide a leak proof seal. The nozzles and split eyelets shall be as manufactured by Spraying System Company, BETE Fog Nozzle, Inc., or equal.

B. Hollow Cone Foam Control Nozzle

Foam spray nozzles shall be furnished and installed at locations shown on the Drawings. Hollow cone nozzles shall produce a 90° hollow cone spray pattern at 2 gpm at 10 psi, shall be 1/4" NPT (M), and constructed of 316 stainless steel. Nozzle shall be as manufactured by Spraying System Company, BETE Fog Nozzle, Inc., or equal.

**2.18 Sewage Air Release Valves**

Sewage air release valves shall have an elongated body and be designed to open while pressurized, allowing entrained air in the pipeline to escape through the air release orifice. Unless otherwise specified, each unit shall be supplied with isolation valve (solid wedge gate), blowoff valve, 1/2" back flushing shutoff valve, and 5' rubber supply hose with quick disconnect couplings. The unit shall be designed for an operating pressure of not less than 125 psi. The body and cover shall be cast iron, internal float and float guide shall be stainless steel with Buna N seat, valves shall be gate type of bronze construction. Seat hardness shall be selected by the manufacturer for actual

operating pressure of system. The sewage air release valve shall be manufactured by APCO by Valve and Primer Corporation, Val-Matic Valve, Multiplex Manufacturing Corporation (Crispin), or equal.

### **2.19 Combination Sewage Air and Vacuum Valve**

Combination sewage air and vacuum valves shall have an elongated body and be of the type that automatically exhausts large quantities of air during filling of the system, allows air to re-enter during draining of the system, and allows accumulating air to escape while in operation and under pressure. Unless otherwise specified, each unit shall be supplied with isolation valve (solid wedge gate), blowoff valve, 1/2" back flushing shutoff valve, and 5' rubber supply hose with disconnect couplings. The unit shall be designed for an operating pressure of not less than 125 psi. The body and cover shall be cast iron, internal float and float guide shall be stainless steel with Buna N seat, valves shall be gate type of bronze construction. Seat hardness shall be selected by the manufacturer for actual operating pressure of the system. Combination sewage air and vacuum valves shall be manufactured by APCO by Valve and Primer Corporation, Val-Matic Valve, Multiplex Manufacturing Corporation (Crispin), or equal.

### **2.20 Air Valves**

Unless specified otherwise, air valves shall be combination air or combination air and vacuum valve (air, vacuum, and automatic release). They shall permit automatic escape of large quantities of air from pipeline when it is being filled, permit air to enter pipeline when it is being emptied, and allow accumulating air to escape while pipeline is in operation and under pressure.

Air valves shall have ductile iron bodies and covers, stainless steel floats rated 1,000 psi minimum, all bronze or stainless steel internal working parts, and stainless steel pressure seats.

Air valve inlets shall be size as shown on Drawings, flanged or threaded as specified and outlets shall be threaded at the same nominal sizes as the inlets, minimum. Air valves shall be subjected to factory hydrostatic test at pressure equal to 200% rated working pressure with no harmful deflections or other defects.

Valves shall be as manufactured by APCO by Valve and Primer Corporation, Val-Matic Valve, Multiplex Manufacturing Corporation (Crispin), or equal.

### **2.21 Wye Strainers**

Wye strainers shall be installed where shown on the Drawings and specified herein. Strainers shall be suitable for a minimum 150 psi working pressure unless otherwise specified. Strainers shall be cast iron with 316 stainless steel No. 40 mesh strainer screen. Wye strainers shall be manufactured by Watts, Spirax Sarco, Crane, Hayward, A.W. Cash Valve, or equal.

### **2.22 Globe Valve (3" and Smaller)**

Globe valves shall be 150 lb., screwed ends, bronze construction with renewable PTFE or Buna N disc. Globe valves shall have a rising stem and union bonnet. Globe valves shall be the product of a single manufacturer and shall be Milwaukee #590, Stockham #B22, Crane #7, Powell #150, or equal.

### **2.23 Gate Valves (3" and Smaller)**

Gate valves shall be 150 lb., screwed ends, bronze construction meeting the requirements of ASTM B62. Valves shall have a rising stem, gland packed, solid wedge disc, and a union bonnet. Gate valves shall be the product of a single manufacturer and shall be Milwaukee #1151, Stockham #B-120, Crane #431, Powell #2714, or equal.

### **2.24 Small Pressure Reducing and Regulating Valves (Air and Water)**

Pressure reducing and regulating valves shall be of the spring-loaded diaphragm type with a minimum pressure rating of 250 psi, with bronze body, nickel alloy or stainless steel seat, and threaded ends. Each valve shall be furnished with built-in or separate strainer and union ends. Valves shall provide pressure relief or regulation as required by the Drawings as specified. Valves shall be manufactured by A.W. Cash Valve Mfg. Corp., Fisher Controls Company, Mueller Company, Watts Regulator Company, or equal.

### **2.25 Stainless Steel Ball Valves**

Ball valves shall be 300 lb (minimum) water working pressure, full bore, with 316 stainless steel (or better) body, ball, and stem. Ball valves shall be provided with free floating ball, reinforced PTFE (RPTFE) seats, PTFE seals, and blow-out proof stems. Ball valves 2" and smaller shall be provided with threaded ends, two-piece bodies, and stainless steel operating levers with locking device. Ball valves 3" and larger shall be provided with flanged ends, split bodies, and worm gear operator as specified herein.

Where specified for gas service (natural gas or digester gas), ball valves shall be certified fire safe to API-607, and shall be furnished with anti-static devices.

Ball valves shall be the product of a single manufacturer and shall be as manufactured by GWC Valve International, Inc., or equal.

### **2.26 Hose Bibs**

Unless specified otherwise, hose bibs shall consist of stainless steel ball valves with female threaded ends, threaded pipe nipples, and 90-degree elbows (FNPT x hose thread or FNPT x FNPT with MNPT x hose thread adaptor). Ball valve shall be installed on the pipe riser below the elbow. Pipe material shall be Type 316 stainless steel (Schedule 40 minimum) and fittings shall be Type 316 stainless steel, Class 150, unless specified otherwise on the Drawings.

### **2.27 Solenoid Valves**

Solenoid valves shall be of the size, type, and class shown and shall be designed for not less than 150 psi water-working pressure. Valves for water, air, or gas service shall have brass or bronze body with, unless specified otherwise, screwed ends, stainless steel trim and spring, PTFE or other resilient seals with material best suited for the temperature and fluid handled. Solenoid valves in corrosive environment shall have stainless steel bodies. For chemicals and all corrosive fluids, solenoid valves with PTFE bodies and springs or other suitable materials shall be used. General purpose enclosures for indoors shall be NEMA type 2. For explosion proof, corrosive, special purpose, or outdoor locations NEMA type 4, 7, 8, 9, 9E, 9F, or 9G enclosures shall be used, as applicable. All coil ratings shall be for continuous duty. For electrical characteristics see electrical drawings or specifications.



For general duty valve shall be as manufactured by Automatic Switch Co. (ASCO), Model "RED HAT", Skinner Valve Division of Honeywell, Model "LANCER", Magnatrol Valve Corporation, or equal.

For corrosive fluids valves shall be as manufactured by Valcor Engineering Corporation, Asahi/American, or equal.

## **2.28 Cast Iron Knife Gate Valves**

Knife gate valves shall be bonnetless wafer type, with resilient seat and a rated pressure of 150 psi. Gate, outside trim, bolting, stem, and yoke shall be constructed of Type 316 stainless steel. Valve body and packing gland shall be of cast iron and ductile iron with plastic coating respectively. Resilient seat shall be HYCAR and packing shall be TFE impregnated synthetic. Gates shall be finish-ground on both sides to prevent packing or seat damage. Actuator shall be handwheel. Port design shall be full round. Valves shall be manufactured by Red Valve, DeZurik, ITT Industries, or equal.

## **2.29 Stainless Steel Knife Gate Valve**

Knife gate valves shall be bonnetless wafer type, constructed entirely of Type 316 stainless steel, with resilient seat and a rated pressure of 150 psi. Valve body, gate, outside trim, packing gland, bolting, stem, and yoke shall be constructed of Type 316 stainless steel. Resilient seat shall be HYCAR and packing shall be TFE impregnated synthetic. Gates shall be finish-ground on both sides to prevent packing or seat damage. Actuator shall be handwheel. Port design shall be full round. Valves shall be manufactured by Red Valve, ITT Industries, or equal.

## **2.30 Shutoff Valves for Sulfuric Acid Solution**

### **A. Plastic Valves for PTFE Piping System**

Where PTFE piping is specified for sulfuric acid solution, valves shall be plug valves and shall be made from low-creep virgin PTFE resin conforming to ASTM D4894 Type III, Grade 1. Plug shall be of one-piece design. Unless noted otherwise, plug valves shall be two-way valves and have quarter turn manual operators for full-closed and full-open positions. Plug valves shall have female NPT connections. Plug valves shall be full port through the orifice equal to the area of Schedule 80 pipe. Pressure rating for plug valves shall be equal to or greater than the connection piping. Plug valves shall be Fluor-O-Valve as manufactured by Micromold, or approved equal.

### **B. Plastic Valves for E-CTFE Piping System**

Where ethylene-chlorotrifluoroethylene (E-CTFE, trade name Halar) piping is specified for sulfuric acid solution, valves shall be ball valves and shall be made from all new Halar resin produced by Solvay Solexis, no substitutes. Halar resin shall be free of chemical additives, fillers, property enhancers, and reinforcements. Unless noted otherwise, ball valves shall be two-way valves and have quarter turn manual operators for full-closed and full-open positions. Valves shall have true union ends for easy removal. Valves shall have elongated spigot ends for butt fusion welding. The balls shall have full size ports through the orifice and PTFE seats. Valve stems shall have double O-rings and be of blowout-

proof design. Pressure rating for ball valves shall be 150 psi (minimum). Ball valves shall be Halar ball valves as manufactured by Asahi/America, or approved equal.

C. Metal Valves

Metal valves for sulfuric acid solution shall be ball valves and shall be 150 lb (minimum), full bore, with Alloy-20 body, ball, and stem. Ball valves shall be provided with free floating ball, RPTFE seats, PTFE seals, and blow-out proof stems. Ball valves 2" and smaller shall be provided with threaded ends, top entry bodies, and stainless steel operating levers with locking device. Ball valves 3" and larger shall be provided with flanged ends, top entry bodies, and worm gear operator as specified herein.

Manufacturer shall confirm the materials specified herein are suitable for the service condition specified.

Ball valves shall be the product of a single manufacturer and shall be as manufactured by Apollo Valves, or equal.

**2.31 Diaphragm Check Valves for Sulfuric Acid Solution Piping System**

Check valves for sulfuric acid solution shall be made from all PTFE construction. Check valves shall have female NPT connections. Check valves shall utilize a flexible elastomeric disk for the sealing action. The disk shall be self centering and shall always seal in the same position. Check valves shall be installed vertically to utilize gravity to seal the disk to the seat. Pressure rating for check valves shall be 100 psi (minimum) at 75° F. Check valves shall be Series CKD compact diaphragm check valves as manufactured by Plast-O-Matic, or approved equal.

**2.32 Metal Valves for Sodium Hypochlorite Solution**

A. Shutoff Valves

Metal shutoff valves for sodium hypochlorite solution shall be ball valves and shall be 150 lb (minimum), full bore, with 3-piece bodies and of Hastelloy-C construction. Body and ends shall be constructed of Type CW12MW Hastelloy-C meeting the requirements of ASTM A494. Ball and stem shall be constructed of Hastelloy-C276 meeting the requirements of ASTM B574. Ball valves shall be provided with free floating ball, reinforced TFE seats, TFE seals, and blow-out proof stems. Ball valves 2" and smaller shall be provided with threaded ends and stainless steel operating levers with locking device. Ball valves 3" and larger shall be provided with flanged ends and worm gear operator as specified herein.

Unless otherwise shown on the Drawings or modified by Chemical Feed Systems Technical Specifications, metal ball valves for sodium hypochlorite solution shall be provided as specified herein.

Manufacturer shall confirm the materials specified herein are suitable for the service condition specified.

Ball valves shall be the product of a single manufacturer and shall be Series 99 as manufactured by Sharpe Valves, or approved equal.

B. Check Valves

Metal check valves for sodium hypochlorite solution shall be ball check valves, 150 lb (minimum), and completely of Hastelloy-C construction. Body shall be constructed of Type CW12MW Hastelloy-C meeting the requirements of ASTM A494. Ball shall be constructed of Hastelloy C276 meeting the requirements of ASTM B574. Seat shall be reinforced TFE and seals shall be TFE O-rings. Ball check valves shall be provided with a bolted cover or threaded cap for accessing the ball. Ball check valves 2" and smaller shall be provided with threaded ends. Ball check valves 3" and larger shall be provided with flanged ends.

Unless otherwise shown on the Drawings or modified by Chemical Feed Systems Technical Specifications, metal ball check valves for sodium hypochlorite solution shall be provided as specified herein.

Manufacturer shall confirm the materials specified herein are suitable for the service condition specified.

Ball check valves shall be the product of a single manufacturer and shall be Series 25 as manufactured by Sharpe Valves, or approved equal.

**2.33 Metal Shutoff Valves for Ferric Chloride Solution**

Metal valves for ferric chloride solution shall be ball valves and shall be 150 lb (minimum), full bore, with titanium body, ball, and stem. Ball valves shall be provided with free floating ball, RPTFE seats, PTFE seals, and blow-out proof stems. Ball valves 2" and smaller shall be provided with threaded ends, top entry bodies, and stainless steel operating levers with locking device. Ball valves 3" and larger shall be provided with flanged ends, top entry bodies, and worm gear operator as specified herein.

Manufacturer shall confirm the materials specified herein are suitable for the service condition specified.

Ball valves shall be the product of a single manufacturer and shall be as manufactured by Apollo Valves, or equal.

**2.34 Metal Shutoff Valves for Sodium Hydroxide Solution**

Metal valves for sodium hydroxide solution shall be ball valves and shall be 150 lb (minimum), full bore, with 316 stainless steel body, ball, and stem. Ball valves shall be provided with free floating ball, PTFE seats, PTFE seals, and blow-out proof stems. Ball valves 2" and smaller shall be provided with threaded ends, top entry bodies, and stainless steel operating levers with locking device. Ball valves 3" and larger shall be provided with flanged ends, top entry bodies, and worm gear operator as specified herein.

Manufacturer shall confirm the materials specified herein are suitable for the service condition specified.

Ball valves shall be the product of a single manufacturer and shall be as manufactured by Apollo Valves, or equal.

## 2.35 Insulation Covers

Where specified or shown on the Drawings for valves, instrumentation, and various appurtenances to be insulated, insulation shall be vitreous silicate fiber thermal insulation mat with asbestos free PTFE resin impregnated woven fiberglass fabric exterior shell. The exterior shell shall be top coated with pigmented PTFE. Insulation for piping shall be per Specification Section 15070, "Miscellaneous Piping and Appurtenances Technical Specifications". Insulation shall be suitable for outdoor installation in ambient temperature ranges of 0° to 120° F, weather proof, and UV resistant. Insulation cover shall completely cover the valve, instrumentation, or appurtenances and shall be capable of preventing process water from freezing. Insulation covers shall be provided with stainless steel lacing hooks and tie wire or stainless steel buckles with Velcro straps to provide simple installation and removal. Insulation material shall be Treo as manufactured by Tritex, or approved equal, and exterior shell shall be 1650T as manufactured by Lewco Specialty Products, Inc., or approved equal. Insulation covers shall be factory pre-fabricated covers and shall be as manufactured by Insultech, or approved equal.

## PART 3 - EXECUTION

### 3.01 Installation

All valves shall be installed in accordance with the manufacturer's recommendation, the Construction Drawings, Standard Drawings, and Contract Specifications. Valves shall be kept clean and free from dirt, earth, debris, and other deleterious materials prior to, during, and after installation and construction.

#### A. Buried Valves

Buried valves shall be firmly supported in place by compacted backfill to preclude strain on the pipe connections. Valve boxes shall be checked for centering plumb over the wrench nut and ensure that the box cover is flush with the finish grade. Interior of valve box shall be cleaned of all foreign material before installation. The valve shall be inspected in the opened and closed positions to ensure all parts are in working condition. Valve shall be installed in accordance with the Standard Drawings.

Unless otherwise specified, flange bolts shall be standard hex head machine per ASTM A325. Nuts shall be heavy hex cold-press semi-finished steel per ASTM A194-2, 2H. Threads shall be lubricated with an approved anti-seize compound. All exposed steel shall be field coated with an approved bitumastic.

#### B. Aboveground Valves

Aboveground valves shall be rigidly held in place using supports and hangers. The stem orientation shall provide ease of operation, clearance, and be approved by the Owner.

Unless otherwise specified, flange bolts shall be standard hex head machine per ASTM A325. Nuts shall be heavy hex cold-press semi-finished steel per ASTM A194-2, 2H. Threads shall be lubricated with an approved anti-seize compound.

C. Air Valves (Potable and Sewage Service)

Until placed in operation, each valve shall be protected by the use of an approved canvas or plastic bag or sack completely covering the valve and securely fastened to valve riser.

Air valve outlets, including combination air and vacuum valve outlets/inlets, shall be adequately screened to prevent entrance of foreign substances or materials. Where valves contain more than a single outlet, each outlet shall be adequately screened. Screens shall be installed in accordance with the Standard Drawings.

Where Standard Drawings have not been provided for air valve installation, each air valve outlet shall be equipped with standard weight pipe nipples, 90° street elbows (two total) of the same size as the outlet, and a screen. Each screen shall be constructed of 22 gauge stainless steel wire cloth banded with 1/2" wide stainless steel bands to a 10 gauge expanded stainless steel mesh cylinder (3/4" opening). The expanded stainless steel mesh cylinder shall be a minimum of 4" diameter and 5" long, tack welded to 10 gauge stainless steel round plates at each end. Unless specified otherwise, the standard weight pipe nipples and 90° street elbows shall be hot dipped galvanized.

D. Plastic Valves for Sulfuric Acid Solution

1. PTFE Valves

PTFE valves shall be installed in accordance with the manufacturer's printed instructions. Contractor shall obtain said instructions and have same onsite during work. All joints shall be sealed with manufacturer's recommended PTFE paste sealant. Teflon thread tape will not be acceptable. Joints shall be retightened after 24 hours (minimum) to account for creep in the piping system.

2. E-CTFE Valves

E-CTFE valves shall be installed in accordance with the manufacturer's printed instructions. Contractor shall obtain said instructions and have same onsite during work. Installers shall be certified and trained by the manufacturer for installation of the valves. Said certification shall be valid for a maximum of one (1) year from the date of original certification. Installers shall construct pipe to valve joints with manufacturer's recommended equipment and shall obtain said equipment directly from the manufacturer. Contractor shall obtain the services of the valve supplier to instruct the installers in the correct way of installing the valves.

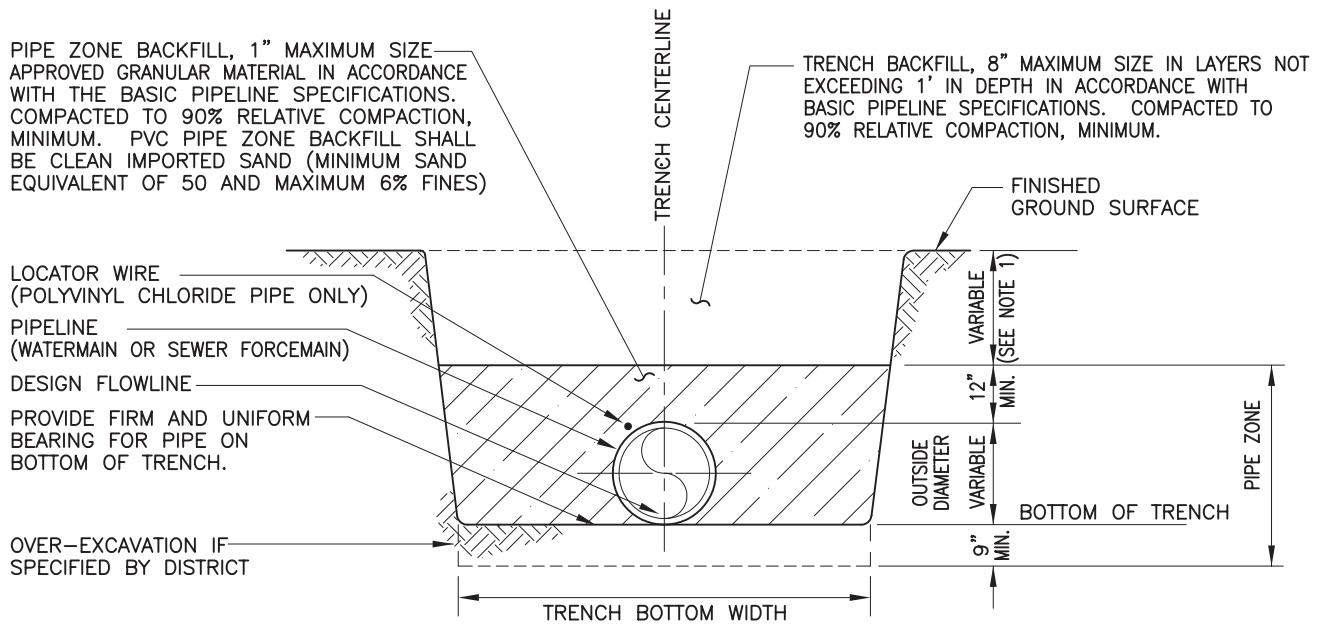
**3.02 Insulation Covers**

Contractor shall field measure all valves and appurtenances required to be insulated prior to manufacturer constructing insulation covers. Manufacturer shall provide instruction to Contractor if field altering of insulation covers is required.

**END OF SECTION**

[PAGE LEFT INTENTIONALLY BLANK]

## **STANDARD DRAWINGS**



PIPE DIAMETER (INCHES)	TRENCH BOTTOM WIDTH	
	MINIMUM (FEET)	MAXIMUM (FEET)
12 OR LESS	2.0	2.5
16	2.5	3.5

**NOTES:**

- 1) PIPELINE (WATERMAIN OR SEWER FORCEMAIN) COVER SHALL BE 42" MINIMUM UNLESS SPECIFIED OTHERWISE.
- 2) TRENCH SIDES SHALL BE SLOPED OR SHORED IN ACCORDANCE WITH CAL OSHA CONSTRUCTION SAFETY ORDERS FOR TRENCH DEPTHS 5' AND GREATER.
- 3) ALL EXISTING PAVEMENT SHALL BE SAWCUT PRIOR TO TRENCHING, AND WHERE TRENCH SIDES SLUFF AND PAVEMENT BREAKS AWAY, IT SHALL BE SAWCUT AGAIN PRIOR TO PERMANENT PAVEMENT REPAIR.
- 4) WHENEVER EXISTING CURBS ARE BEING USED FOR GRADE CONTROL, PIPELINES SHALL BE LAID ON PROJECTED CONTINUOUS SLOPES THROUGH LOCALIZED HILLS, HUMPS, AND MOUNDS SUCH AS STREET INTERSECTIONS AND CHANNEL BERMS. PIPELINE GRADES SHALL BE SELECTED TO MAINTAIN MINIMUM COVER WITH CONTINUOUS PIPELINE SLOPE. PIPELINE TRENCH DEPTHS SHALL BE INCREASED TO ACCOMPLISH SAME AND PIPELINE COVER SHALL BE INCREASED ACCORDINGLY.
- 5) FOR WATERMAINS, WHENEVER EXISTING UTILITY FACILITIES, EXCEPT SEWERS, ARE ENCOUNTERED, WATERMAIN SHALL CLEAR THEM BY 12" MINIMUM, BOTH HORIZONTALLY AND VERTICALLY. WATERMAINS SHALL CLEAR SEWERS IN ACCORDANCE WITH STANDARD DRAWING W1010. FOR SEWER FORCEMAINS, WHENEVER EXISTING UTILITY FACILITIES, EXCEPT WATERMAINS, ARE ENCOUNTERED, SEWER FORCEMAINS SHALL CLEAR THEM BY 12" MINIMUM, BOTH HORIZONTALLY AND VERTICALLY. SEWER FORCEMAINS SHALL CLEAR WATERMAINS IN ACCORDANCE WITH STANDARD DRAWING S2020. SPECIFIED CLEARANCES OR SEPARATIONS SHALL NOT BE REDUCED UNLESS ORDERED OR PERMITTED BY DISTRICT. PIPELINES (WATERMAINS AND SEWER FORCEMAINS) SHALL NOT BE IN CONTACT WITH OR REST AGAINST OTHER UTILITY FACILITIES.
- 6) WHERE BOTTOM OF EXCAVATION IS IN ROCK WHICH CANNOT BE EXCAVATED TO PROVIDE UNIFORM BEARING FOR THE PIPE, TRENCH SHALL BE OVER-EXCAVATED 9" MINIMUM AND REFILLED WITH SELECT EXCAVATED MATERIAL OR IMPORTED BACKFILL MATERIAL COMPACTED TO 90% MINIMUM RELATIVE COMPACTION.
- 7) LOCATOR WIRE FOR POLYVINYL CHLORIDE PIPE SHALL BE INSULATED 14 GAUGE COPPER WIRE. IT SHALL BE CONTINUOUS ALONG THE PIPELINE, LOOPED AROUND THE PIPE AT EACH JOINT, AND LOOPED INTO VALVE BOXES WITHIN 12" OF THE SURFACE AND WITH 3' OF SLACK.



APPROVED:  
ASSISTANT GENERAL MANAGER/  
DISTRICT ENGINEER

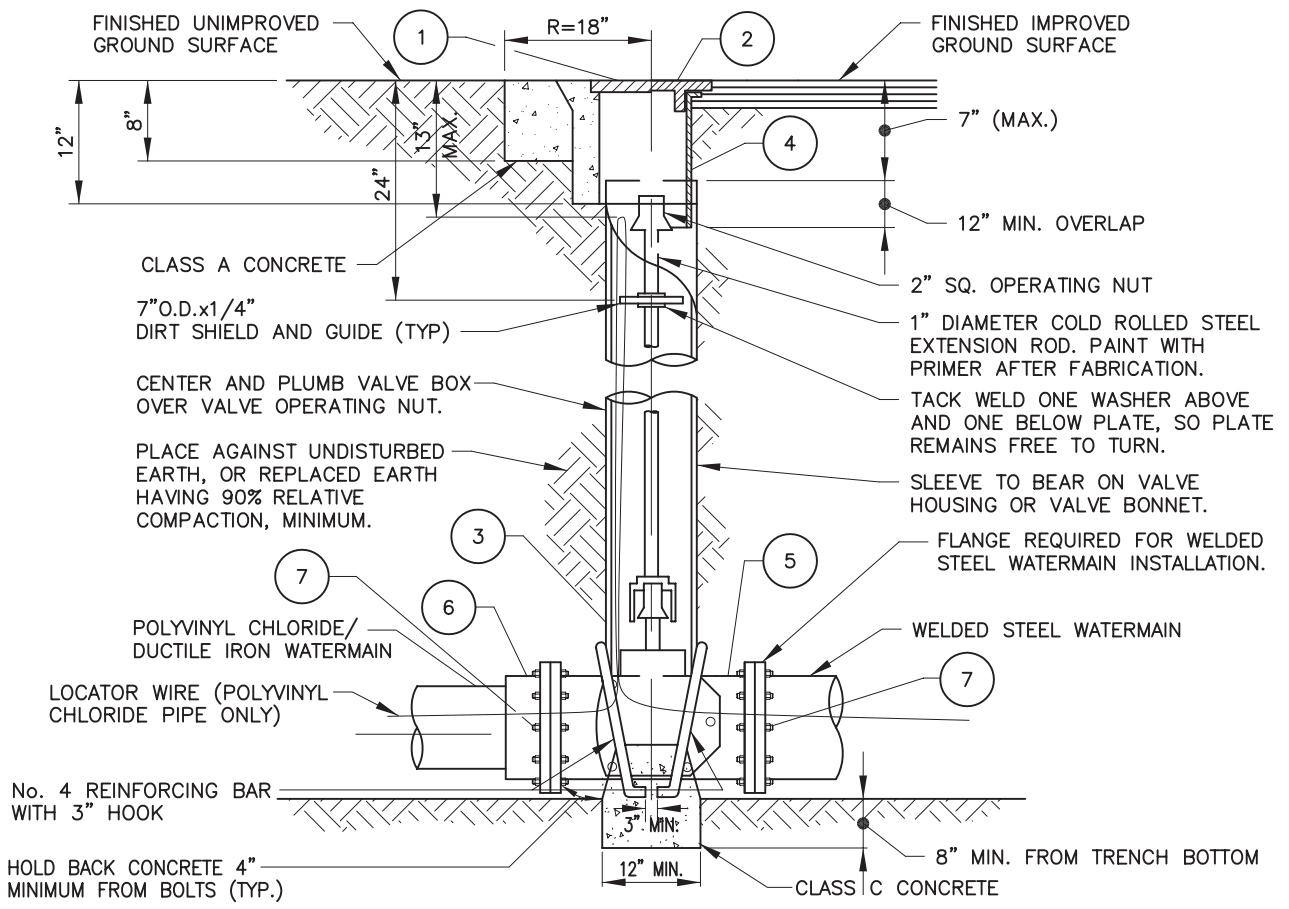
DATE: JANUARY 2005

RUBIDOUX COMMUNITY SERVICES DISTRICT  
PIPELINE TRENCH

STANDARD DRAWING

G20

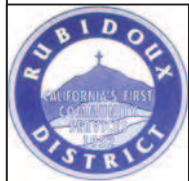




ITEM	DESCRIPTION
1	TRAFFIC BOX COVER FOR UNIMPROVED SURFACE (TRIANGULAR COVER WITH FRAME) – COVER MARKED "RCS D".
2	TRAFFIC BOX COVER FOR IMPROVED SURFACE (CIRCULAR COVER WITHOUT FRAME) – COVER MARKED "RCS D".
3	VALVE BOX EXTENSION, 8" I.D. SDR 35 POLYVINYL CHLORIDE PIPE.
4	18 GAUGE x 18" LONG GALVANIZED STEEL SLEEVE WITH 1-1/2" OVERLAP AND 1/2" LIP (FLARE) ON ONE END.
5	FLANGED BUTTERFLY VALVE, SHORT BODY. VALVE STEM SHALL TURN COUNTER-CLOCKWISE TO OPEN. VALVE OPERATORS SHALL BE PLACED ON STREET OR EASEMENT CENTERLINE SIDE OF VALVE.
6	FLANGE BY TYTON JOINT ADAPTER REQUIRED FOR POLYVINYL CHLORIDE OR DUCTILE IRON WATERMAIN.
7	BOLTS SHALL BE STANDARD HEX HEAD MACHINE PER ASTM A325. NUTS SHALL BE HEAVY HEX COLD-PRESSED SEMI-FINISHED STEEL PER ASTM A194-2, 2H. THREADS SHALL BE LUBRICATED WITH AN APPROVED ANTI-SEIZE COMPOUND. ALL EXPOSED STEEL SHALL BE FIELD COATED WITH AN APPROVED BITUMASTIC.

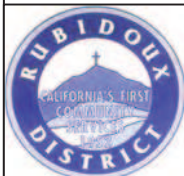
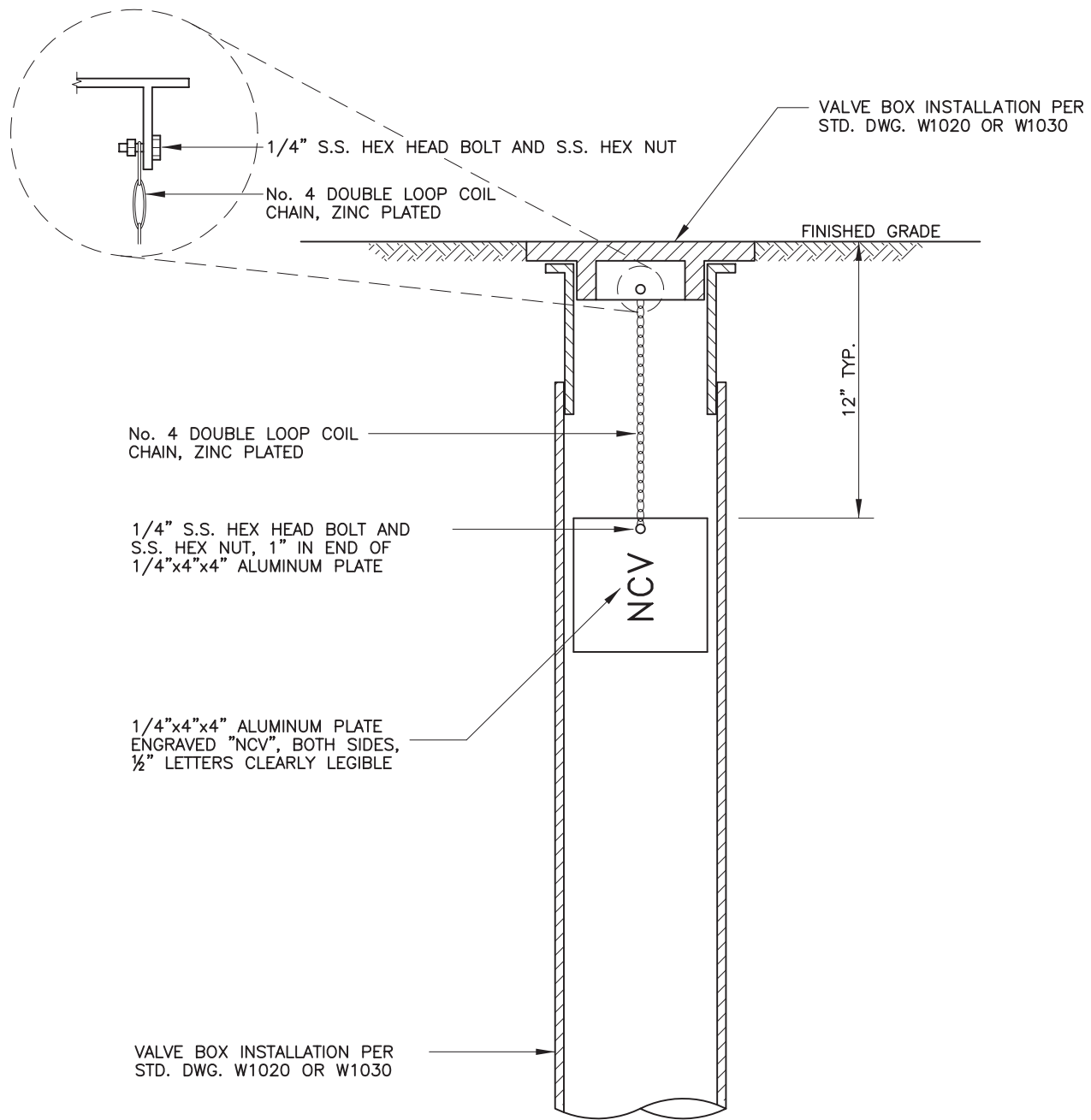
**NOTES:**

- EXTENSION ROD REQUIRED WHENEVER TOP OF VALVE IS 3' OR MORE BELOW FINISHED GROUND SURFACE. REQUIRED LENGTH FOR EXTENSION ROD SHALL BE DETERMINED BY FIELD MEASUREMENT. EXTENSION ROD OPERATOR NUT SHALL BE 18" BELOW FINISHED GRADE. EXTENSION ROD SHALL BE SECURED TO VALVE OPERATING NUT BY WELDING A BEAD ON THE INSIDE OF THREE WALLS OF THE EXTENSION NUT CAP.
- CHISEL 1-1/2" MINIMUM "V" ON ADJACENT CURB FACE WITH APPROXIMATE DISTANCE TO VALVE BOX, 2 LOCATIONS.
- VALVE BOX COVERS SHALL BE PAINTED BLUE, IN ACCORDANCE WITH THE BASIC PAINTING SPECIFICATIONS.
- LOCATOR WIRE FOR POLYVINYL CHORIDE PIPE SHALL BE INSULATED 14 GAUGE COPPER WIRE. IT SHALL BE CONTINUOUS ALONG THE PIPELINE, LOOPED AROUND THE PIPE AT EACH JOINT, AND LOOPED INTO VALVE BOXES WITHIN 13" OF THE SURFACE AND WITH 3' OF SLACK.



APPROVED:  
 ASSISTANT GENERAL MANAGER/  
 DISTRICT ENGINEER  
 DATE: JANUARY 2005

RUBIDOUX COMMUNITY SERVICES DISTRICT  
 BUTTERFLY VALVE INSTALLATION  
 STANDARD DRAWING W1030



APPROVED:  
 ASSISTANT GENERAL MANAGER/  
 DISTRICT ENGINEER

DATE: JANUARY 2005

RUBIDOUX COMMUNITY SERVICES DISTRICT  
 NORMALLY CLOSED  
 VALVE BOX INSTALLATION

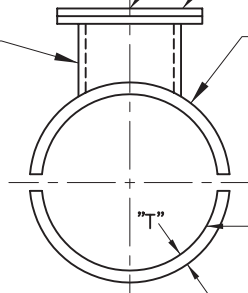
STANDARD DRAWING

W1040

TYPICAL BUTT-STRAP WITH HANDHOLE

LOCATION FOR 1 HANDHOLE  
(6" DIAMETER-16" DIAMETER  
WATERMAIN)

6" DIAMETER  
STANDARD WEIGHT  
CEMENT MORTAR  
LINED NIPPLE



END VIEW

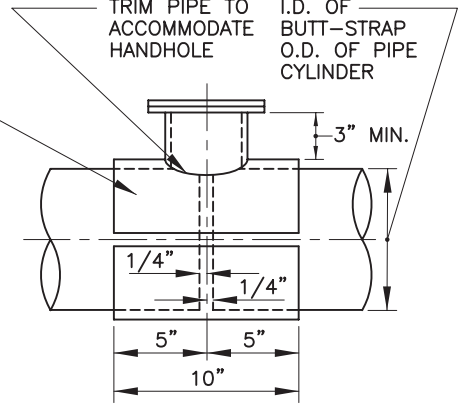
FLANGE AND BLIND FLANGE  
PER BASIC PIPELINE  
SPECIFICATIONS

FIELD APPLY COATING, SAME  
AS BALANCE OF PIPELINE, TO  
ALL STEEL EXCEPT FLANGES  
(REINFORCED WITH 2"x4"  
13 GAGE WELDED WIRE MESH  
FOR CEMENT MORTAR COATING)

FIELD APPLY LINING, SAME AS  
BALANCE OF PIPELINE

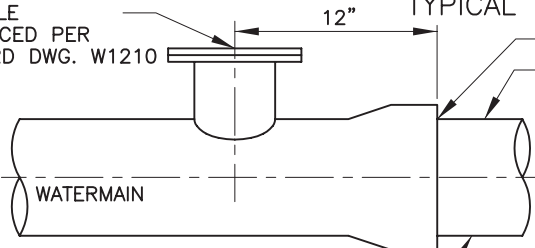
"T"=3/16" PLATE FOR 6" DIAMETER-  
16" DIAMETER PIPE.

TRIM PIPE TO  
ACCOMMODATE  
HANDHOLE



SIDE VIEW

HANDHOLE  
REINFORCED PER  
STANDARD DWG. W1210



TYPE I CUT-TO-FIT

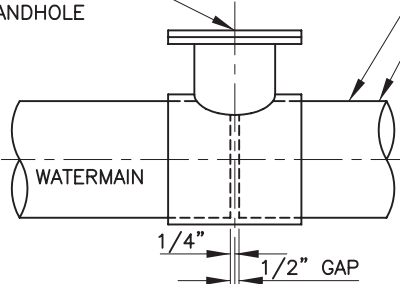
TYPICAL CUT-TO-FIT DETAILS

LAP WELD BELL  
CUT-TO-FIT. HOLD COATING AS  
REQUIRED FOR CUT-TO-FIT,  
THEN FIELD APPLY TO  
COMPLETE JOINT



LAP WELD BELL  
TYPE III CUT-TO-FIT

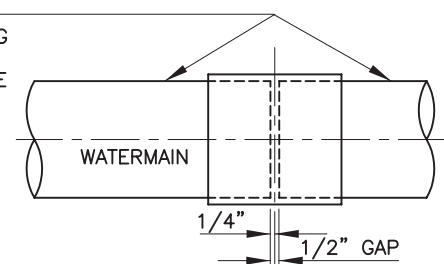
SPLIT BUTT-STRAP  
WITH HANDHOLE



TYPE II CUT-TO-FIT

TYPE I OR II CUT-TO-FIT  
OPTIONAL TO THE CONTRACTOR,  
UNLESS OTHERWISE SPECIFIED

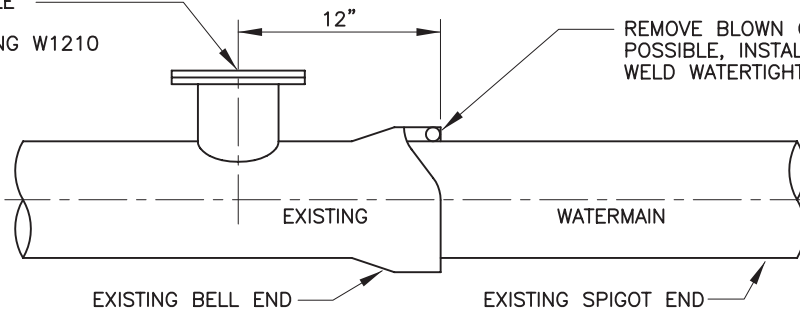
CUT-TO-FIT ON EITHER PIPE  
OR AS SPECIFIED. HOLD COATING  
AS REQUIRED FOR CUT-TO-FIT,  
THEN FIELD APPLY TO COMPLETE  
JOINT



TYPE IV CUT-TO-FIT

TYPICAL JOINT REPAIR DETAIL  
(FIELD CONSTRUCTION)

INSTALL HANDHOLE  
REINFORCED PER  
STANDARD DRAWING W1210



REMOVE BLOWN OUT GASKET WHERE  
POSSIBLE, INSTALL FILLER ROD AND  
WELD WATERTIGHT



APPROVED:  
ASSISTANT GENERAL MANAGER/  
DISTRICT ENGINEER

DATE: JANUARY 2005

RUBIDOUX COMMUNITY SERVICES DISTRICT  
WELDED STEEL PIPE CUT-TO-FIT  
AND JOINT REPAIR DETAIL

STANDARD DRAWING W1220

**APPENDIX A**

**APPROVED MANUFACTURED MATERIALS**

## **SECTION VII**

### **LIST OF APPROVED MANUFACTURED MATERIALS**

#### **A. GENERAL**

The Rubidoux Community Services District maintains a list of Approved Manufactured Materials for both water and sewer system improvements. Only those indicated on the most current list have been approved for use within the District. It is the sole responsibility of the user to assure that the product proposed for use is currently approved. The District may require installation of a different product in special circumstances.

Manufacturers may request approval by (1) making a formal written request for approval, (2) providing detailed drawings and technical information on their product, and (3) providing a non-returnable sample of the product for District use. Documentation of use by other local water purveyors (with phone numbers and contact names) will assist the District in evaluating such requests. The District will evaluate the product and make a determination within 90 days. If determined as being suitable for District use, the product will be placed on this approved Manufactured Materials list. Inventory of spare parts is a consideration. All products shall always comply with District Standard Specifications.

#### **B. LIST OF APPROVED MANUFACTURED MATERIALS**

##### 1. Pipe

- a. PVC Pipe (AWWA C-900)  
*JM Pipe, PW Pipe, VinylTech*
- b. Ductile Iron Pipe (AWWA C-151)  
*Pacific States, Tyler Pipe, Union Foundry, U.S. Pipe*
- c. Welded Steel Pipe (AWWA C-200)  
*Ameron, Kelly Pipe, Northwest, West Coast Pipe Linings*
- d. Vitrified Clay Sewer Pipe  
*Pacific Clay Products, Mission Clay Products, Gladding McBean*

##### 2. Valves, Fire Hydrants and Related Products

- a. Butterfly Valves  
*Pratt, DeZurik*
- b. Gate Valves  
*American AVK, American Flow Control, Clow, Mueller*
- c. Air Valves  
*APCO (143C or 145C), Crispin (UL10 or UL20), Val-Matic (201C or 202C)*

- d. Eccentric Plug Valves (Force Mains)  
*Clow, DeZurik, Val-Matic*
  - e. Fire Hydrants  
*AVK (24-150-40-000 or 24-150-50-000), Jones (J-4040D or J-4060D), Clow (850 or 860)*
  - f. Fire Hydrant Break-off Check  
*Long Beach (LB-400), Clow (#40)*
  - g. Traffic Box Valve Cover (Stamped RCSD)  
*Unimproved: Brooks (4TT), Southbay Foundry (SBTT)  
Improved: Southbay Foundry*
  - h. Valve Box Extension  
*Brooks*
  - i. Gaskets, Ring Flange (Non-Asbestos)  
*Garlock, Klinger*
  - j. Nuts and Bolts (5/8" to 1-1/2" diameter U.S. only A325)  
*Nucore, Rosenberg*
  - k. Air Valve Screen  
*Cebe Products, Knox (M16-8)*
  - l. Reduced Pressure Backflow Devices  
*Any device approved by USC Cross-Connection Foundation and California Department of Health Services Office of Drinking Water (Latest List)*
  - m. Double Detector Check Assemblies  
*Febco (806YD), Watts (709DCDA), Hersey, Ames*
3. Water Service Materials
- a. Service Saddle (double strap, bronze 1pt)  
*Ford (S91 or 202B), Jones (J-979 or J-996), Mueller (H-13483 or H-16116)*
  - b. Corporation Stops  
*Ford (FB1100-7-G), Jones (J-1957-SG), Mueller (H-25028 or H-15023)*
  - c. Type K Soft Copper Tubing  
*Cerro, Halsead, Mueller, or Streamline*

- d. 1" Angle Meter Stops  
*Ford (KV43-444W-G), Jones (J-4201-SG), Mueller (H-14258)*
- e. 2" Angle Meter Stops  
*Ford (Ball Valve, BFA13-777W), Jones (Ball Valve, J-1974-W), Mueller (Ball Valve, B-24286)*
- f. Meter Boxes (with concrete base plate and polymer cover with quick read port)  
*Armorcast, J&R, or Brooks*
- g. Linesetters (5/8 x 3/4", 3/4", or 1")  
*Ford (LSVBG-95040-016), Jones (J05CCTSFIPAMV04AH)*

4. Miscellaneous Materials

- a. Flange Coupling Adapters  
*Tyler, U.S. Pipe, Smith-Blair, or Romac*
- b. Connector Couplings (with Stainless Steel nuts and bolts and epoxy coated, interior and exterior, 12 mils min)  
*Romac (501), Baker*
- c. Standard Galvanized Pipe  
*Frontier 1, Stockton, Union Steel*
- d. Pipe Tape Wrap  
*Protecto Wrap (200A)*
- e. Sample Stations  
*John C. Kupferle Foundry (Model No. 88 Eclipse)*
- f. Manhole Frame and Covers  
*Southbay Foundry, Alhambra Foundry, Neenah*
- g. Grease Interceptors/Sand Oil Separators  
*Pyramid Precast, Nottingham, Jensen*

THIS PAGE INTENTIONALLY BLANK



**APPENDIX B**

**GEOTECHNICAL INVESTIGATION REPORT  
PREPARED BY CONVERSE CONSULTANTS  
DATED MAY 22, 2020**



**Converse Consultants**

Geotechnical Engineering  
Environmental & Groundwater Science  
Inspection & Testing Services

# GEOTECHNICAL INVESTIGATION REPORT

WATER TREATMENT SYSTEM FOR WELLS NO 1A AND 18  
Near the Intersection of 34<sup>th</sup> Street and Crestmore Drive  
City of Riverside, Riverside County, California

CONVERSE PROJECT No. 20-81-155-01



*Prepared For:*

**HAZEN AND SAWYER**

7700 Irvine Center Drive, Suite 200  
Irvine, CA 92618

*Presented By:*

**CONVERSE CONSULTANTS**

2021 Rancho Drive, Suite 1  
Redlands, CA 92373  
909-796-0544

May 22, 2020



# Converse Consultants

Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 22, 2020

Mr. Tori Yokoyama, PE  
Senior Associate  
Hazen and Sawyer  
7700 Irvine Center Drive, Suite 200  
Irvine, CA 92618

**Subject: GEOTECHNICAL INVESTIGATION REPORT**  
**Water Treatment System for Wells No 1A and 18**  
Rubidoux Community Services District  
Near the Intersection of 34<sup>th</sup> Street and Crestmore Drive  
City of Riverside, Riverside County, California  
Converse Project No. 20-81-155-01

Dear Mr. Yokoyama:

Converse Consultants (Converse) is pleased to submit this geotechnical investigation report to assist with the design and construction of the Water Treatment System for Wells No. 1A & 18 (hereinafter the "Project"), located near the intersection of 34<sup>th</sup> Street and Crestmore Drive in the City of Riverside, Riverside County, California. This report was prepared in accordance with our proposal dated April 17, 2020 and your Subcontract Agreement for Professional Services dated April 27, 2020.

Based upon our field investigation, laboratory data, and analyses, the proposed project is considered feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into the design and construction of the project.

Based on similar subsurface soil conditions and distance between these 2 wells, recommendations (earthwork, design and construction) provided in this report will be applicable for both well sites.

We appreciate the opportunity to be of service to Hazen and Sawyer. Should you have any questions, please do not hesitate to contact us at 909-796-0544.

## CONVERSE CONSULTANTS

Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer

Dist.: 4/Addressee  
HSQ/RG/ZA/kvg/MS

### PROFESSIONAL CERTIFICATION

This report has been prepared by the following professionals whose seals and signatures appear herein.

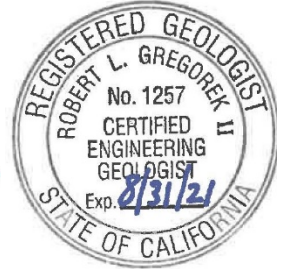
The findings, recommendations, specifications and professional opinions contained in this report were prepared in accordance with the generally accepted professional engineering and engineering geologic principle and practice in this area of Southern California. We make no other warranty, either expressed or implied.

---

Zahangir Alam, PhD, EIT  
Senior Staff Engineer

---

Robert L. Gregorek II, PG, CEG  
Senior Geologist



---

Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer



## EXECUTIVE SUMMARY

The following is a summary of our geotechnical investigation, conclusions and recommendations, as presented in the body of this report. Please refer to the appropriate sections of the report for complete conclusions and recommendations. In the event of a conflict between this summary and the report, or an omission in the summary, the report shall prevail.

- Well No. 18 site is located at 5245 34<sup>th</sup> Street in the City of Riverside, Riverside County, California. The site is bounded to the north by vacant land, to the south by 34<sup>th</sup> Street, to the west by residential houses and to the east by residential houses and vacant land. The site is presently occupied with Well No. 18 and associated equipment and equipment building. The site is surrounded by a perimeter wall. The proposed facility will be located northeast of the existing equipment building. Presently, most of proposed location is covered with gravel. The approximate elevation of the proposed site is 790 feet above mean sea level (amsl).
- Well No. 1A site is located at 5200 34<sup>th</sup> Street in the City of Riverside, Riverside County, California. The site is bounded to the north by 34<sup>th</sup> Street, to the south and west by residential houses and to the east by Crestmore Drive. The site is presently occupied with Well No. 1A and associated equipment and equipment building. The site is surrounded by a fence. The proposed facility (some part) will be located northeast corner of the site (outside of the fence). Presently, the proposed location is vacant and covered with dirt. The approximate elevation of the proposed site is 787 feet above mean sea level (amsl).
- Based on information provided by Alejandro Quiroz with Hazen and Sawyer, the water treatment system will be supported on an approximately 77 feet x 34 feet concrete pad with thickness approximately of 2.5 feet. The system consists of 6 ion-exchange vessels, two cartridge filters, a 1,000-gallon chemical storage tank, a chemical metering skid, and a canopy structure over chemical tank. All the equipment, except for the chemical storage tank, will be anchored directly to the concrete pad. The chemical storage tank will be raised on a 6-inch thick equipment pad. All piping on the slab will be above ground and there will be no penetrations through the slab. An existing well located within the proposed slab area at the Well No. 18 site will be demolished along with its associated above ground piping. Associated improvements also include underground piping. Some existing underground pipelines will be relocated and/or demolished as needed.
- One exploratory boring (BH-01) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No. 1A site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 21.5 feet below existing ground surface (bgs).





- One exploratory boring (BH-02) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No.18 site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 51.5 feet below existing ground surface (bgs).
- The subsurface soils at the sites encountered in the borings at various depths consists primarily of a mixture of sand, silt, clay and gravel up to 2 inches in largest dimension that. Inter-layered sand and silty sand was observed in boring BH-01 within the 7.5 feet bgs. Although soil at depth between 5 and 10 feet classified as sand with silt, decrease in sand content was observed at a depth of 7.5 feet bgs. Approximately 2.5 feet of artificial fill was encountered in boring BH-02.
- Groundwater was not encountered during the investigation to the maximum explored depth of 21.5 feet bgs in boring BH-01. Groundwater was encountered at a depth of 32.3 feet bgs during the investigation to the maximum explored depth of 51.5 feet bgs in BH-02. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in each site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation or irrigation events.
- The project sites are not located within a currently designated State of California or San Bernardino County Earthquake Fault Zone. There are no known active faults projecting toward or extending across the project sites. The potential for surface rupture resulting from the movement of nearby major faults is not known with certainty but is considered low.
- The potential for earthquake-induced liquefaction, lateral spreading, landsliding, or flooding at the sites is considered low.
- The expansion indices (EI) of the tested samples were 0.0 for both sites, corresponding to very low expansion potential. The collapse at a depth of 2.5 feet soil at the Well No. 18 site was 1.3 percent, indicating slight collapse potential.
- The sulfate contents of the sampled soils correspond to American Concrete Institute (ACI) exposure category S0 for these sulfate concentrations. No concrete type restrictions are specified for exposure category S0. A minimum compressive strength of 2,500 psi is recommended. The chloride contents of the sampled soils correspond to American Concrete Institute (ACI) exposure category C1 (concrete is exposed to moisture, but not to external sources of chlorides). For exposure category C1, ACI provides concrete compressive strength of at least 2,500 psi and a maximum chloride content of 0.3 percent.
- The measured value of the minimum electrical resistivity of the sample when saturated were 4,437 and 2,209 ohm-cm for the site. This indicates that the soils tested are moderately corrosive to ferrous metals in contact with the soil. Converse



does not practice in the area of corrosion consulting. If needed, a qualified corrosion consultant should provide appropriate corrosion mitigation measures for any ferrous metals in contact with the site soils.

- Prior to the start of construction, all existing underground utilities and appurtenances should be located at the project site. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as to not cause loss of bearing and/or lateral support of existing utilities.
- Some existing underground pipelines will be relocated and/or demolished as needed. All debris, deleterious material, artificial fill and demolished materials should be removed from the site.
- The surface and subsurface soil materials at the sites are expected to be excavatable by conventional heavy-duty earth moving and trenching equipment.
- Excavated on-sites earth materials cleared of deleterious matter can be moisture conditioned and re-used as compacted fill.
- Soils below the concrete pad should be overexcavated based on Table No. 4 *Overexcavation Depths*. The overexcavation below the concrete pad should be uniform. The overexcavation should extend to at least 3 feet beyond the footprint of the concrete pad.
- All fill placed at the project sites should be compacted to at least 90 percent of the laboratory maximum dry densities as determined by ASTM Standard D1557 test method, unless a higher compaction is specified herein.
- Footings should be at least 18 inches in width and embedded to at least 18 inches below the lowest adjacent grade. The footing dimensions and reinforcement should be based on structural design. Continuous and isolated footings can be designed based on an allowable net bearing capacity of 2,000 psf.
- Mat foundation recommendations are presented in the Section 10.2 *Mat Foundation Design Parameters*.
- The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be 1 inch or less. The differential settlement resulting from static loads is anticipated to be 0.5 inches or less over a horizontal distance of 40 feet.
- Our analysis of the potential dynamic settlement is presented in Appendix C, *Liquefaction and Settlement Analysis*. We estimate that the project sites have the potential for up to 1.4 inches of dry seismic settlement with liquefaction induced



settlement of up to 0.2 inches during a large earthquake. Based on the subsurface conditions, we anticipate the total dynamic settlement will likely be uniform. Therefore, dynamic differential settlement of the site is considered nominal.

- Lateral earth pressures and pipe design parameters are presented in the text of this report.
- Recommendations for temporary sloped excavations are provided in the text of this report.

Based on our investigation, it is our professional opinion that the project is suitable for construction of the project, provided the findings, conclusions and recommendations presented in this geotechnical investigation report are considered in the planning, design and construction of the project.





**TABLE OF CONTENTS**

**1.0 INTRODUCTION----- 1**

**2.0 PROJECT DESCRIPTION ----- 1**

**3.0 SITE DESCRIPTION----- 1**

**4.0 SCOPE OF WORK ----- 3**

    4.1 DOCUMENT REVIEW ----- 3

    4.2 PROJECT SET-UP ----- 4

    4.3 SUBSURFACE EXPLORATION ----- 4

    4.4 LABORATORY TESTING ----- 4

    4.5 ANALYSIS AND REPORT PREPARATION ----- 5

**5.0 LABORATORY TEST RESULTS ----- 5**

    5.1 PHYSICAL TESTING----- 5

    5.2 CHEMICAL TESTING - CORROSIVITY EVALUATION----- 6

**6.0 SUBSURFACE CONDITIONS ----- 7**

    6.1 SUBSURFACE PROFILE ----- 7

    6.2 GROUNDWATER ----- 7

    6.3 EXPANSIVE SOILS----- 8

    6.4 COLLAPSE POTENTIAL----- 8

    6.5 EXCAVATABILITY ----- 9

    6.6 SUBSURFACE VARIATIONS----- 9

**7.0 ENGINEERING GEOLOGY----- 9**

    7.1 REGIONAL GEOLOGY ----- 9

    7.2 LOCAL GEOLOGY----- 10

**8.0 FAULTING AND SEISMICITY----- 10**

    8.1 FAULTING----- 10

    8.2 CBC SEISMIC DESIGN PARAMETERS ----- 11

    8.3 SECONDARY EFFECTS OF SEISMIC ACTIVITY ----- 12

**9.0 EARTHWORK RECOMMENDATIONS----- 14**

    9.1 GENERAL ----- 14

    9.2 REMEDIAL GRADING ----- 14

    9.3 ENGINEERED FILL ----- 15

    9.4 COMPACTED FILL PLACEMENT ----- 15

    9.5 SITE DRAINAGE----- 16

    9.6 UTILITY TRENCH BACKFILL ----- 16

**10.0 DESIGN RECOMMENDATIONS ----- 19**

    10.1 SHALLOW FOUNDATION DESIGN PARAMETERS----- 19

    10.2 MAT FOUNDATION DESIGN PARAMETERS ----- 20



10.3	LATERAL EARTH PRESSURES AND RESISTANCE TO LATERAL LOADS-----	20
10.4	SETTLEMENT-----	21
10.5	SOIL CORROSIVITY -----	22
<b>11.0</b>	<b>CONSTRUCTION RECOMMENDATIONS-----</b>	<b>23</b>
11.1	GENERAL-----	23
11.2	TEMPORARY SLOPED EXCAVATIONS-----	23
<b>12.0</b>	<b>GEOTECHNICAL SERVICES DURING CONSTRUCTION -----</b>	<b>24</b>
<b>13.0</b>	<b>CLOSURE-----</b>	<b>24</b>
<b>14.0</b>	<b>REFERENCES -----</b>	<b>26</b>

### FIGURES

	Following Page No.
Figure No. 1, Approximate Project Location Map .....	1
Figures No. 2a and 2b, Approximate Boring Locations Map .....	4

### TABLES

Table No. 1, Collapse Potential Values .....	9
Table No. 2, Summary of Regional Faults .....	11
Table No. 3, CBC Seismic Design Parameters .....	12
Table No. 4, Overexcavation Depths.....	14
Table No. 5, Recommended Foundation Parameters .....	19
Table No. 6, Active and At-Rest Earth Pressures.....	21
Table No. 7, Correlation Between Resistivity and Corrosion .....	22
Table No. 8, Slope Ratios for Temporary Excavations .....	24

### APPENDICES

Appendix A.....	<i>Field Exploration</i>
Appendix B.....	<i>Laboratory Testing Program</i>
Appendix C.....	<i>Liquefaction and Settlement Analysis</i>



## 1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed for Wells No. 1A & 18 (hereinafter the “Project”), located near the intersection of 34<sup>th</sup> Street and Crestmore Drive in the City of Riverside, Riverside County, California. The project location is shown in Figure No. 1, *Approximate Project Location Map*.

The purposes of this investigation were to determine the nature and engineering properties of the subsurface soils, and to provide design and construction recommendations for the project.

This report is prepared for the project described herein and is intended for use solely by Hazen and Sawyer and their authorized agents for design purposes. It should not be used as a bidding document but may be made available to the potential contractors for information on factual data only. For bidding purposes, the contractors should be responsible for making their own interpretation of the data contained in this report.

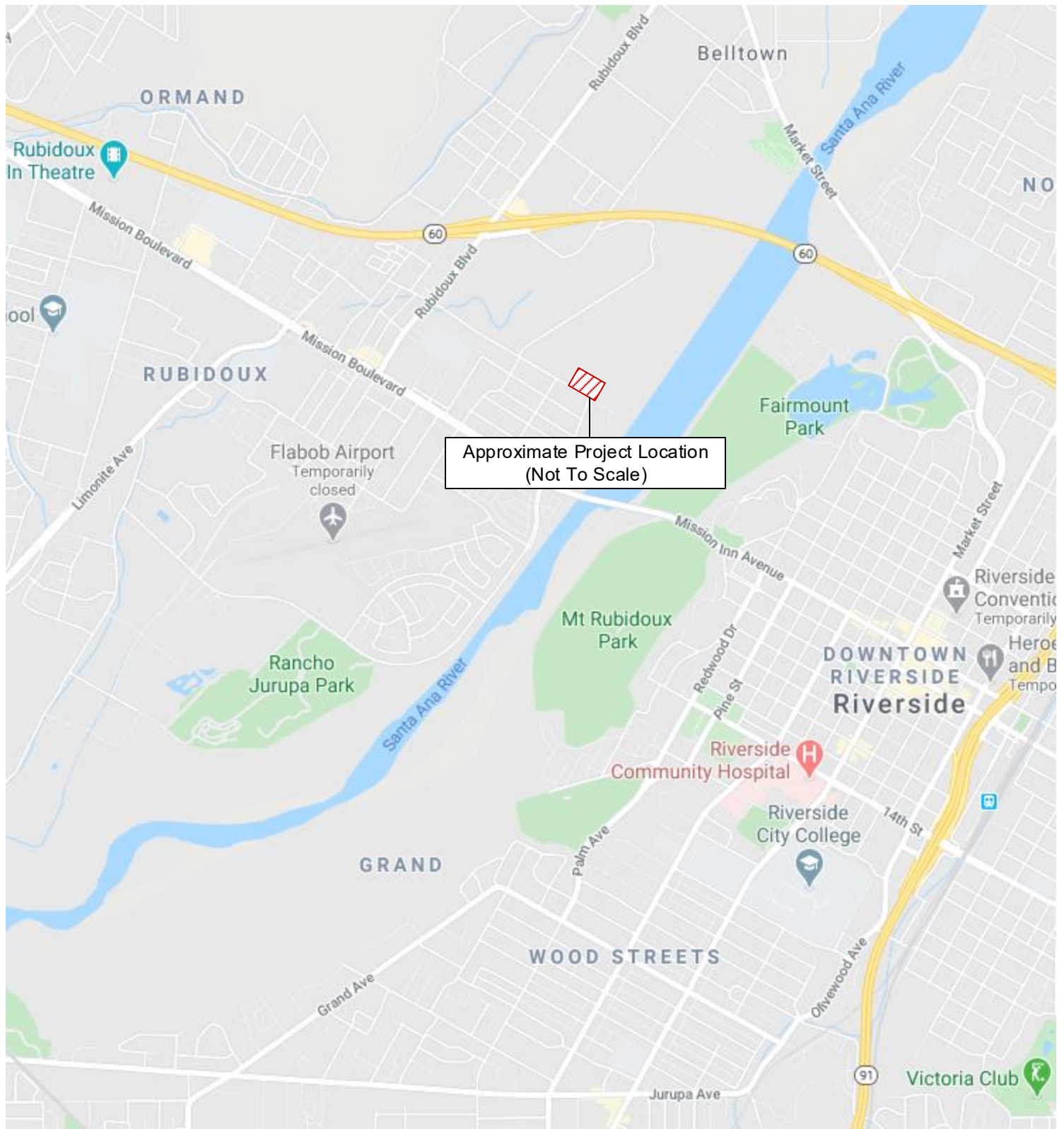
## 2.0 PROJECT DESCRIPTION

Based on information provided by Alejandro Quiroz with Hazen and Sawyer, the water treatment system will be supported on an approximately 77 feet x 34 feet concrete pad with thickness approximately of 2.5 feet. The system consists of six ion-exchange vessels, two cartridge filters, a 1,000-gallon chemical storage tank, a chemical metering skid, and a canopy structure over chemical tank. All the equipment, except for the chemical storage tank, will be anchored directly to the concrete pad. The chemical storage tank will be raised on a 6-inch thick equipment pad. All piping on the slab will be above ground and there will be no penetrations through the slab. An existing well located within the proposed slab area at the Well No. 18 site will be demolished along with its associated above ground piping. Associated improvements also include underground piping. Some existing underground pipelines will be relocated and demolished as needed.

## 3.0 SITE DESCRIPTION

Well No. 18 site is located at 5245 34<sup>th</sup> Street in the City of Riverside, Riverside County, California. The site is bounded to the north by vacant land, to the south by 34<sup>th</sup> Street, to the west by residential houses and to the east by residential houses and vacant land. The site is presently occupied with Well No. 18 and its equipment and equipment building. The site is surrounded by a perimeter wall. The proposed facility will be located northeast of the existing equipment building. Presently, most of proposed location is covered with gravel. The approximate elevation of the proposed site is 790 feet above mean sea level (amsl). Photograph No. 1 depicts the present site conditions.





## Approximate Project Location Map



Project: Water Treatment System for Wells No 1A and 18  
 Location: Near the Intersection of 34<sup>th</sup> Street and Crestmore Drive  
 City of Riverside, Riverside County, California  
 For: Hazen and Sawyer

Project No.  
 20-18-155-01



Well No. 1A site is located at 5200 34<sup>th</sup> Street in the City of Riverside, Riverside County, California. The site is bounded to the north by 34<sup>th</sup> Street, to the south and west by residential houses and to the east by Crestmore Drive. The site is presently occupied with Well No. 1A and its equipment and equipment building. The site is surrounded by a fence. The proposed facility (some part) will be located northeast corner of the site (outside of the fence). Presently, the proposed location is vacant and covered with dirt. The approximate elevation of the proposed site is 787 feet above mean sea level (amsl). Photograph No. 2 depicts the present site conditions.



*Photograph No. 1: Present proposed site conditions at Well No. 18, facing southwest*







*Photograph No. 2: Present proposed site conditions at Well No. 1A, facing south*

## **4.0 SCOPE OF WORK**

The scope of this investigation included project set-up, subsurface exploration, laboratory testing, engineering analysis, and preparation of this report, as described in the following sections.

### **4.1 Document Review**

We reviewed geologic maps, aerial photographs, groundwater data, and other information pertaining to the project area to assist in the evaluation of geologic hazards that may be present. Besides, pertinent information (the documents cited in Section 14, *References*) were used to understand the subsurface conditions and plan the investigation for this project.



## 4.2 Project Set-up

The project set-up consisted of the following tasks.

- Coordinated with you and the District for the site (Well No. 18) access.
- Conducted a field reconnaissance and marked the boring locations in the presence of Lee Bugbee (District representative) such that the drill rig access to all locations was available.
- Informed Lee Bugbee (District representative) to mark on-sites existing underground utilities.
- Notified Underground Service Alert (USA) at least 48 hours prior to drilling to clear the boring locations of any conflict with existing underground utilities.
- Engaged a California-licensed driller to drill exploratory borings.

## 4.3 Subsurface Exploration

One exploratory boring (BH-01) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No. 1A site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 21.5 feet below existing ground surface (bgs).

One exploratory boring (BH-02) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No. No 18 site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 51.5 feet below existing ground surface (bgs).

Approximate boring locations are indicated in Figures No. 2a and 2b, *Approximate Boring Location Map*. For a description of the field exploration and sampling program, see Appendix A, *Field Exploration*.

## 4.4 Laboratory Testing



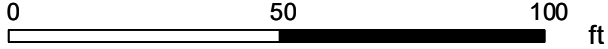
Representative soil samples of the project sites were tested in the laboratory to aid in the soils classification and to evaluate the relevant engineering properties of the soils. These tests included the following.

- *In-situ* moisture contents and dry densities (ASTM D2216 and ASTM D2937)
- Expansion index (ASTM D4829)
- Collapse potential (ASTM D4546)
- Soil corrosivity (California Tests 643, 422, and 417)
- Grain size distribution (ASTM D6913)
- Maximum dry density and optimum-moisture content (ASTM D1557)
- Direct shear (ASTM D3080)







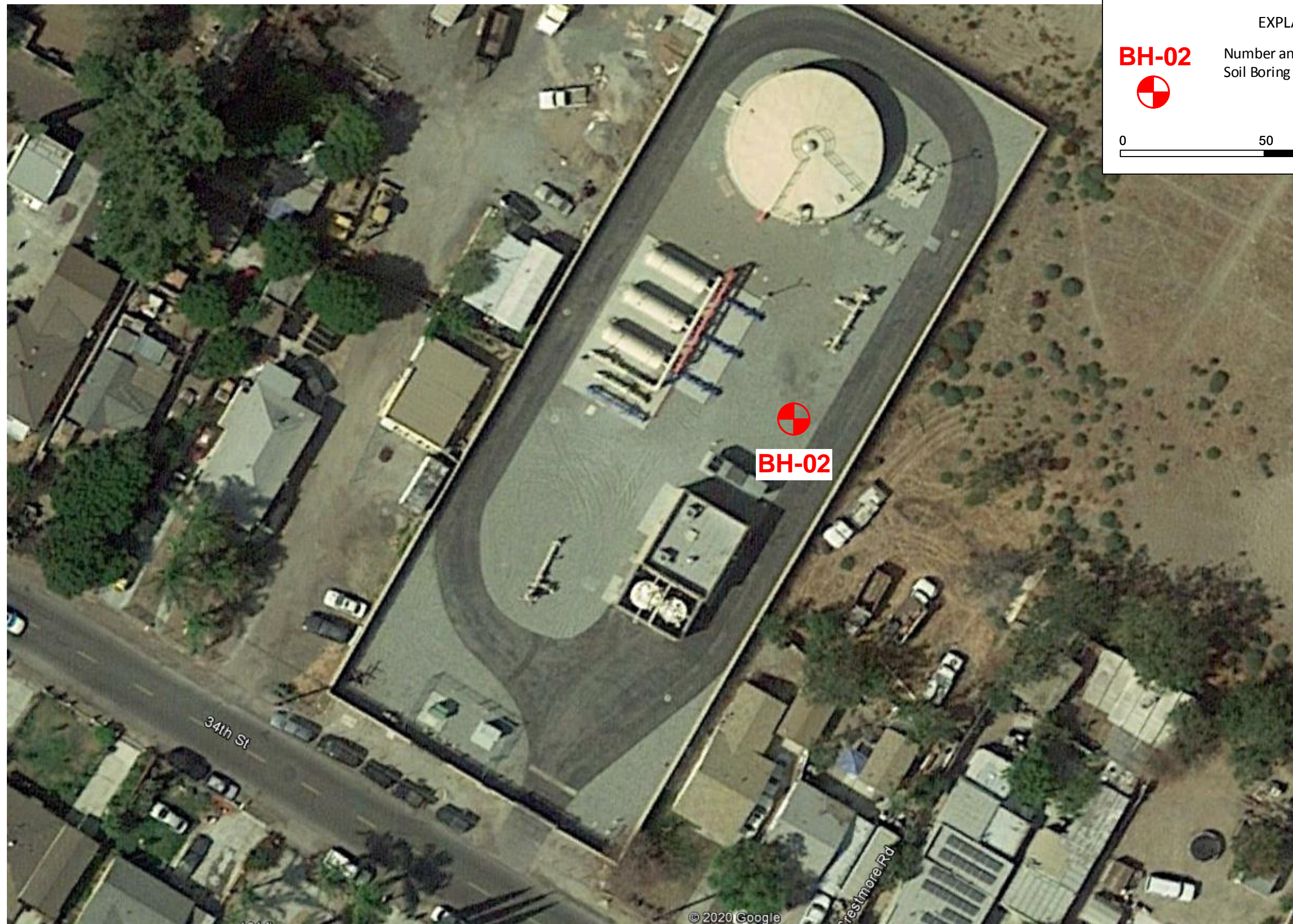
EXPLANATION	
<b>BH-01</b>	Number and Approximate Location of Soil Boring
	
	

Project: Water Treatment System for Wells No 1A and 18  
 Location: Near the Intersection of 34<sup>th</sup> Street and Crestmore Drive  
 City of Riverside, Riverside County, California  
 For: Hazen and Sawyer

### Approximate Boring Location Map



Project No.  
20-81-155-01





EXPLANATION

**BH-02** Number and Approximate Location of Soil Boring



0 50 100 ft

Project: Water Treatment System for Wells No 1A and 18  
Location: Near the Intersection of 34<sup>th</sup> Street and Crestmore Drive  
City of Riverside, Riverside County, California  
For: Hazen and Sawyer

### Approximate Boring Location Map

Project No.  
20-81-155-01



For *in-situ* moisture and dry density data, see the Logs of Borings in Appendix A, *Field Exploration*. For a description of the laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*.

#### **4.5 Analysis and Report Preparation**

Data obtained from the field exploration and laboratory testing program was compiled and evaluated. Geotechnical analyses of the compiled data were performed, and this report was prepared to present our findings, conclusions, and recommendations for the project.

### **5.0 LABORATORY TEST RESULTS**

Results of physical and chemical tests performed for this project are presented below.

#### **5.1 Physical Testing**

Results of the various laboratory tests are presented in Appendix B, *Laboratory Testing Program*, except for the results of *in-situ* moisture and dry density tests which are presented on the Logs of Borings in Appendix A, *Field Exploration*. The results are also discussed below.

#### **Well No. 1A Site**

- **In-situ Moisture and Dry Density** – *In-situ* dry densities and moisture contents of the site soils were determined in accordance with ASTM Standard D2216 and D2937. Dry densities of alluvium soils ranged from 84 to 97 pounds per cubic foot (pcf) with moisture contents of 1 to 25 percent.
- **Expansion Index (EI)** – One representative sample from the upper 5 feet soils was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result showed an EI of 0.
- **Grain Size Analysis** – One representative sample was tested to determine the relative grain size distribution in accordance with the ASTM Standard D6913. The test results are graphically presented in Drawing No. B-1, *Grain Size Distribution Results*.
- **Maximum Dry Density and Optimum Moisture Content** – Typical moisture-density relationship test was performed on a representative sample in accordance with ASTM D1557. The results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry density was 126.0 pcf and the optimum moisture content of 8.5 percent.
- **Direct Shear** – One direct shear test was performed on undisturbed representative ring samples under soaked moisture condition in accordance with ASTM Standard D3080. The results are presented in Drawings No. B-3, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.



### **Well No. 18 Site**

- **In-situ Moisture and Dry Density** – *In-situ* dry densities and moisture contents of the site soils were determined in accordance with ASTM Standard D2216 and D2937. No drive samples were collected within upper 2.5 feet artificial fill. Dry densities of alluvium soils ranged from 82 to 112 pounds per cubic foot (pcf) with moisture contents of 4 to 24 percent.
- **Expansion Index (EI)** – One representative sample from the upper 5 feet soils was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result showed an EI of 0.
- **Collapse Potential** – The collapse potential of one relatively undisturbed sample was tested under a vertical stress of up to 2.0 kips per square foot (ksf) in accordance with the ASTM Standard D4546 test method. The test result showed collapse potential of 1.3 percent.
- **Grain Size Analysis** – Two representative samples were tested to determine the relative grain size distribution in accordance with the ASTM Standard D6913. The test results are graphically presented in Drawing No. B-1, *Grain Size Distribution Results*.
- **Maximum Dry Density and Optimum Moisture Content** – Typical moisture-density relationship test was performed on a representative sample in accordance with ASTM D1557. The results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry density was 113.8 pcf and the optimum moisture content of 11.5 percent.
- **Direct Shear** – One direct shear test was performed on undisturbed representative ring samples under soaked moisture condition in accordance with ASTM Standard D3080. The results are presented in Drawings No. B-4, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.

### **5.2 Chemical Testing - Corrosivity Evaluation**

Two representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purposes of these tests were to determine the corrosion potential of site soils when placed in contact with common pipe materials. These tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with California Tests 643, 422, and 417. The test results are presented in Appendix B, *Laboratory Testing Program and summarized below*.

### **Well No. 1A Site**

- The pH measurement of the tested sample was 8.6.
- The sulfate content of the tested sample was 0.027 percent by weight (27 ppm).
- The chloride concentration of the tested sample was 50 ppm.
- The minimum electrical resistivity when saturated was 4,437 ohm-cm.



### **Well No. 18 Site**

- The pH measurement of the tested sample was 11.2.
- The sulfate content of the tested sample was 0.076 percent by weight (76 ppm).
- The chloride concentration of the tested sample was 29 ppm.
- The minimum electrical resistivity when saturated was 2,209 ohm-cm.

## **6.0 SUBSURFACE CONDITIONS**

A general description of the subsurface conditions, various materials and groundwater conditions encountered at each location during our field exploration is discussed below.

### **6.1 *Subsurface Profile***

Based on the exploratory borings and laboratory test results, the subsurface soils at the sites encountered in the borings at various depths consists primarily of a mixture of sand, silt, clay and gravel up to 2 inches in largest dimension that. Inter-layered sand and silty sand was observed in boring BH-01 within the 7.5 feet bgs. Although soil at depth between 5 and 10 feet classified as sand with silt, decrease in sand content was observed at a depth of 7.5 feet bgs. Approximately 2.5 feet of artificial fill was encountered in boring BH-02.

For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 and A-3, Logs of Borings, in Appendix A, Field Exploration.

### **6.2 *Groundwater***

Groundwater was not encountered during the investigation to the maximum explored depth of 21.5 feet bgs in boring BH-01. Groundwater was encountered at a depth of 32.3 feet bgs during the investigation to the maximum explored depth of 51.5 feet bgs in BH-02.

For comparison, regional groundwater data from the GeoTracker database (SWRCB, 2020) for locations within a one-mile radius of the project sites was reviewed to evaluate the current and historical groundwater levels and no data was available.

Regional groundwater data from the USGS National Water Information System (USGS, 2020) for locations within a one-mile radius of the project sites was reviewed to evaluate the current and historical groundwater levels and no data was available

Regional groundwater data from the California Water Data Library (DWR, 2020) for locations within a one-mile radius of the project sites was reviewed to evaluate the current and historical groundwater levels and no data was available.



Based on the presence of groundwater during boring operations, as well as current and historical data, groundwater is expected to be present around 32.3 feet bgs. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in each site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation or irrigation events.

### **6.3 Expansive Soils**

Expansive soils are characterized by their ability to undergo significant volume changes (shrink or swell) due to variations in moisture content. Changes in soil moisture content can result from precipitation, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors and may result in unacceptable settlement or heave of structures or concrete slabs supported on grade. Depending on the extent and location below finish subgrade, expansive soils can have a detrimental effect on structures.

Based on the laboratory test results, the expansion indices of the upper 5 feet of both sites soils were 0, corresponding to very low expansion potentials.

### **6.4 Collapse Potential**

Soil deposits subjected to collapse/hydro-consolidation generally exist in regions of moisture deficiency. Collapsible soils are generally defined as soils that have potential to suddenly decrease in volume upon increase in moisture content even without an increase in external loads. Moreover, some soils may have a different degree of collapse/hydro-consolidation based on the amount of proposed fill or structure loads. Soils susceptible to collapse/ hydro-consolidation include wind-blown silt, weakly cemented sand, and silt where the cementing agent is soluble (e.g. soluble gypsum, halite), alluvial or colluvial deposits within semi-arid to arid climate, and certain weathered bedrock above the groundwater table.

Granular soils may have a potential to collapse upon wetting in arid climate regions. Collapse/hydro-consolidation may occur when the soluble cements (carbonates) in the soil matrix dissolve, causing the soil to densify from its loose/low density configuration from deposition.

The degree of collapse of a soil can be defined by the collapse potential value, which is expressed as a percent of collapse of the total sample using the Collapse Potential Test (ASTM D4546). According to the ASTM guideline, the severity of collapse potential is commonly evaluated by the following Table No. 1, *Collapse Potential Values*.



**Table No. 1, Collapse Potential Values**

<b>Collapse Potential Value (%)</b>	<b>Severity of Problem</b>
0	None
0.1 to 2	Slight
2.1 to 6.0	Moderate
6.0 to 10.0	Moderately Severe
>10	Severe

Based on the laboratory test result of the Well No. 18 site (collapse potential of 1.3 percent at a depth of 2.5 feet bgs), a slight problem is anticipated at the site. Collapse potential distress is typically considered a concern when collapse potential is over 2% (LA County, 2013).

### **6.5 Excavatability**

The surface and subsurface soil materials at the sites are expected to be excavatable by conventional heavy-duty earth moving and trenching equipment.

The phrase “conventional heavy-duty excavation equipment” is intended to include commonly used equipment such as excavators and trenching machines. It does not include hydraulic hammers (“breakers”), jackhammers, blasting, or other specialized equipment and techniques used to excavate hard earth materials. Selection of an appropriate excavation equipment model should be done by an experienced earthwork contractor and may require test excavations in representative areas.

### **6.6 Subsurface Variations**

Based on results of the subsurface exploration and our experience, some variations in the continuity and nature of subsurface conditions within the project sites should be anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the boring locations.

## **7.0 ENGINEERING GEOLOGY**

The regional and local geology within the proposed project area are discussed below.

### **7.1 Regional Geology**

The project sites lie in the Chino Basin and are centrally located within the Peninsular Ranges Geomorphic Province adjacent to the Transverse Ranges province.



The Peninsular Ranges Geomorphic Province consists of a series of northwest-trending mountain ranges and valleys bounded on the north by the San Bernardino and San Gabriel Mountains, on the west by the Los Angeles Basin, and on the south by the Pacific Ocean.

The province is a seismically active region characterized by a series of northwest-trending strike-slip faults. The most prominent of the nearby fault zones include the San Andreas, Elsinore, and San Jacinto fault zones which have been known to be active during Quaternary time.

Topography within the province is generally characterized by broad alluvial valleys separated by linear mountain ranges. This northwest-trending linear fabric is created by the regional faulting within the granitic basement rock of the Southern California Batholith. Broad, linear, alluvial valleys have been formed by erosion of these principally granitic mountain ranges.

The Chino Basin is a broad alluvial valley bounded by the San Gabriel Mountains on the north, the San Bernardino Mountains on the east and northeast, the Santa Ana Mountains on the southwest, and the Puente Hills on the west. The thickness of the alluvium is more than 800 feet in the central area of the basin with a maximum thickness of 1,300 feet near the Riverside area.

## **7.2 Local Geology**

Review of geologic mapping indicates that the project sites are underlain locally by young (Holocene and late Pleistocene aged) axial channel deposits. These axial channel deposits primarily consist of slightly to moderately consolidated silt, sand, and gravel (Morton and Miller, 2006).

## **8.0 FAULTING AND SEISMICITY**

The approximate distance and seismic characteristics of nearby faults as well as seismic design coefficients are presented in the following subsections.

### **8.1 Faulting**

The proposed sites are situated in a seismically active region. As is the case for most areas of Southern California, ground-shaking resulting from earthquakes associated with nearby and more distant faults may occur at the project sites. During the life of the project, seismic activity associated with active faults can be expected to generate moderate to strong ground shaking at the sites. Review of recent seismological and geophysical publications indicates that the seismic hazard for the project is high.



The project sites are not located within a currently mapped State of California Earthquake Fault Zone for surface fault rupture. Table No. 2, *Summary of Regional Faults*, summarizes selected data of known faults capable of seismic activity within 100 kilometers of the sites. The data presented below was calculated using the National Seismic Hazard Maps Database (USGS, 2008) and other published geologic data.

**Table No. 2, Summary of Regional Faults**

Fault Name and Section	Closest Distance (km)	Slip Sense	Length (km)	Slip Rate (mm/year)	Maximum Magnitude
San Jacinto	12.45	strike slip	241	n/a	7.88
Cucamonga	20.45	thrust	28	5	6.70
S. San Andreas	22.55	strike slip	548	n/a	8.18
Chino, alt 2	24.46	strike slip	29	1	6.80
Chino, alt 1	24.65	strike slip	24	1	6.70
Elsinore	24.82	strike slip	241	n/a	7.85
San Jacinto	28.85	strike slip	178	n/a	7.62
San Jose	30.34	strike slip	20	0.5	6.70
Cleghorn	31.99	strike slip	25	3	6.80
Sierra Madre Connected	34.95	reverse	76	2	7.30
Sierra Madre	34.95	reverse	57	2	7.20
Elsinore	36.41	strike slip	169	n/a	7.64
North Frontal (West)	37.43	reverse	50	1	7.20
S. San Andreas	38.31	strike slip	342	n/a	7.92
Puente Hills (Coyote Hills)	45.13	thrust	17	0.7	6.90
Clamshell-Sawpit	49.74	reverse	16	0.5	6.70

(Source: [https://earthquake.usgs.gov/cfusion/hazfaults\\_2008\\_search/](https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/))

## 8.2 CBC Seismic Design Parameters

Seismic parameters based on the 2019 California Building Code (CBSC, 2019) are provided in the following table. These parameters were determined using the generalized coordinates (33.996948N, 117.394891W) and the Seismic Design Maps ATC online tool.





**Table No. 3, CBC Seismic Design Parameters**

Seismic Parameters	
Site Coordinates	33.996948N, 117.394891W
Site Class	D
Mapped Short period (0.2-sec) Spectral Response Acceleration, $S_s$	1.50g
Mapped 1-second Spectral Response Acceleration, $S_1$	0.60g
Site Coefficient (from Table 11.4-1), $F_a$	1.0
Site Coefficient (from Table 11.4-2), $F_v$	1.7
MCE 0.2-sec period Spectral Response Acceleration, $S_{MS}$	1.50g
MCE 1-second period Spectral Response Acceleration, $S_{M1}$	1.02g
Design Spectral Response Acceleration for short period $S_{DS}$	1.00g
Design Spectral Response Acceleration for 1-second period, $S_{D1}$	0.68g
Site Modified Maximum Peak Ground Acceleration, $PGA_M$	0.58g

### 8.3 Secondary Effects of Seismic Activity

In general, secondary effects of seismic activity include surface fault rupture, soil liquefaction, landslides, lateral spreading, and settlement due to seismic shaking, tsunamis, seiches, and earthquake-induced flooding. The site-specific potential for each of these seismic hazards is discussed in the following sections.

**Surface Fault Rupture:** The project sites are not located within a currently designated State of California or Riverside County Earthquake Fault Zone (CGS, 2007; Riverside County, 2020). There are no known active faults projecting toward or extending across the project sites. The potential for surface rupture resulting from the movement of nearby major faults is not known with certainty but is considered low.

**Liquefaction:** Liquefaction is defined as the phenomenon in which a cohesionless soil mass within the upper 50 feet of the ground surface suffers a substantial reduction in its shear strength, due the improvement of excess pore pressures. During earthquakes, excess pore pressures in saturated soil deposits may develop as a result of induced cyclic shear stresses, resulting in liquefaction.

Soil liquefaction generally occurs in submerged granular soils and non-plastic silts during or after strong ground shaking. There are several general requirements for liquefaction to occur and they are as follows.

- Soils must be submerged.
- Soils must be loose to medium-dense.



- Ground motion must be intense.
- Duration of shaking must be sufficient for the soils to lose shear resistance.

Based on review of hazard maps, the project sites are located within an area not evaluated for liquefaction by State of California (CGS, 2007). However, the project sites are located within a Riverside County liquefaction zone determined to have a liquefaction potential of very high. Based on a site-specific settlement analysis presented in Appendix C, *Liquefaction and Settlement Analysis*, we estimate that the liquefaction induced settlement of the sites is up to 0.2 inches.

**Seismic Settlement:** Dynamic dry settlement may occur in loose, granular, unsaturated soils during a large seismic event. Based on a site-specific settlement analysis presented in Appendix C, *Liquefaction and Settlement Analysis*, we estimate that the sites will have the potential for up to approximately 1.4 inches of total dry seismic settlement following completion of the remedial earthwork recommended in this report.

**Landslides:** Seismically induced landslides and slope failures are common occurrences during or soon after large earthquakes. Due to the flat nature of the sites, the potential for seismically induced landslides affecting the proposed sites is considered to be low.

**Lateral Spreading:** Seismically induced lateral spreading involves primarily lateral movement of earth materials over underlying materials which are liquefied due to ground shaking. It differs from the slope failure in that complete ground failure involving large movement does not occur due to the relatively smaller gradient of the initial ground surface. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. Due to the low risk of liquefaction, the risk of lateral spreading is considered low.

**Tsunamis:** Tsunamis are large waves generated in open bodies of water by fault displacement or major ground movement. Due to the inland location of the sites, tsunamis are not considered to be a risk.

**Seiches:** Seiches are large waves generated in enclosed bodies of water in response to ground shaking. There are no enclosed bodies of water near the project sites. Seiching is not considered to be a risk during construction.

**Earthquake-Induced Flooding:** Dams or other water-retaining structures may fail as a result of large earthquakes. The project sites are not located within a Riverside County designated dam inundation zone (Riverside County, 2020). The risk for earthquake-induced flooding to affect the project sites is considered low.



## 9.0 EARTHWORK RECOMMENDATIONS

Earthwork recommendations for the project are presented in the following sections.

### 9.1 General

This section contains our general recommendations regarding earthwork and grading for the project. These recommendations are based on the results of our field exploration, laboratory tests, our experience with similar projects, and data evaluation as presented in the preceding sections. These recommendations may require modification by the geotechnical consultant based on observation of the actual field conditions during grading.

Prior to the start of construction, all existing underground utilities and appurtenances should be located at the project sites. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing utilities and structure (if any).

An existing well located within the proposed slab area at the Well No. 18 site will be demolished along with its associated above ground piping. Some existing underground pipelines will be relocated and demolished as needed. All debris, deleterious material, artificial fill and demolished materials should be removed from the sites.

The final bottom surfaces of all excavations should be observed and approved by the project geotechnical consultant prior to placing any fill. Based on these observations, localized areas may require remedial grading deeper than indicated herein. Therefore, some variations in the depth and lateral extent of excavation recommended in this report should be anticipated.

### 9.2 Remedial Grading

Concrete pad should be uniformly supported by compacted fill. In order to provide uniform support, structural areas should be overexcavated, scarified, and recompacted as follows.

**Table No. 4, Overexcavation Depths**

Structure/Pavement	Minimum Excavation Depth
Concrete Pad	2 feet below pad bottom or 3 feet below existing ground surface, whichever is deeper

The overexcavation should extend to at least 3 feet beyond the footprint of the concrete pad. The overexcavation bottom should be scarified and compacted as described in Section 9.4, *Compacted Fill Placement*.



If isolated pockets of very soft, loose, eroded, or pumping soil are encountered, the unstable soil should be excavated as needed to expose undisturbed, firm, and unyielding soils.

The contractor should determine the best manner to conduct the excavations, such that there are no losses of bearing and/or lateral support to the existing structures or utilities (if any).

### **9.3 Engineered Fill**

No fill should be placed until excavations and/or natural ground preparation have been observed by the geotechnical consultant. The native soils encountered within the project sites are generally considered suitable for re-use as compacted fill. Excavated soils should be processed, including removal of roots and debris, removal of oversized particles, mixing, and moisture conditioning, before placing as compacted fill. On-sites soils used as fill should meet the following criteria.

- No particles larger than 3 inches in largest dimension.
- Rocks larger than one inch should not be placed within the upper 12 inches of subgrade soils.
- Free of all organic matter, debris, or other deleterious material.
- Expansion index of 20 or less.
- Sand Equivalent greater than 15 (greater than 30 for pipe bedding).
- Contain less than 30 percent by weight retained in 3/4-inch sieve.
- Contain less than 40 percent fines (passing #200 sieve).

Based on field investigation and laboratory testing results, on-sites soils may be suitable as fill materials.

Imported materials, if required, should meet the above criteria prior to being used as compacted fill. Any imported fills should be tested and approved by geotechnical representative prior to delivery to the sites.

### **9.4 Compacted Fill Placement**

All surfaces to receive structural fills should be scarified to a depth of 6 inches. The soil should be moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse soils and 0 to 2 percent above optimum moisture content for fine soils. The scarified soils should be recompacted to at least 90 percent of the laboratory maximum dry density.

Fill soils should be mixed thoroughly, and moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse soils and 0 to 2 percent above optimum moisture



content for fine soils. Fill soils should be evenly spread in horizontal lifts not exceeding 8 inches in uncompacted thickness.

All fill placed at the sites should be compacted to at least 90 percent of the laboratory maximum dry densities as determined by ASTM Standard D1557 test method, unless a higher compaction is specified herein. At least the upper 12 inches of subgrade soils below the pad bottom should be compacted to at least 95 percent of the laboratory maximum dry density.

Fill materials should not be placed, spread or compacted during unfavorable weather conditions. When sites grading is interrupted by heavy rain, filling operations should not resume until the geotechnical consultant approves the moisture and density conditions of the previously placed fill.

### **9.5 Site Drainage**

Adequate positive drainage should be provided away from the sites and excavation areas to prevent ponding and to reduce percolation of water into the foundation soils. Surface drainage should be directed to suitable non-erosive devices.

### **9.6 Utility Trench Backfill**

The following sections present earthwork recommendations for utility trench backfill, including subgrade preparation and trench zone backfill.

Open cuts adjacent to existing roadways or structures are not recommended within a 1:1 (horizontal:vertical) plane extending down and away from the roadway or structure perimeter (if any).

Soils from the trench excavation should not be stockpiled more than 6 feet in height or within a horizontal distance from the trench edge equal to the depth of the trench. Soils should not be stockpiled behind the shoring, if any, within a horizontal distance equal to the depth of the trench, unless the shoring has been designed for such loads.

#### **9.6.1 Pipeline Subgrade Preparation**

The final subgrade surface should be level, firm, uniform, and free of loose materials and properly graded to provide uniform bearing and support to the entire section of the pipe placed on bedding material. Protruding oversize particles larger than 2 inches in dimension, if any, should be removed from the trench bottom and replaced with compacted on-sites materials.



Any loose, soft and/or unsuitable materials encountered at the pipe subgrade should be removed and replaced with an adequate bedding material. During the digging of depressions for proper sealing of the pipe joints, the pipe should rest on a prepared bottom for as near its full length as is practicable.

## 9.6.2 Pipe Bedding

Bedding is defined as the material supporting and surrounding the pipe to 1 foot above the pipe. Recommendations for pipe bedding are provided below.

To provide uniform and firm support for the pipe, compacted granular materials such as clean sand, gravel or ¾-inch crushed aggregate, or crushed rock may be used as pipe bedding material. Typically, soils with sand equivalent value of 30 or more are used as pipe bedding material. The pipe designer should determine if the soils are suitable as pipe bedding material.

The type and thickness of the granular bedding placed underneath and around the pipe, if any, should be selected by the pipe designer. The load on the rigid pipes and deflection of flexible pipes and, hence, the pipe design, depends on the type and the amount of bedding placed underneath and around the pipe.

Bedding materials should be vibrated in-place to achieve compaction. Care should be taken to densify the bedding material below the springline of the pipe. Prior to placing the pipe bedding material, the pipe subgrade should be uniform and properly graded to provide uniform bearing and support to the entire section of the pipe placed on bedding material. During the digging of depressions for proper sealing of the pipe joints, the pipe should rest on a prepared bottom for as near its full length as is practicable.

Migration of fines from the surrounding native and/or fill soils must be considered in selecting the gradation of any imported bedding material. We recommend that the pipe bedding material should satisfy the following criteria to protect migration of fine materials.

- i.  $\frac{D_{15}(F)}{D_{85}(B)} \leq 5$
- ii.  $\frac{D_{50}(F)}{D_{50}(B)} < 25$
- iii. Bedding Materials must have less than 5 percent passing No. 200 sieve (0.0074 mm) to avoid internal movement of fines.

Where,

F = Bedding Material

B = Surrounding Native and/or Fill Soils

D<sub>15</sub>(F) = Particle size through which 15% of bedding material will pass



$D_{85}(B)$  = Particle size through which 85% of surrounding soil will pass

$D_{50}(F)$  = Particle size through which 50% of bedding material will pass

$D_{50}(B)$  = Particle size through which 50% of surrounding soil will pass

If the above criteria do not satisfy, commercially available geofabric used for filtration purposes (such as Mirafi 140N or equivalent) may be wrapped around the bedding material encasing the pipe to separate the bedding material from the surrounding native or fill soils.

### 9.6.3 Trench Zone Backfill

The trench zone is defined as the portion of the trench above the pipe bedding extending up to the final grade level of the trench surface. Excavated sites soil free of oversize particles and deleterious matter may be used to backfill the trench zone. Detailed trench backfill recommendations are provided below.

- Trench excavations to receive backfill should be free of trash, debris or other unsatisfactory materials at the time of backfill placement.
- Trench zone backfill should be compacted to at least 90 percent of the laboratory maximum dry density as per ASTM D1557 test method. At least the upper 1 foot of trench backfill underlying pavement should be compacted to at least 95 percent of the laboratory maximum dry density as per ASTM D1557 test method.
- Particles larger than 1 inch should not be placed within 12 inches of the pavement subgrade. No more than 30 percent of the backfill volume should be larger than  $\frac{3}{4}$ -inch in the largest dimension. Gravel should be well mixed with finer soil. Rocks larger than 3 inches in the largest dimension should not be placed as trench backfill.
- Trench backfill should be compacted by mechanical methods, such as sheepsfoot, vibrating or pneumatic rollers or mechanical tampers to achieve the density specified herein. The backfill materials should be brought to within  $\pm 3$  percent of optimum moisture content for coarse-grained soil, and between optimum and 2 percent above optimum for fine-grained soil, then placed in horizontal layers. The thickness of uncompacted layers should not exceed 8 inches. Each layer should be evenly spread, moistened or dried as necessary, and then tamped or rolled until the specified density has been achieved.
- The contractor should select the equipment and processes to be used to achieve the specified density without damage to adjacent ground, structures, utilities and completed work.
- The field density of the compacted soil should be measured by the ASTM D1556 (Sand Cone) or ASTM D6938 (Nuclear Gauge) or equivalent.
- Observations and field tests should be performed by the project soils consultant to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compactive effort should be made





with adjustment of the moisture content as necessary, until the specified compaction is obtained.

- It should be the responsibility of the contractor to maintain safe working conditions during all phases of construction.
- Trench backfill should not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations should not resume until field tests by the project's geotechnical consultant indicate that the moisture content and density of the fill are in compliance with project specifications.

## 10.0 DESIGN RECOMMENDATIONS

The various design recommendations provided in this section are based on the assumption that the above earthwork and grading recommendations will be implemented in the project design and construction.

### 10.1 *Shallow Foundation Design Parameters*

The proposed concrete pad may be supported on continuous spread and/or isolated spread footings. The design of the shallow foundations should be based on the recommended parameters presented in the table below.

**Table No. 5, Recommended Foundation Parameters**

Parameter	Value
Minimum continuous spread footing width	18 inches
Minimum isolated footing width	18 inches
Minimum continuous or isolated footing depth of embedment below lowest adjacent grade	18 inches
Allowable net bearing capacity	2,000 psf

The actual footing dimensions and reinforcement should be based on structural design. The allowable bearing capacity can be increased by 500 pounds per square foot (psf) with each foot of additional embedment and 100 psf with each foot of additional width up to a maximum of 3,000 psf.

The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity. If normal code requirements are applied for design, the above vertical bearing value may be increased by 33 percent for short duration loadings, which will include loadings induced by wind or seismic forces.





## 10.2 *Mat Foundation Design Parameters*

The proposed concrete pad may be designed as mat foundation. The modulus of subgrade reaction (k) for design of flexible mat foundation was estimated from the available soil compressibility data and published charts. For design of flexible mat foundation, the following equation may be used.

$$k = k_1 [(B+1)/2B]^2$$

Where:

k = vertical modulus of subgrade reaction for mat foundation, kips per cubic feet

k<sub>1</sub> = 200 kcf, normalized modulus of subgrade reaction for 1-square-foot footing

B = foundation width, feet

Other necessary parameters (modulus of elasticity and Poisson's ratio) for mat foundation design are as follows.

$$E = 33 W_c^{1.5} f_c^{0.5} \text{ psi}$$

Where, E = Modulus of Elasticity of Concrete (psi)

W<sub>c</sub> = weight of concrete (pcf)

f<sub>c</sub> = compressive strength of concrete at 28 days (psi)

v = 0.35, Poisson's Ratio

An allowable net bearing capacity of 3,500 psf may be used for mat foundations founded on compacted native soil. The mat should be reinforced with top and bottom steel, as appropriate, to provide structural continuity and to permit spanning of local irregularities. The mat foundation dimensions, and reinforcement should be based on structural design. For design purposes, the self-weight of the mat foundation can be negligible.

## 10.3 *Lateral Earth Pressures and Resistance to Lateral Loads*

In the following subsections, the lateral earth pressures and resistance to lateral loads are estimated by using on-sites native soils strength parameters obtained from laboratory testing.

### 10.3.1 *Active Earth Pressures*

The active earth pressure behind any buried wall or foundation depends primarily on the allowable wall movement, type of backfill materials, backfill slopes, wall or foundation inclination, surcharges, and any hydrostatic pressures. The lateral earth pressures are presented in the following tables.



**Table No. 6, Active and At-Rest Earth Pressures**

Loading Conditions	Lateral Earth Pressure (psf)
Active earth conditions (wall is free to deflect at least 0.001 radian)	40
At-rest (wall is restrained)	60

These pressures assume a level ground surface around the structure for a distance greater than the structure height, no surcharge, and no hydrostatic pressure.

If water pressure is allowed to build up behind the walls, the active pressures should be reduced by 50 percent and added to a full hydrostatic pressure to compute the design pressures against the walls.

### 10.3.2 Passive Earth Pressure

Resistance to lateral loads can be assumed to be provided by a combination of friction acting at the base of foundations and by passive earth pressure. A coefficient of friction of 0.35 between formed concrete and soil may be used with the dead load forces. An allowable passive earth pressure of 240 psf per foot of depth may be used for the sides of the footing poured against recompacted native soils. A factor of safety of 1.5 was applied in calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 2,000 psf.

Vertical and lateral bearing values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing and lateral resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.

Due to the low overburden stress of the soil at shallow depth, the upper 1 foot of passive resistance should be neglected unless the soil is confined by pavement or slab.

### 10.4 Settlement

The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be 1 inch or less. The differential settlement resulting from static loads is anticipated to be 0.5 inches or less over a horizontal distance of 40 feet.

Our analysis of the potential dynamic settlement is presented in Appendix C, *Liquefaction and Settlement Analysis*. We estimate that the project sites have the potential for up to 1.4 inches of dry seismic settlement with liquefaction induced settlement of up to 0.2 inches during a large earthquake. Based on the subsurface conditions, we anticipate the total



dynamic settlement will likely be uniform. Therefore, dynamic differential settlement of the site is considered nominal.

Generally, the static and dynamic settlement does not occur at the same time. For design purposes, the structural engineer should decide whether static and dynamic settlement will be combined or not.

### 10.5 Soil Corrosivity

Two representative soil sample were evaluated for corrosivity with respect to common construction materials such as concrete and steel. The test results are presented in Appendix B, *Laboratory Testing Program* and design recommendations pertaining to soil corrosivity are presented below.

The sulfate contents of the sampled soils correspond to American Concrete Institute (ACI) exposure category S0 for these sulfate concentrations (ACI 318-14, Table 19.3.1.1). No concrete type restrictions are specified for exposure category S0 (ACI 318-14, Table 19.3.2.1). A minimum compressive strength of 2,500 psi is recommended.

We anticipate that concrete structures such as footings, slab, and concrete pad will be exposed to moisture from precipitation and irrigation. Based on the site locations and the results of chloride testing of the sites soils, we do not anticipate that concrete structures will be exposed to external sources of chlorides, such as deicing chemicals, salt, brackish water, or seawater. ACI specifies exposure category C1 where concrete is exposed to moisture, but not to external sources of chlorides (ACI 318-14, Table 19.3.1.1). ACI provides concrete design recommendations in ACI 318-14, Table 19.3.2.1, including a compressive strength of at least 2,500 psi and a maximum chloride content of 0.3 percent.

According to Romanoff, 1957, the following table provides general guideline of soil corrosion based on electrical resistivity.

**Table No. 7, Correlation Between Resistivity and Corrosion**

Soil Resistivity (ohm-cm) per Caltrans CT 643	Corrosivity Category
Over 10,000	Mildly corrosive
2,000 – 10,000	Moderately corrosive
1,000 – 2,000	corrosive
Less than 1,000	Severe corrosive



The measured value of the minimum electrical resistivity of the sample when saturated were 4,437 and 2,209 ohm-cm for the sites. This indicates that the soils tested are moderately corrosive to ferrous metals in contact with the soil. Converse does not practice in the area of corrosion consulting. If needed, a qualified corrosion consultant should provide appropriate corrosion mitigation measures for any ferrous metals in contact with the site soils.

## 11.0 CONSTRUCTION RECOMMENDATIONS

Temporary sloped excavation and shoring design recommendations are presented in the following sections.

### 11.1 *General*

Prior to the start of construction, all existing underground utilities should be located at the project sites. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications.

Vertical braced excavations can be considered for the foundations. Sloped excavations may not be feasible in locations adjacent to existing utilities, pavement, or structures. Recommendations pertaining to temporary excavations are presented in this section.

Excavations near existing structures may require vertical side wall excavation. Where the side of the excavation is a vertical cut, it should be adequately supported by temporary shoring to protect workers and any adjacent structures.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act, and the Construction Safety Act should be met. The soils exposed in cuts should be observed during excavation by the geotechnical consultant and the competent person designated by the contractor. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

### 11.2 *Temporary Sloped Excavations*

Temporary open-cut trenches may be constructed with side slopes as recommended in the following table. Temporary cuts encountering soft and wet fine-grained soils; dry loose, cohesionless soils or loose fill from trench backfill may have to be constructed at a flatter gradient than presented below.



**Table No. 8, Slope Ratios for Temporary Excavations**

Soil Type	OSHA Soil Type	Depth of Cut (feet)	Recommended Maximum Slope (Horizontal:Vertical) <sup>1</sup>
Sand (SP) and Silty Sand (SM)	C	0-10	1.5:1

<sup>1</sup> Slope ratio assumed to be uniform from top to toe of slope.

For shallow excavations up to 4 feet bgs, excavation can be vertical. For steeper temporary construction slopes or deeper excavations, or unstable soil encountered during the excavation, shoring or trench shields should be provided by the contractor to protect the workers in the excavation.

Surfaces exposed in slope excavations should be kept moist but not saturated to retard raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Surcharge loads, including construction materials, should not be placed within 5 feet of the unsupported slope edge. Stockpiled soils with a height higher than 6 feet will require greater distance from trench edges.

## **12.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION**

The project geotechnical consultant should review plans and specifications as the project design progresses. Such review is necessary to identify design elements, assumptions, or new conditions which require revisions or additions to our geotechnical recommendations.

The project geotechnical consultant should be present to observe conditions during construction. Geotechnical observation and testing should be performed as needed to verify compliance with project specifications. Additional geotechnical recommendations may be required based on subsurface conditions encountered during construction.

## **13.0 CLOSURE**

This report is prepared for the project described herein and is intended for use solely by Hazen and Sawyer to assist in the design and construction of the proposed project. Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied.

Converse Consultants is not responsible or liable for any claims or damages associated with interpretation of available information provided to others. Field exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Data derived through sampling and laboratory testing is extrapolated by Converse



employees who render an opinion about the overall soil conditions. Actual conditions in areas not sampled may differ. In the event that changes to the project occur, or additional, relevant information about the project is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the recommendations of this report are modified or verified in writing. In addition, the recommendations can only be finalized by observing actual subsurface conditions revealed during construction. Converse cannot be held responsible for misinterpretation or changes to our recommendations made by others during construction.

As the project evolves, continued consultation and construction monitoring by a qualified geotechnical consultant should be considered an extension of geotechnical investigation services performed to date. The geotechnical consultant should review plans and specifications to verify that the recommendations presented herein have been appropriately interpreted, and that the design assumptions used in this report are valid. Where significant design changes occur, Converse may be required to augment or modify the recommendations presented herein. Subsurface conditions may differ in some locations from those encountered in the explorations, and may require additional analyses and, possibly, modified recommendations.

Design recommendations given in this report are based on the assumption that it will be implemented. Additional consultation may be prudent to interpret Converse's findings for contractors, or to possibly refine these recommendations based upon the review of the actual site conditions encountered during construction. If the scope of the project changes, if project completion is to be delayed, or if the report is to be used for another purpose, this office should be consulted.



## 14.0 REFERENCES

- AMERICAN CONCRETE INSTITUTE (ACI), 2014, Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary, October 2014.
- AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE), 2010, Minimum Design Loads for Buildings and Other Structures, SEI/ASCE Standard No. 7-10, dated January 1, 2010.
- CALIFORNIA BUILDING STANDARDS COMMISSION (CBSC), 2019, California Building Code (CBC).
- CALIFORNIA DEPARTMENT OF WATER RESOURCES (DWR), 2020, Water Data Library (<http://wdl.water.ca.gov/waterdatalibrary/>), accessed May 14, 2020.
- CALIFORNIA GEOLOGICAL SURVEY (CGS), 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Faulting Zoning Act with Index to Earthquake Fault Zone Maps, Special Publication 42, revised 2007.
- CALIFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB), 2020, GeoTracker database (<http://geotracker.waterboards.ca.gov/>), accessed on May 14, 2020.
- DAS, B.M., 2011, Principles of Foundation Engineering, Seventh Edition, published by Global Engineering, 2011.
- COUNTY OF LOS ANGELES, 2013, Manual for the Preparation of Geotechnical Reports, July 1, 2013.
- MORTON, D.M. and MILLER, F.K., 2006, Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles, California, U.S. Geological Survey Open-File Report 2006-1217, scale 1:100,000.
- PUBLIC WORKS STANDARDS, INC., 2018, Standard Specifications for Public Works Construction ("Greenbook"), 2018.
- RIVERSIDE COUNTY, 2020, Riverside County GIS - Map My County ([https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC\\_Public](https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public)), accessed on May 14, 2020.
- ROMANOFF, MELVIN, 1957, Underground Corrosion, National Bureau of Standards Circular 579, dated April 1957.



U.S. DEPARTMENT OF THE NAVY, 1986, NAVFAC DM 7.01: Soil Mechanics, Naval Facilities Engineering Command, Alexandria, Virginia.

U.S. GEOLOGICAL SURVEY (USGS), 2020, National Water Information System: Web Interface (<http://nwis.waterdata.usgs.gov/nwis/gwlevels>), accessed on May 14, 2020.

UNITED STATES GEOLOGIC SURVEY, 2008 National Seismic Hazard Maps – Source Parameters, [https://earthquake.usgs.gov/cfusion/hazfaults\\_2008\\_search](https://earthquake.usgs.gov/cfusion/hazfaults_2008_search).





## APPENDIX A

### FIELD EXPLORATION

Our field investigation included sit reconnaissance and a subsurface exploration program consisting of drilling soil borings. During the site reconnaissance, the surface conditions were noted, and the borings were marked at the locations in the presence of Lee Bugbee (District representative). The approximate boring locations were established in the field with reference to existing sites, street centerlines and other visible features. The locations should be considered accurate only to the degree implied by the method used.

One exploratory boring (BH-01) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No. 1A site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 21.5 feet below existing ground surface (bgs).

One exploratory boring (BH-02) was drilled on April 30, 2020 to investigate subsurface conditions at the Well No. No 18 site. The boring was drilled using an 8-inch diameter hollow stem auger to the planned maximum depth of 51.5 feet below existing ground surface (bgs).

The borings were advanced using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers for soils sampling. Encountered materials were continuously logged by a Converse geologist and classified in the field by visual classification in accordance with the Unified Soil Classification System. Where appropriate, the field descriptions and classifications have been modified to reflect laboratory test results.

Relatively undisturbed samples were obtained using California Modified Samplers (2.4 inches inside diameter and 3.0 inches outside diameter) lined with thin sample rings. The steel ring sampler was driven into the bottom of the borehole with successive drops of a 140-pound driving weight falling 30 inches. Blow counts at each sample interval are presented on the boring logs. Samples were retained in brass rings (2.4 inches inside diameter and 1.0 inch in height) and carefully sealed in waterproof plastic containers for shipment to the Converse laboratory. Bulk samples of typical soil types were also obtained.

Standard Penetration Testing (SPT) was also performed in accordance with the ASTM Standard D1586 test method at 10-foot intervals beginning at 20 feet bgs in boring BH-02 using a standard (1.4 inches inside diameter and 2.0 inches outside diameter) split-barrel sampler. The mechanically driven hammer for the SPT sampler was 140 pounds, falling 30 inches for each blow. The recorded blow counts for every 6 inches for a total of 1.5 feet of sampler penetration are shown on the Logs of Borings.



The exact depths at which material changes occur cannot always be established accurately. Unless a more precise depth can be established by other means, changes in material conditions that occur between drive samples are indicated on the logs at the top of the next drive sample.

Following the completion of logging and sampling, the borings were backfilled with soil cuttings and compacted by pushing down with augers using drill rig weight. If construction is delayed, the surface may settle over time. We recommend the owner monitor the boring locations and backfill any depressions that might occur or provide protection around the boring locations to prevent trip and fall injuries from occurring near the area of any potential settlement.

For a key to soil symbols and terminology used in the boring logs, refer to Drawing No. A-1, *Unified Soil Classification and Key to Boring Log Symbols*. For logs of borings, see Drawings No. A-2 and A-3, *Logs of Borings*.



# SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
<b>COARSE GRAINED SOILS</b>  MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	<b>GRAVEL AND GRAVELLY SOILS</b>  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	<b>CLEAN GRAVELS</b>  (LITTLE OR NO FINES)		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		<b>GRAVELS WITH FINES</b>  (APPRECIABLE AMOUNT OF FINES)		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		<b>CLEAN SANDS</b>  (LITTLE OR NO FINES)		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		<b>SANDS WITH FINES</b>  (APPRECIABLE AMOUNT OF FINES)		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	<b>SAND AND SANDY SOILS</b>  MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	<b>CLEAN GRAVELS</b>  (LITTLE OR NO FINES)		<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		<b>GRAVELS WITH FINES</b>  (APPRECIABLE AMOUNT OF FINES)		<b>GC</b>	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
		<b>CLEAN SANDS</b>  (LITTLE OR NO FINES)		<b>SM</b>	SILTY SANDS, SAND - SILT MIXTURES
		<b>SANDS WITH FINES</b>  (APPRECIABLE AMOUNT OF FINES)		<b>SC</b>	CLAYEY SANDS, SAND - CLAY MIXTURES
<b>FINE GRAINED SOILS</b>  MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	<b>SILTS AND CLAYS</b>  LIQUID LIMIT LESS THAN 50		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
			<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
			<b>OL</b>	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	<b>SILTS AND CLAYS</b>  LIQUID LIMIT GREATER THAN 50		<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
			<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY	
			<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
<b>HIGHLY ORGANIC SOILS</b>				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

## BORING LOG SYMBOLS

### SAMPLE TYPE

	<b>STANDARD PENETRATION TEST</b> Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method
	<b>DRIVE SAMPLE</b> 2.42" I.D. sampler (CMS).
	<b>DRIVE SAMPLE</b> No recovery
	<b>BULK SAMPLE</b>
	<b>GROUNDWATER WHILE DRILLING</b>
	<b>GROUNDWATER AFTER DRILLING</b>

Apparant Density	Very Loose	Loose	Medium	Dense	Very Dense
SPT (N)	< 4	4 - 11	11 - 30	31 - 50	> 50
CA Sampler	< 5	5 - 12	13 - 35	36 - 60	> 60
Relative Density (%)	< 20	20 - 40	40 - 60	60 - 80	> 80

### LABORATORY TESTING ABBREVIATIONS

TEST TYPE	STRENGTH
(Results shown in Appendix B)	Pocket Penetrometer p
	Direct Shear ds
	Direct Shear (single point) ds*
	Unconfined Compression uc
	Triaxial Compression tx
	Vane Shear vs
<b>CLASSIFICATION</b>	
Plasticity pi	
Grain Size Analysis ma	Consolidation c
Passing No. 200 Sieve wa	Collapse Test col
Sand Equivalent se	Resistance (R) Value r
Expansion Index ei	Chemical Analysis ca
Compaction Curve max	Electrical Resistivity er
Hydrometer h	Permeability perm
Disturb Dist.	Soil Cement sc

Consistency	Very Soft	Soft	Medium	Stiff	Very Stiff	Hard
SPT (N)	< 2	2-4	5-8	9-15	16-30	> 30
CA Sampler	< 3	3-6	7-12	13-25	26-50	> 50

## UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS



**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
Near the Intersection of 34th Street and Crestmore Drive  
City of Riverside, Riverside County, California  
For: Hazen and Sawyer

Project No.  
**20-81-155-01**

Drawing No.  
**A-1**

# Log of Boring No. BH-01

Dates Drilled: 4/30/2020      Logged by: Catherine Nelson      Checked By: Robert L. Gregorek

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 787      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
5		<p><b>ALLUVIUM SAND/SILTY SAND (SP/SM):</b> inter-layered fine to medium-grained, scattered gravel up to 1" in largest dimension, brown. - increase in sand content, fine to coarse-grained, white gray</p> <p>- decrease in sand content, fine to medium-grained, brown</p>		<p>6/7/11</p> <p>6/8/8</p> <p>5/6/10</p>	<p>1</p> <p>2</p> <p>8</p>	<p>97</p> <p>91</p> <p>92</p>	<p>ei, ca, er, ma, max</p> <p>ds</p>	
10		<p><b>SANDY SILT TO SANDY CLAY (ML-CL):</b> fine to medium-grained sand, mottled, brown.</p>		<p>4/6/7</p>	<p>25</p>	<p>84</p>		
15		<p><b>SILTY SAND TO SANDY SILT (SM-ML):</b> fine to medium-grained, mottled, brown.</p>		<p>4/7/8</p>	<p>11</p>	<p>88</p>		
20		<p><b>SAND (SP):</b> fine to coarse-grained, trace silt, mottled, brown.</p>		<p>7/10/12</p>	<p>4</p>	<p>97</p>		
		<p>End of boring at 21.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and compacted by pushing with augers using drill rig weight on 4/30/2020.</p>						



**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
Near the Intersection of 34th Street and Crestmore Drive  
City of Riverside, Riverside County, California  
For: Hazen and Sawyer

Project No.  
**20-81-155-01**

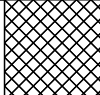



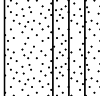


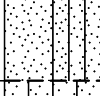

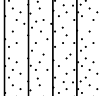



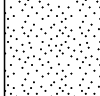

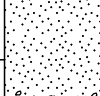



Drawing No.  
**A-2**

# Log of Boring No. BH-02

Dates Drilled: 4/30/2020      Logged by: Catherine Nelson      Checked By: Robert L. Gregorek

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 790      Depth to Water (ft): 32.3'

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>ARTIFICIAL FILL</b> <b>SILTY SAND (SM):</b> fine to coarse-grained, scattered gravel up to 1" in largest dimension, dark brown.						
5		<b>ALLUVIUM</b> <b>SILTY SAND WITH GRAVEL (SM):</b> fine to coarse-grained, some gravel up to 1" in largest dimension, dark brown.			18/20/18	9	102	col ei, ca, er, ma
		<b>SAND WITH SILT (SP-SM):</b> fine to coarse-grained, brown.  - decrease sand content, fine-grained			9/12/13	4	87	dist
10		<b>SANDY SILT TO SANDY CLAY (ML-CL):</b> fine to medium-grained, brown.			5/8/5	9	82	ma, max ds
15		<b>SANDY SILT TO SANDY CLAY (ML-CL):</b> fine to medium-grained, brown.			5/7/6	24	85	
		<b>SAND (SP):</b> fine to coarse-grained, trace silt, grayish brown.			7/9/10	5	93	
20		<b>SAND (SP):</b> fine to coarse-grained, trace silt, grayish brown.  - scattered gravel up to 1" in largest dimension			3/5/3			
25					13/19/19			NR
30					9/11/13			
								



**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
Near the Intersection of 34th Street and Crestmore Drive  
City of Riverside, Riverside County, California  
For: Hazen and Sawyer

Project No.  
**20-81-155-01**

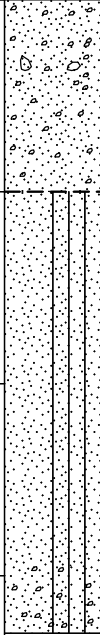
Drawing No.  
**A-3a**

# Log of Boring No. BH-02

Dates Drilled: 4/30/2020 Logged by: Catherine Nelson Checked By: Robert L. Gregorek

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 790 Depth to Water (ft): 32.3'

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<p><b>ALLUVIUM SAND (SP):</b> fine to coarse-grained, scattered gravel up to 2" in largest dimension, trace silt, grayish brown</p>			16/21/26	8		dist
40		<p><b>SAND WITH SILT (SP-SM):</b> fine to coarse-grained, trace clay, gray.</p>	X		6/15/27			
45					13/30/49	18	112	
50		<p>- scattered gravel up to 1" in largest dimension,</p>	X		16/21/21			
		<p>End of boring at 51.5 feet bgs. Groundwater encountered at 32.3 feet bgs. Borehole backfilled with soil cuttings and compacted by pushing with augers using drill rig weight on 4/30/2020.</p>						



**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
Near the Intersection of 34th Street and Crestmore Drive  
City of Riverside, Riverside County, California  
For: Hazen and Sawyer

Project No.  
**20-81-155-01**

Drawing No.  
**A-3b**

## APPENDIX B

### LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Borings, in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

#### **In-Situ Moisture Content and Dry Density**

In-situ dry density and moisture content tests were performed on relatively undisturbed ring samples, in accordance with ASTM Standard D2216 and D2937 to aid soils classification and to provide qualitative information on strength and compressibility characteristics of the site soils. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

#### **Expansion Index**

Two representative bulk samples were tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test results are presented in the following table.

**Table No. B-1, Expansion Index Test Results**

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-01	0-5	Silty Sand (SM)	0	Very Low
BH-02	2.5-5.0	Silty Sand with Gravel (SM)	0	Very Low

#### **Soil Corrosivity**

Two representative soil samples were tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of sites soils when placed in contact with common construction materials. The tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with Caltrans Test Methods 643, 422 and 417. Test results are presented in the following table.

**Table No. B-2, Summary of Soil Corrosivity Test Result**

Boring No.	Depth (feet)	pH	Soluble Sulfates (CA 417) (% by weight)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
BH-01	0-5	8.6	0.027	50	4,437
BH-02	2.5-5	11.2	0.076	29	2,209

**Collapse**

To evaluate the moisture sensitivity (collapse/swell potential) of the encountered soils, one collapse test was performed in accordance with the ASTM Standard D4546 laboratory procedure. The sample was loaded to approximately 2 kips per square foot (ksf), allowed to stabilize under load, and then submerged. The test result is presented in the following table.

**Table No. B-3, Collapse Test Result**

Boring No.	Depth (feet)	Soil Classification	Percent Swell (+) Percent Collapse (-)	Collapse Potential
BH-02	2.5-4.0	Silty Sand with Gravel (SM)	-1.3	Slight

**Grain-Size Analyses**

To assist in classification of soils, mechanical grain-size analyses were performed on three select samples in accordance with the ASTM Standard D6913 test method. Grain-size curves are shown in Drawing No. B-1, *Grain Size Distribution Results* and results are presented in the below table.

**Table No. B-4, Grain Size Distribution Test Results**

Boring No.	Depth (ft)	Soil Classification	% Gravel	% Sand	% Silt	% Clay
BH-01	0-5	Silty Sand (SM)	1.0	75.0	24.0	
BH-02	2.5-5.0	Silty Sand with gravel (SM)	25.0	60.0	15.0	
BH-02	5-10	Sand with Silt (SP-SM)	1.0	93.0	6.0	

**Maximum Density and Optimum Moisture Content**

Laboratory maximum dry density-optimum moisture content relationship tests were performed on two representative bulk samples. The tests were conducted in accordance with the ASTM Standard D1557 test method. The tests results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, and are summarized in the following table.





**Table No B-5, Summary of Moisture-Density Relationship Results**

Boring No.	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Density (lb/cft)
BH-01	0-5	Silty Sand (SM), Brown	8.5	126.0
BH-02	5-10	Sand with Silt (SP-SM), Brown	11.0	113.8

**Direct Shear**

Two direct shear tests were performed on relatively undisturbed representative ring samples under soaked moisture condition in accordance with the ASTM D3080 procedure. For each test, three samples contained in brass sampler rings were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.02 inch/minute. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawings No. B-3 and B-4, *Direct Shear Test Results*, and the following table.

**Table No. B-6, Summary of Direct Shear Test Results**

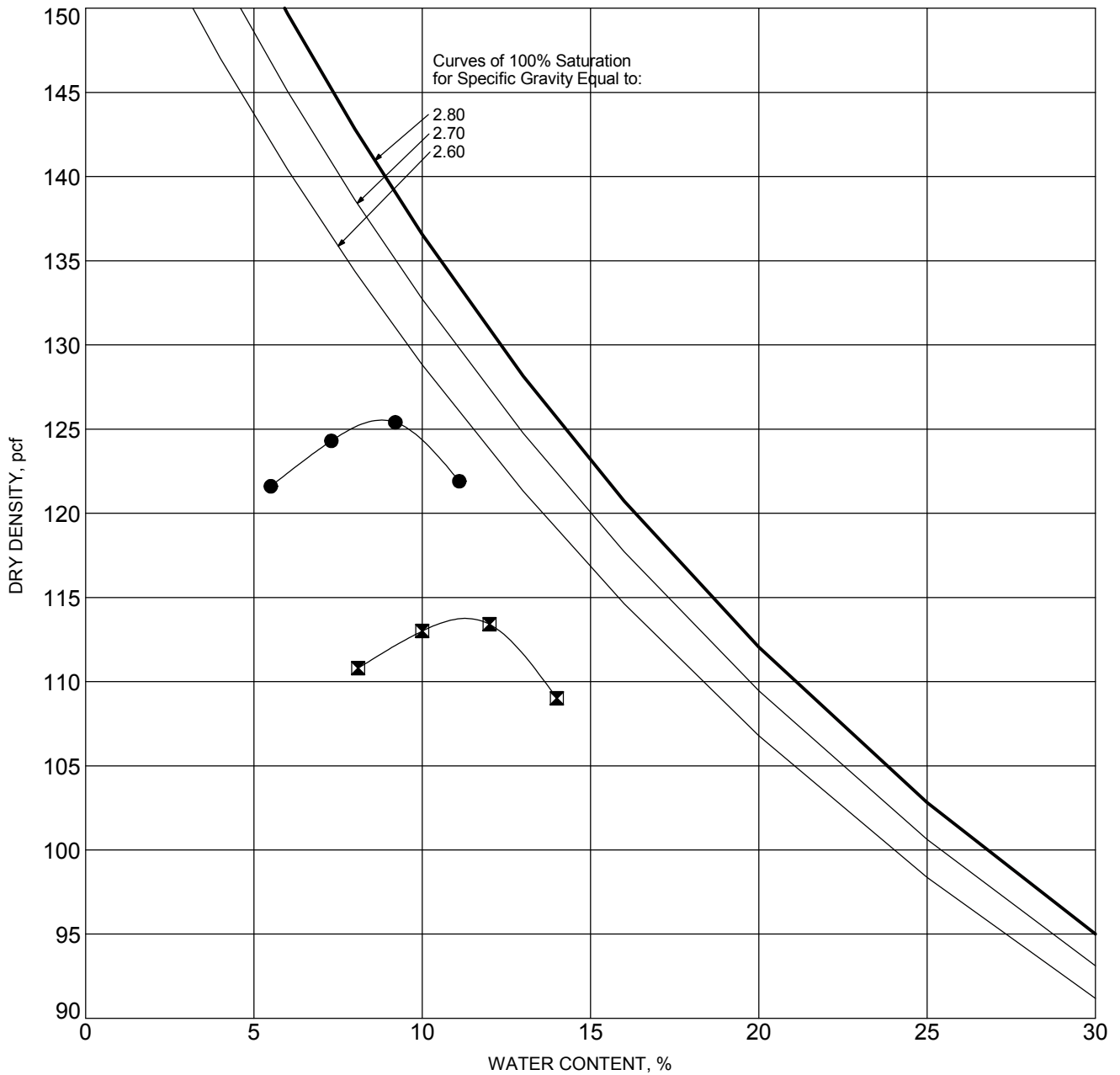
Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-01	5.0-6.5	Silty Sand (SM)	32	90
BH-02	7.5-9.0	Sand with Silt (SP-SM)	35	40

**Sample Storage**

Soil samples presently stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period.







SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-01	0-5	SILTY SAND (SM) BROWN	D1557 - A	8.5	126.0
☒	BH-02	5-10	SAND WITH SILT (SP-SM) BROWN	D1557 - A	11.0	113.8

## MOISTURE-DENSITY RELATIONSHIP RESULTS

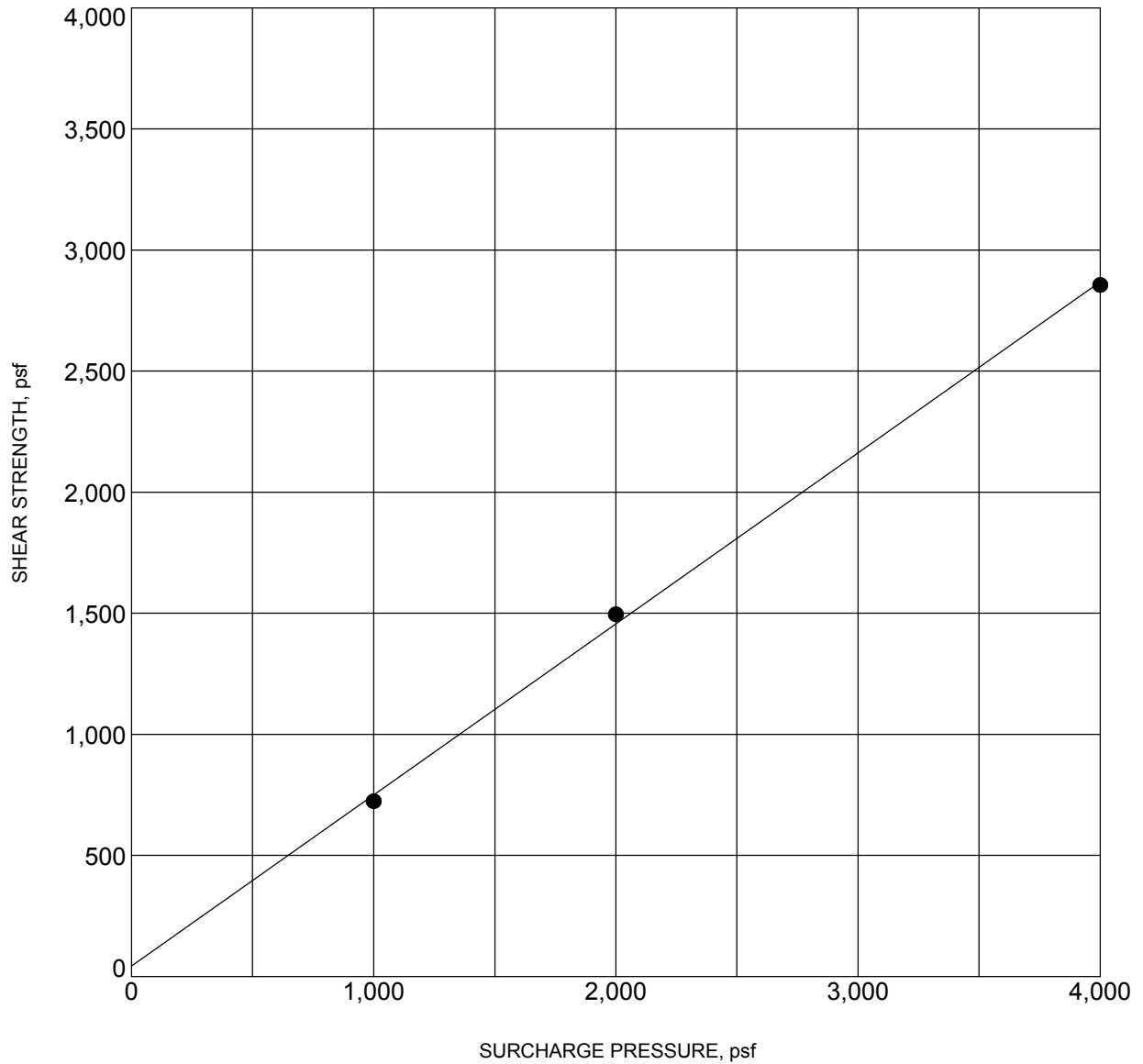


**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
 Near the Intersection of 34th Street and Crestmore Drive  
 City of Riverside, Riverside County, California  
 For: Hazen and Sawyer

Project No.  
**20-81-155-01**

Drawing No.  
**B-2**



BORING NO. :	<b>BH-01</b>	DEPTH (ft) :	<b>5.0-6.5</b>
DESCRIPTION :	<b>SILTY SAND (SM)</b>		
COHESION (psf) :	<b>90</b>	FRICTION ANGLE (degrees):	<b>32</b>
MOISTURE CONTENT (%) :	<b>2.0</b>	DRY DENSITY (pcf) :	<b>91.0</b>

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS

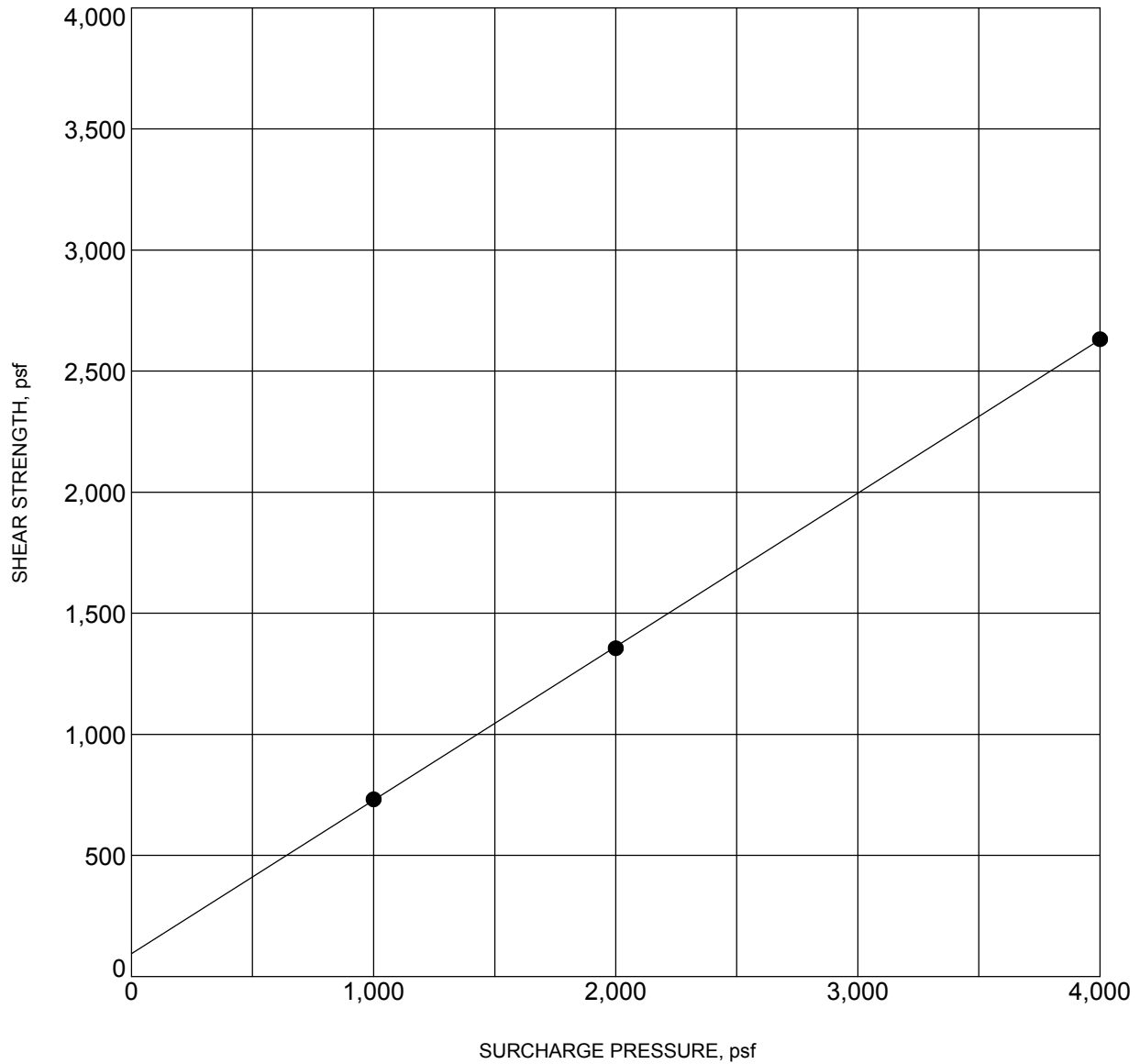


**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
 Near the Intersection of 34th Street and Crestmore Drive  
 City of Riverside, Riverside County, California  
 For: Hazen and Sawyer

Project No.  
**20-81-155-01**

Drawing No.  
**B-3**



BORING NO. :	<b>BH-02</b>	DEPTH (ft) :	<b>7.5-9.0</b>
DESCRIPTION :	<b>SAND WITH SILT (SP-SM), Fine-grained</b>		
COHESION (psf) :	<b>40</b>	FRICTION ANGLE (degrees):	<b>35</b>
MOISTURE CONTENT (%) :	<b>8.0</b>	DRY DENSITY (pcf) :	<b>82</b>

NOTE: Ultimate Strength.

## DIRECT SHEAR TEST RESULTS



**Converse Consultants**

Water Treatment System for Wells No 1A and 18  
 Near the Intersection of 34th Street and Crestmore Drive  
 City of Riverside, Riverside County, California  
 For: Hazen and Sawyer

Project No.  
**20-81-155-01**

Drawing No.  
**B-4**

## APPENDIX C

### LIQUEFACTION AND SETTLEMENT ANALYSIS

The subsurface data obtained from the borings BH-02 was used to evaluate the liquefaction potential and associated dry seismic settlement when subjected to ground shaking during earthquakes.

A simplified liquefaction hazard analysis was performed using the program SPTLIQ (InfraGEO Software, 2019) using the liquefaction triggering analysis method by Boulanger and Idriss (2014). A modal earthquake magnitude of M 8.1 was selected based on the results of seismic deaggregation analysis using the USGS interactive online tool (<https://earthquake.usgs.gov/hazards/interactive/>).

A peak ground acceleration ( $PGA_M$ ) of 0.58g for the MCE design event, where g is the acceleration due to gravity, was selected for this analysis. The PGA was based on the 2019 CBC seismic design parameters presented in Section 8.2, *CBC Seismic Design Parameters*.

The result of our analysis is presented on Plate No. C-1 and summarized in the following table.

**Table C-1, Estimated Dynamic Settlements**

Location	Groundwater Conditions	Groundwater Depth (feet bgs)	Dry Seismic Settlement (inches)	Liquefaction Induced Settlement (inches)
BH-02	Current	> 32.3	1.40	0.17
	Historical			

Based on our analysis, the project sites have the potential for up to 1.4 inch of dry seismic settlement with liquefaction induced settlement of up to 0.2 inches. Based on the subsurface conditions, we anticipate the total dynamic settlement will likely be uniform. Therefore, dynamic differential settlement of the sites is considered nominal.



# SIMPLIFIED LIQUEFACTION HAZARDS ASSESSMENT USING STANDARD PENETRATION TEST (SPT) DATA

(Copyright © 2015, 2018, SPTLIQ, All Rights Reserved; By: InfraGEO Software)

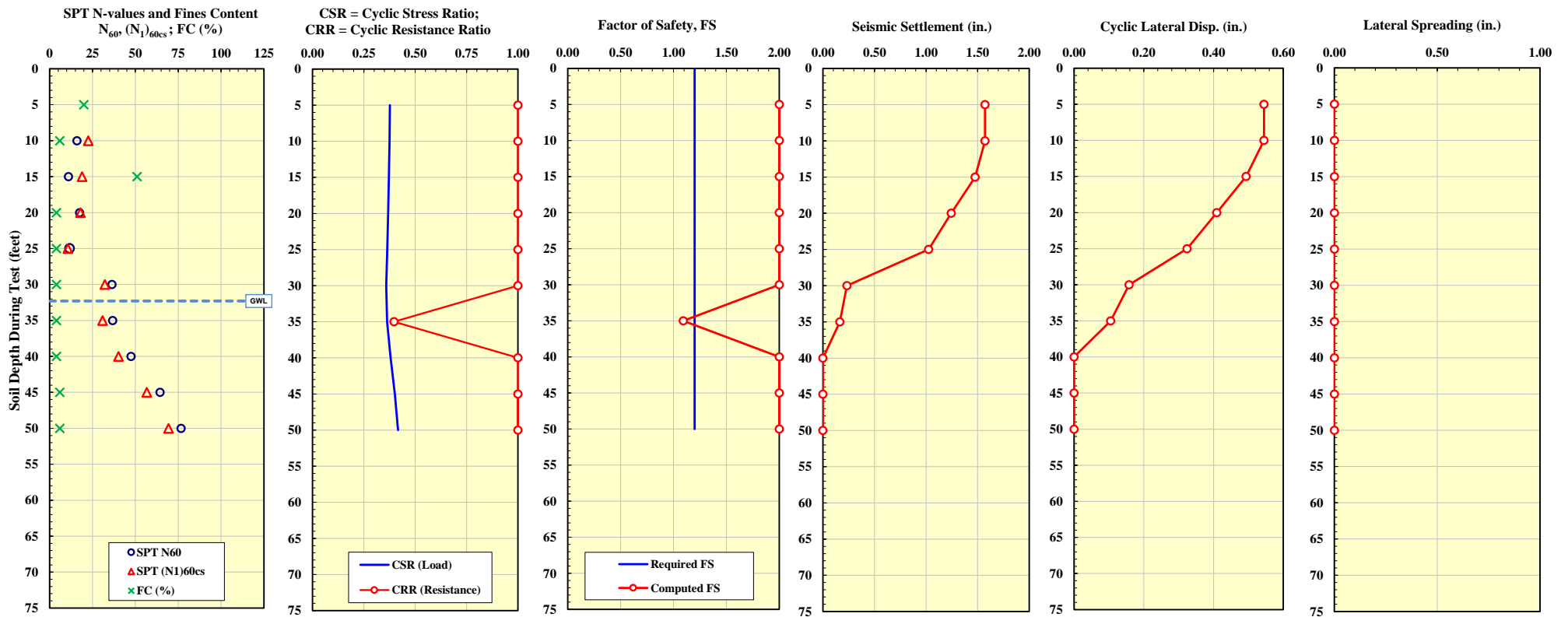
PROJECT INFORMATION	
Project Name	Water Treatment System for Wells No.1A and 18
Project No.	20-81-155-01
Project Location	Riverside, Riverside County, CA
Analyzed By	Mahmoud Suliman
Reviewed By	Zahangir Alam

BORING DATA	
Boring No.	BH-02
Ground Surface Elevation	790.00 feet
Proposed Grade Elevation	790.00 feet
Borehole Diameter	8.00 inches
Hammer Weight	140.00 pounds
Hammer Drop	30.00 inches
Hammer Energy Efficiency Ratio, ER	80.00 %
Hammer Distance to Ground Surface	5.00 feet

TOPOGRAPHIC CONDITIONS	
Ground Slope, S	0.00 %
Free Face (L/H) Ratio	N/A      H = 0.00 feet

SEISMIC DESIGN PARAMETERS	
Earthquake Moment Magnitude, $M_w$	8.10
Peak Ground Acceleration, $A_{g,max}$	0.58 g
Required Factor of Safety, FS	1.20

GROUNDWATER LEVEL DATA	
GWL Depth Measured During Test	32.30 feet
GWL Depth Used in Design	32.30 feet



Analysis Methods Used ==>>

**Liquefaction Triggering:**

Boulanger-Idriss (2014)

**Seismic Settlements:**

Above GWL: Pradel (1998)  
Below GWL: Ishihara and Yoshimine (1992)

**Cyclic Lateral Displacements:**

Above GWL: Pradel (1998)  
Below GWL: Tokimatsu and Asaka (1998)

**Lateral Spreading:**

Zhang et al. (2004)

**APPENDIX C**

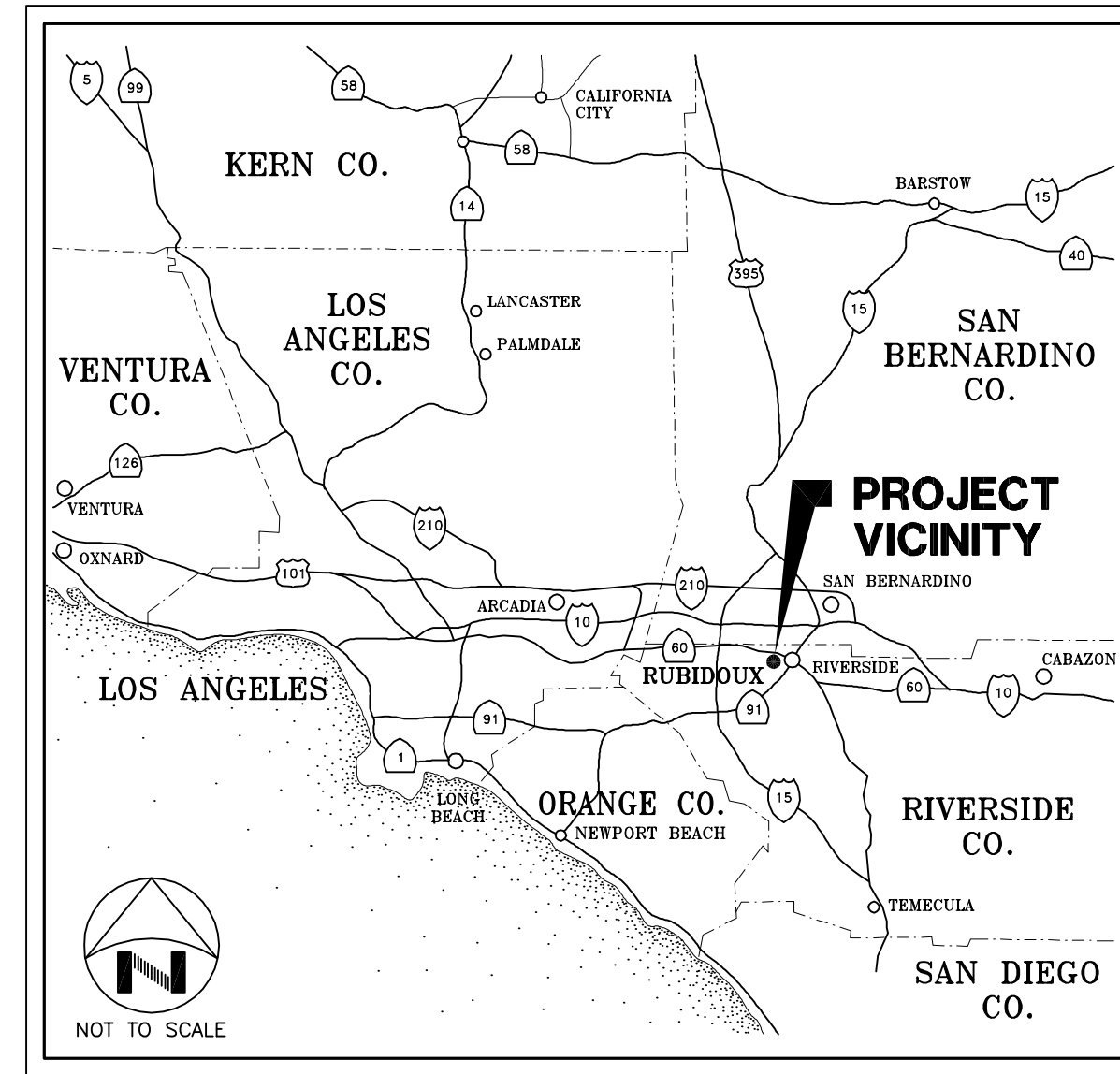
**RECORD DRAWINGS FOR  
WELLS NO. 17 AND NO. 18 IRON AND MANGANESE REMOVAL FACILITY  
PREPARED BY KRIEGER & STEWART  
DATED MAY 21, 2013**



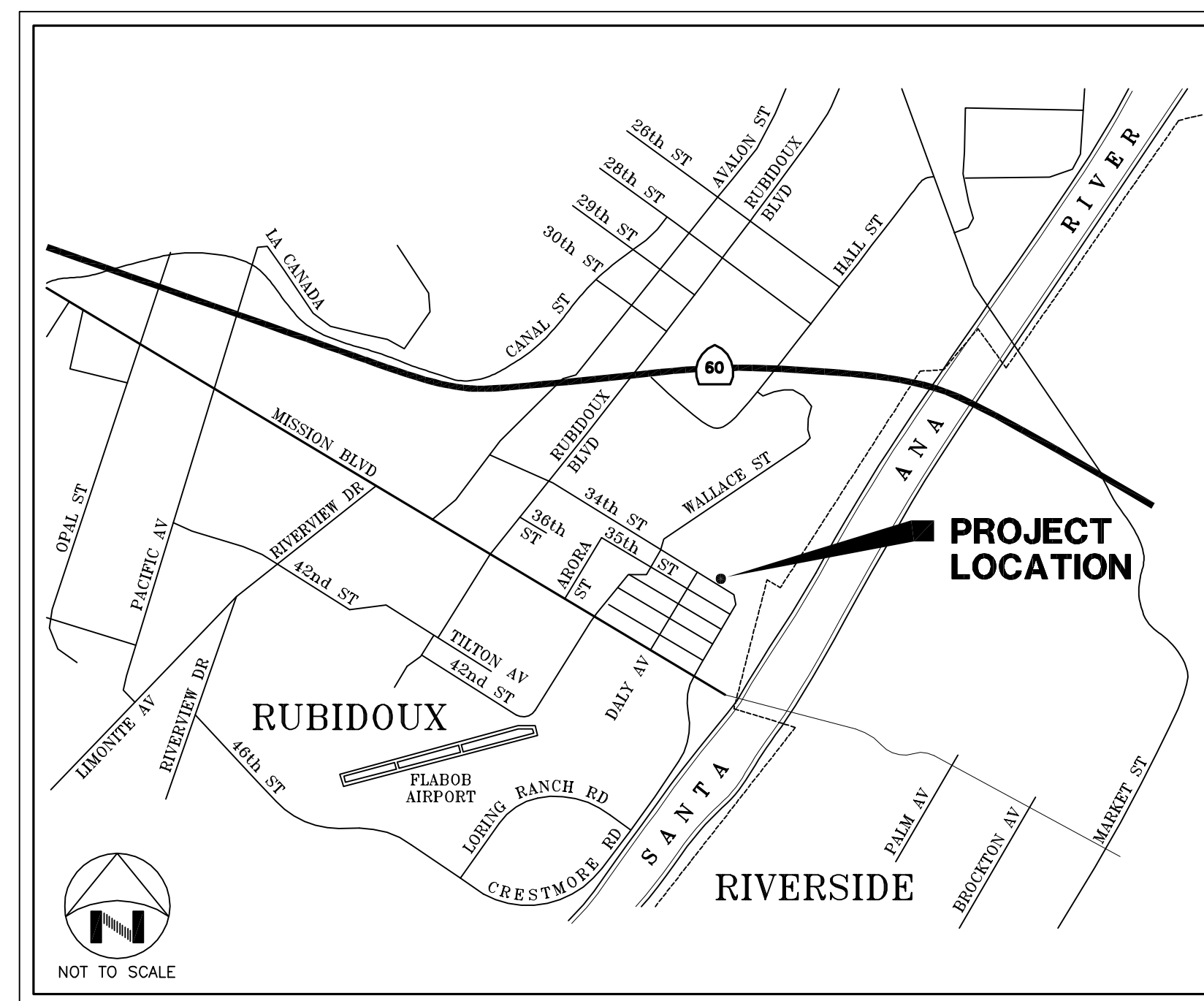
# RUBIDOUX COMMUNITY SERVICES DISTRICT

## WELLS No.17 AND No.18

# IRON AND MANGANESE REMOVAL FACILITY



VICINITY MAP



LOCATION MAP

### DRAWING INDEX

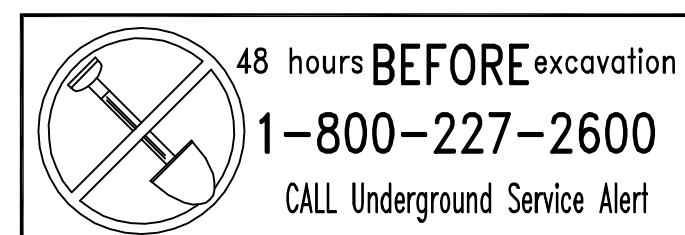
DWG. No.	SHEET No.	DESCRIPTION
G-1	1	TITLE SHEET, LOCATION AND VICINITY MAPS, AND DRAWING INDEX
G-2	2	CONSTRUCTION NOTES
G-3	3	CONSTRUCTION NOTES AND ABBREVIATIONS
G-4	4	LEGENDS, SYMBOLS, AND COATING SCHEDULE
G-5	5	PIPE MATERIAL SCHEDULE
G-6	6	TREATMENT PROCESS SCHEMATIC
G-7	7	CHEMICAL SYSTEMS SCHEMATIC
C-1	8	GENERAL SITE PLAN
C-2	9	GRADING PLAN - SOUTH
C-3	10	GRADING PLAN - NORTH AND SECTION
C-4	11	SITE PIPING AND ELECTRICAL PLAN - SOUTH
C-5	12	SITE PIPING AND ELECTRICAL PLAN - NORTH
C-6	13	WALL ELEVATIONS
C-7	14	WALL ELEVATION AND MISCELLANEOUS DETAILS
C-8	15	WALL AND GATE DETAILS
C-9	16	SITE PIPING DETAILS
C-10	17	MISCELLANEOUS SECTIONS AND DETAILS
C-11	18	SITE OVER-EXCAVATION AND RECOMPACTION PLAN AND SECTIONS
D-1	19	DEMOLITION AND TEMPORARY FACILITIES PLAN AND DETAIL
M-1	20	STANDARD PIPE/CONDUIT SUPPORT DETAILS
M-2	21	STANDARD PIPE/CONDUIT/DUCT SUPPORT DETAILS
M-3	22	STANDARD MECHANICAL DETAILS
M-4	23	STANDARD MECHANICAL DETAILS
1M-1	24	FILTER PLAN
1M-2	25	FILTER SECTIONS
1M-3	26	FILTER SECTIONS
1M-4	27	FILTER DETAILS
2M-1	28	EQUIPMENT BUILDING FLOOR PLAN
2M-2	29	EQUIPMENT BUILDING ROOF PLAN
2M-3	30	EQUIPMENT BUILDING SECTIONS
2M-4	31	EQUIPMENT BUILDING SECTIONS
2M-5	32	EQUIPMENT BUILDING DETAILS
3M-1	33	BACKWASH WASTE TANK PLAN
3M-2	34	BACKWASH WASTE TANK ROOF PLAN AND SECTIONS
3M-3	35	BACKWASH WASTE TANK SECTIONS AND DETAILS

### DRAWING INDEX (CONT.)

DWG. No.	SHEET No.	DESCRIPTION
3M-4	36	RCW/WF PUMP STATION PLAN
3M-5	37	RCW/WF PUMP STATION SECTIONS AND DETAILS
4M-1	38	EXISTING WELL MODIFICATION PLANS, SECTION, AND DETAILS
4M-2	39	EMERGENCY STANDBY GENERATOR
A-1	40	EQUIPMENT BUILDING FLOOR/ROOF PLANS AND TANK ENCLOSURE SOUTH ELEVATION
A-2	41	EQUIPMENT BUILDING ELEVATIONS AND SCHEDULES
A-3	42	STANDARD ARCHITECTURAL DETAILS
S-1	43	TYPICAL STRUCTURAL DETAILS
S-2	44	STANDARD STRUCTURAL DETAILS
S-3	45	STANDARD AND MISCELLANEOUS STRUCTURAL DETAILS
1S-1	46	FILTER AREA PLAN
1S-2	47	FILTER SECTIONS AND DETAILS
2S-1	48	EQUIPMENT BUILDING FOUNDATION PLAN AND SECTIONS
2S-2	49	EQUIPMENT BUILDING ROOF FRAMING PLAN AND DETAILS
2S-3	50	EQUIPMENT BUILDING SECTIONS AND DETAILS
2S-4	51	EQUIPMENT BUILDING DETAILS
3S-1	52	BACKWASH WASTE TANK PLAN, SECTION, AND DETAIL
3S-2	53	RCW/WF PUMP STATION PLAN
E-1	54	ELECTRICAL, SYMBOLS, ABBREVIATIONS, AND FIXTURE LIST
E-2	55	ELECTRICAL MCC SINGLE LINE DIAGRAM
E-3	56	SERVICE SECTION, MCC, AND CONTROL PANELS PLANS, ELEVATIONS, AND SCHEMATIC
E-4	57	STANDARD ELECTRICAL DETAILS
E-5	58	ELECTRICAL POWER AND CONTROL CONDUIT/CONDUCTOR SCHEDULE
E-6	59	ELECTRICAL POWER AND CONTROL CONDUIT/CONDUCTOR SCHEDULE AND ELECTRICAL PULL BOX SCHEDULE
E-7	60	BWWT, CL2 STORAGE AND BRINE TANK LEVEL SCHEMATICS
E-8	61	CONTROL LADDER DIAGRAMS
E-9	62	CONTROL LADDER DIAGRAMS
E-10	63	CONTROL LADDER DIAGRAMS
E-11	64	RTU INTERCONNECT DIAGRAMS
1E-1	65	FILTER ELECTRICAL PLAN
2E-1	66	EQUIPMENT BUILDING ELECTRICAL PLAN
2E-2	67	EQUIPMENT BUILDING LIGHTING PLAN
3E-1	68	RCW/WF PUMP STATION ELECTRICAL PLAN
4E-1	69	EXISTING WELLS 17 AND 18 ELECTRICAL PLANS

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



RUBIDOUX COMMUNITY SERVICES DISTRICT  
APPROVED BY: *Steven W. Appel*  
STEVEN W. APPEL  
ASSISTANT GENERAL MANAGER/  
DISTRICT ENGINEER  
DATE 2-15-11



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jim C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	TMW
CHECKED	PES

RUBIDOUX COMMUNITY SERVICES DISTRICT  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
TITLE SHEET, LOCATION AND VICINITY  
MAPS, AND DRAWING INDEX

DRAWING  
**G-1**  
1 OF 69 SHEETS  
11711  
R.C.S.D. PLAN No.

DWG. NO.: re-98-19-54-01 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:15PM PLOT SCALE: 1=1



DWG. NO.: 16-587-19-54-00 FILE NO.: 16-587-19-54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:16PM PLOT SCALE: 1=1

GENERAL

- 1. CONTRACTOR SHALL PERFORM CONSTRUCTION WORK IN A MANNER TO MAINTAIN CONTINUOUS OPERATION OF THE EXISTING WELLS No.17 AND No.18 PUMPING PLANT FACILITIES. CONTRACTOR SHALL COOPERATE WITH THE DISTRICT WHO WILL BE OPERATING THE EXISTING AND PROPOSED FACILITIES AND SHALL NOT INTERFERE NOR INTERRUPT THE FACILITY OPERATION, EXCEPT AS SPECIFICALLY APPROVED BY THE DISTRICT OR CONTRACTOR SHALL NOT OPERATE ANY EXISTING VALVE OR EQUIPMENT. ANY SUCH WORK NECESSARY SHALL BE PERFORMED BY THE DISTRICT. CONTRACTOR SHALL FOLLOW THE SEQUENCE OF WORK SPECIFIED IN SPECIFICATION SECTION 01185. UNLESS SPECIFIED OTHERWISE, A MINIMUM OF 10 WORKING DAYS WRITTEN NOTICE TO THE DISTRICT IS REQUIRED PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITIES WHICH MAY AFFECT EXISTING FACILITIES.
2. CONTRACTOR SHALL PROTECT EXISTING FACILITIES AND IMPROVEMENTS IN PLACE AND NOT INTERRUPT EXISTING FACILITIES OPERATION. EXISTING FACILITIES SHALL REMAIN OPERATIONAL AT ALL TIMES EXCEPT FOR SHORT DURATION SHUT-DOWN AS REFERENCED IN SEQUENCE OF WORK. ANY FACILITIES DAMAGED SHALL BE REPAIRED OR REPLACED IN KIND AS APPROVED BY DISTRICT.
3. CONTRACTOR SHALL FURNISH AND INSTALL THE IRON AND MANGANESE FILTRATION SYSTEM, WHICH SHALL BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS AND THE CONSTRUCTION DRAWINGS. THE DISTRICT HAS PRE-SELECTED THE FILTRATION SYSTEM SUPPLIER (FSS) TO BE FILTRONICS, INC. APPROVED SHOP DRAWINGS SHOWING SPECIFICS OF EQUIPMENT BEING SUPPLIED BY THE FSS, INCLUDING DIMENSIONS AND WEIGHTS, ARE PROVIDED IN APPENDIX "B" OF THE SPECIFICATIONS. CONTRACTOR SHALL VERIFY THAT DELIVERED FSS EQUIPMENT AND ACCESSORIES CONFORM TO THE EQUIPMENT SHOP DRAWINGS AND CONFIRM EXACT DIMENSIONS OF EQUIPMENT FURNISHED.
4. CONTRACTOR SHALL FURNISH AND INSTALL THE CHEMICAL SYSTEM, WHICH SHALL BE FURNISHED BY THE CHEMICAL SYSTEM SUPPLIER (CSS) IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS AND THE CONSTRUCTION DRAWINGS. EQUIPMENT TO BE SPECIFICALLY FURNISHED BY THE CSS TO MAINTAIN UNIT RESPONSIBILITY IS NOTED "BY CSS".
5. THE DISTRICT HAS PRE-SELECTED THE INSTRUMENTATION/SCADA SYSTEM SUBCONTRACTOR (SSC) TO BE CENTER ELECTRIC. EQUIPMENT TO BE FURNISHED AND INSTALLED BY THE SSC IS SPECIFIED IN THE SPECIFICATIONS AND SHOWN ON THE CONSTRUCTION DRAWINGS.
6. EQUIPMENT AND MATERIALS, INCLUDING PIPING, VALVES, FITTINGS, DRAINS, PIPE SUPPORTS, ETC., ARE SHOWN ON THE DRAWINGS BY SYMBOLS. PIPE SIZE IS SHOWN AS STANDARD CALL OUT WITH SIZE AND PIPE DUTY. MATERIAL DESCRIPTION LISTS, WHERE PROVIDED, ARE FOR CLARITY AND SPECIAL ITEMS ON SOME DRAWINGS. NOT ALL EQUIPMENT, PIPING, VALVES, AND FITTINGS ARE INCLUDED IN MATERIAL DESCRIPTION LISTS. CONTRACTOR SHALL FURNISH AND INSTALL EQUIPMENT AND MATERIALS AS SHOWN ON THE DRAWINGS BY SYMBOLS AND MATERIAL DESCRIPTION LISTS, INCLUDING PIPING, PIPE FITTINGS, ADAPTERS, AND APPURTENANCES NECESSARY TO PROVIDE COMPLETE, OPERABLE SYSTEMS.
7. ASTERISK (\*) DENOTES A DIMENSION DEPENDENT UPON ACTUAL EQUIPMENT FURNISHED OR EXISTING EQUIPMENT AS INSTALLED. DIMENSION TO BE VERIFIED PRIOR TO CONSTRUCTION AND PRIOR TO ORDERING EQUIPMENT DEPENDENT UPON DIMENSION. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS WITH ACTUAL FABRICATED EQUIPMENT DELIVERED TO PROJECT SITE UNDER ALL CONDITIONS. CONTRACTOR SHALL ALLOW FOR ADJUSTMENTS TO CONNECTIONS TO EQUIPMENT DUE TO FABRICATION TOLERANCES AND INSTALLATION TOLERANCES.
8. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT THE SITE AND CROSS CHECK DETAILS AND DIMENSIONS SHOWN ON THE DRAWINGS. FLOOR AND WALL OPENINGS, SLEEVES, PENETRATIONS AND OTHER CIVIL, STRUCTURAL, MECHANICAL, OR ELECTRICAL REQUIREMENTS MUST BE COORDINATED BEFORE CONTRACTOR PROCEEDS WITH CONSTRUCTION.
9. IN NO CASE SHALL WORKING DIMENSIONS BE SCALED FROM PLANS, SECTIONS, OR DETAILS ON DRAWINGS.
10. THE PRECISE DIMENSIONS AND LOCATIONS OF ALL OPENINGS AND PENETRATIONS SHALL BE DETERMINED FOR THE ACTUAL EQUIPMENT BEING FURNISHED. SHOP DRAWINGS WITH ADEQUATE ACCURATE DIMENSIONS MUST BE SUBMITTED AND REVIEWED PRIOR TO CONTRACTOR CONSTRUCTING FACILITIES THAT ARE AFFECTED BY SAID EQUIPMENT.
11. CONTRACTOR IS ADVISED THAT THE WORK ON THIS PROJECT MAY INVOLVE WORKING IN A CONFINED SPACE. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING WORK AREA CLASSIFICATION AND IMPLEMENTATION OF ALL PRACTICES AND PROCEDURES REQUIRED FOR "CONFINED SPACES" UNDER THE CALIFORNIA ADMINISTRATIVE CODE, TITLE 8.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING PROJECT SITE SECURITY. PROJECT SITE SHALL REMAIN SECURED BY EXISTING DISTRICT FENCE OR TEMPORARY 6" HIGH CHAIN LINK FENCE AT ALL TIMES. PLANT AREA MUST BE SECURE AT END OF EACH WORK DAY.
13. CONTRACTOR SHALL PROVIDE HIS OWN SANITARY AND OFFICE FACILITIES INCLUDING TELEPHONE AND TEMPORARY POWER.
14. APPROVAL OF DISTRICT IMPLIES NO PERMISSION OTHER THAN THAT WITHIN THE DISTRICT'S JURISDICTION. ALL PERMITS REQUIRED BY LAW AND NOT ALREADY OBTAINED BY THE DISTRICT SHALL BE ACQUIRED BY CONTRACTOR. REQUIREMENTS OF DISTRICT SHALL TAKE PRECEDENCE OVER REQUIREMENTS OF OTHER AGENCIES ONLY WHERE DISTRICT REQUIREMENTS ARE MORE STRINGENT.
15. CONTRACTOR SHALL NOT STORE MATERIALS OR EQUIPMENT ON PRIVATE OR PUBLIC PROPERTY WITHOUT WRITTEN PERMISSION APPROVING SUCH USE. CONTRACTOR MAY STORE MATERIALS AND EQUIPMENT ON DISTRICT'S PROPERTY IN DESIGNATED AREAS.
16. CONTRACTOR IS ADVISED THAT GROUNDWATER WAS ENCOUNTERED DURING PERFORMANCE OF THE PRELIMINARY GEOTECHNICAL INVESTIGATION FOR THE PROPOSED FACILITIES. CONTRACTOR SHALL INCLUDE ALL COSTS FOR PROVIDING MATERIALS, EQUIPMENT, POWER, LABOR, AND RELATED EXPENSES ASSOCIATED WITH DEWATERING GROUNDWATER WITHIN THE EXCAVATIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING PUMPING LOCATIONS IN OR ADJACENT TO THE EXCAVATIONS TO ADEQUATELY REMOVE WATER FROM WITHIN THE EXCAVATIONS DURING CONSTRUCTION.
ALL DEWATERING SHALL BE PERFORMED IN CONFORMANCE WITH ALL SAFETY REGULATIONS AND REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) REQUIREMENTS. CONTRACTOR SHALL HAVE THE SOLE RESPONSIBILITY TO OBTAIN ALL PERMITS AND CLEARANCES FROM ANY AND ALL REGULATORY AGENCIES, WHERE REQUIRED BY RWQCB, MONITORING SHALL BE PERFORMED BY CONTRACTOR.
17. CONTRACTOR SHALL PREPARE A DEWATERING PERMIT FOR OFFSITE DISPOSAL OF FLUSHING WATER DURING DISINFECTION OF PIPELINES IN ACCORDANCE WITH RWQCB REQUIREMENTS. IN ADDITION, CONTRACTOR SHALL DECHLORINATE ANY DISINFECTION WATER DISCHARGED FROM THE CONSTRUCTION SITE TO THE RWQCB PRIOR TO FLUSHING AND SHALL COMPLY WITH ALL REQUIREMENTS OF SAID AGENCY.
18. PROJECT IS FUNDED BY A SAFE DRINKING WATER STATE REVOLVING FUND LOAN PROGRAM AND THE CONTRACTOR SHALL COMPLY WITH STATE AND FEDERAL CONTRACT DOCUMENTS PER SPECIFICATIONS SPECIAL REQUIREMENTS ITEM 9 AND NOTICE INVITING BIDS.

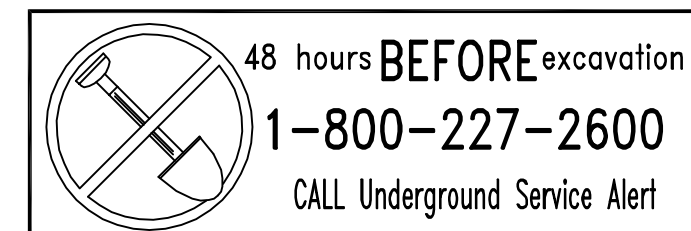
UNDERGROUND FACILITIES AND EXISTING IMPROVEMENTS

- 1. THE LOCATIONS OF EXISTING UNDERGROUND FACILITIES (PIPING, VALVES, CONDUCTORS, ELECTRICAL CONDUIT, ETC.) ARE SHOWN IN AN APPROXIMATE WAY ONLY AND ARE BASED ON OWNER'S EXISTING RECORDS. CONTRACTOR SHALL EXERCISE CARE DURING EXCAVATIONS TO AVOID DAMAGE TO SAID FACILITIES. CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UNDERGROUND FACILITIES BEFORE COMMENCING WORK. CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY DAMAGES WHICH RESULT FROM HIS FAILURE TO EXACTLY LOCATE AND PROTECT ANY AND ALL FACILITIES.

AT LEAST 48 HOURS BEFORE COMMENCING ANY EXCAVATION, CONTRACTOR SHALL REQUEST UNDERGROUND SERVICE ALERT (1-800-227-2600) AND NON-MEMBER COMPANIES OR

RECORD DRAWING

BY: [Signature] DATE: 05/21/13
KRIEGER & STEWART, INCORPORATED



CONSTRUCTION NOTES

UTILITIES TO MARK OR OTHERWISE INDICATE THE LOCATION(S) OF THEIR SUBSURFACE FACILITIES INCLUDING, BUT NOT LIMITED TO, STRUCTURES, VAULTS, PIPING, VALVES, CONDUCTORS, CONDUIT, CABLES, AND SERVICE CONNECTIONS.

- 2. AS FIRST ITEM OF WORK (WITHIN 45 DAYS OF EXECUTION OF CONTRACT) CONTRACTOR SHALL EXCAVATE AND EXPOSE ("POTHOLE") EXISTING FACILITIES IN LOCATIONS WHERE NEW FACILITIES ARE PROPOSED TO ESTABLISH THE EXACT HORIZONTAL LOCATION, SIZE, AND ELEVATION, AND DETERMINE IF THERE WILL BE AN INTERFERENCE WITH PROPOSED FACILITIES. CHANGES OR DELAYS CAUSED BY CONTRACTOR'S FAILURE TO PERFORM "POTHOLING" AND INTERFERE WITH LOCATION WORK SHALL NOT BE ELIGIBLE FOR EXTRA WORK COMPENSATION OR TIME EXTENSION.
CONTRACTOR SHALL SUBMIT "POTHOLE" DATA (EXACT ELEVATION, SIZE, AND HORIZONTAL LOCATION) TO DISTRICT. BASED ON SAID "POTHOLE DATA", DISTRICT MAY MODIFY BELOW GRADE PIPING ALIGNMENT AND GRADE TO AVOID EXISTING PIPING AND WILL SUBMIT MODIFICATIONS, IF ANY, TO CONTRACTOR WITHIN TWO WEEKS OF RECEIPT OF ALL "POTHOLE" DATA.
3. EXISTING IMPROVEMENTS INCLUDING WHERE DAMAGED OR REMOVED BY CONSTRUCTION SHALL BE REPLACED IN KIND. LIMITS OF REMOVAL AND REPLACEMENT SHALL BE APPROVED BY THE DISTRICT PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.

SITE WORK AND GRADING

- 1. SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AND NOTES HEREON.
2. RELATIVE COMPACTION OF 95% SHALL MEAN SOIL COMPACTED TO A DRY DENSITY EXCEEDING 95% OF THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D 1557-91.
3. ALL DEBRIS, BRUSH, AND RUBBISH SHALL BE REMOVED AND DISPOSED OF TO LEAVE THE AREA WHICH HAS BEEN DISTURBED WITH A NEAT AND FINISHED APPEARANCE FREE FROM ALL DEBRIS. WHERE REMOVAL OF SUBSURFACE OBSTRUCTIONS IS NECESSARY, CAVITIES CREATED BY THE REMOVAL SHALL BE CLEARED OF ALL LOOSE DEBRIS AND SOIL AND SHAPED TO PROVIDE ACCESS FOR BACKFILLING AND COMPACTION EQUIPMENT. SAID MATERIALS SHALL BE LEGALLY DISPOSED OF IN AN APPROVED OFFSITE LOCATION (CITY OR COUNTY LANDFILL).
4. EXCAVATED NATIVE SOILS MAY BE UTILIZED FOR SELECT FILL MATERIAL, PROVIDED THESE MATERIAL ARE FREE OF VEGETATIVE MATTER AND OTHER DELETERIOUS SUBSTANCES, AND SHALL NOT CONTAIN ROCKS OR IRREDUCIBLE MATERIALS WITH A MAXIMUM DIMENSION GREATER THAN 3".
ALL ROCK, VEGETATIVE MATTER, AND OTHER DELETERIOUS SUBSTANCES SHALL BE HAULED TO AND DISCARDED AT A LEGAL DISPOSAL SITE. CONTRACTOR SHALL NOT DISPOSE OF SUCH MATERIAL ON VACANT PRIVATE OR PUBLIC PROPERTY WITH OR WITHOUT PERMISSION.
THE FINAL SURFACES SHALL BE WHEEL ROLLED TO A SMOOTH, WELL COMPACTED SURFACE AT BOTH SUBGRADE AND AT FINISHED GRADE.

- 5. CONTRACTOR SHALL IMPORT SUFFICIENT QUANTITIES OF SELECT FILL MATERIAL TO ACHIEVE THE SPECIFIED FINISHED GRADES AND MINIMUM RELATIVE COMPACTION. IMPORT SELECT FILL MATERIAL SHALL BE INORGANIC, GRANULAR, NON-EXPANSIVE SOIL, FREE OR ROCKS OR SUBS OF GREATER THAN 4" IN MAXIMUM DIMENSION. IMPORT SELECT FILL MATERIAL SHALL MEET THE USCS CLASSIFICATIONS OF SM, SP-SM, OR SW-SM WITH 5% TO 35% PASSING THE No.200 SIEVE.
6. THE SOILS UNDER AND 10' BEYOND THE EQUIPMENT BUILDING, FILTER VESSELS, AND BACKWASH WASTE TANK FOUNDATIONS SHALL BE OVER-EXCAVATED A MINIMUM OF 9' BELOW THE EXISTING GRADE. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%. THE COMPACTED SUBGRADE SHALL THEN BE COVERED WITH A FILTER FABRIC (MIRAFI 140N, OR EQUIVALENT) AND OVERLAIN BY 18" OF 2" CRUSHED AGGREGATE. THE AGGREGATE SHALL BE LIGHTLY MOISTENED AND TAMPED INTO PLACE USING 6" TO 9" THICK LIFTS TO INDUCE CONSOLIDATION. THE AGGREGATE LAYER SHALL BE COVERED WITH FILTER FABRIC AND OVERLAIN BY SELECT FILL MATERIAL COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION. TWO LAYERS OF UNIAXIAL GEOGRID (TENSAR UX 1600, OR EQUIVALENT) ORIENTED 90 DEGREES SHALL BE PLACED WITHIN THE FILL, SPACED 1' APART AND BEGINNING WITH THE UPPER GEGRID APPROXIMATELY 2' BELOW THE EXISTING GRADE. PLACEMENT OF GEOGRIDS SHALL TAKE LOCATION OF UNDERGROUND UTILITIES INTO CONSIDERATION, SUCH THAT DAMAGE TO THE GRID IS MINIMIZED DURING SUBSEQUENT TRENCH EXCAVATIONS AND PLACEMENT OF PIPING AND CONDUIT.

- 7. THE SOILS UNDER AND 5' BEYOND THE STANDBY GENERATOR AND BRINE MAKE-UP TANK FOUNDATIONS SHALL BE OVER-EXCAVATED A MINIMUM OF 3' BELOW THE EXISTING GRADE. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%. SELECT FILL MATERIAL SHALL BE PLACED ON THE COMPACTED SUBGRADE AND BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%.

- 8. THE SOILS UNDER AND 3' BEYOND THE SITE WALL FOUNDATIONS SHALL BE OVER-EXCAVATED A MINIMUM OF 3' BELOW THE EXISTING GRADE. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%. SELECT FILL MATERIAL SHALL BE PLACED ON THE COMPACTED SUBGRADE AND BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%.

- 9. THE SOILS UNDER AND 2' BEYOND THE OUTER EDGE OF FOOTINGS FOR BELOW GRADE STRUCTURES SUCH AS MANHOLES, VAULTS, AND PULL BOXES, SHALL BE OVER-EXCAVATED A MINIMUM OF 2' BELOW THE BOTTOM OF THE FOUNDATIONS. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%. SELECT FILL MATERIAL SHALL BE PLACED ON THE COMPACTED SUBGRADE AND BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%.

- 10. SELECT FILL MATERIAL SHALL BE PLACED IN LIFTS NO GREATER THAN 8" IN LOOSE THICKNESS AND COMPACTED TO THE SPECIFIED MINIMUM RELATIVE COMPACTION.

- 11. THE SOILS UNDER AREAS TO RECEIVE AGGREGATE BASE, CRUSHED ROCK, OR CONCRETE SLABS ON GRADE SHALL BE OVER-EXCAVATED A MINIMUM OF 1' BELOW THE EXISTING GRADE. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 90%. SELECT FILL MATERIAL SHALL BE PLACED ON THE COMPACTED SUBGRADE AND BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%.

- 12. THE SOILS UNDER AREAS TO RECEIVE FILL SHALL BE OVER-EXCAVATED A MINIMUM OF 1' BELOW THE EXISTING GRADE. THE EXPOSED SUBGRADE SHALL BE SCARIFIED TO A DEPTH OF 12", BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 90%. SELECT FILL MATERIAL SHALL BE PLACED ON THE COMPACTED SUBGRADE AND BROUGHT TO NEAR OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 95%.

- 13. DISTRICT SHALL APPROVE PREPARATION OF ALL NATURAL GROUND SURFACE PRIOR TO PLACEMENT OF FILL ON THAT SURFACE.
14. CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND INSTALLING EROSION AND DUST CONTROL MEASURES PER CONTRACTOR'S SWPPP, AND AS NECESSARY TO COMPLY WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
15. CLASS II AGGREGATE BASE, CLASS II BASE, OR CLASS 2 BASE SHALL BE CRUSHED AGGREGATE BASE PER SSPWC SECTION 200-2.2.
16. 3/4" GRADED CRUSHED ROCK OR 3/4" CRUSHED ROCK SHALL MEET SSPWC SECTION 200-1.2 FLOOR.
17. ALL SUBGRADES TO RECEIVE ASPHALT CONCRETE PAVEMENT, CLASS II BASE PAVING, OR 3/4" CRUSHED ROCK SHALL RECEIVE SOIL TREATMENT PER SPECIFICATION SECTION 02280.
18. PERMANENT ASPHALT CONCRETE PAVEMENT
PERMANENT ASPHALT CONCRETE PAVEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 02500, EXCEPT AS MODIFIED HEREAFTER.

A. PREPARATION

UPPER 12" OF SUBGRADE BENEATH AGGREGATE BASE SHALL BE SCARIFIED AND COMPACTED TO 95% RELATIVE COMPACTION MINIMUM.

B. THICKNESS

UNLESS NOTED OTHERWISE, PERMANENT ASPHALT CONCRETE PAVEMENT SHALL BE HOT PLACED TO A 1/2" TOTAL THICKNESS MINIMUM PLACED OVER 8" OF CRUSHED AGGREGATE BASE (PER SSPWC SECTION 200-2.2). ASPHALT CONCRETE PAVEMENT AND CRUSHED AGGREGATE BASE SHALL BE COMPACTED TO 95% RELATIVE COMPACTION MINIMUM.

C. ASPHALT CONCRETE PAVEMENT SPECIFICATIONS

PERMANENT PAVEMENT SHALL BE PLACED IN TWO LIFTS. THE FIRST LIFT MAY BE PLACED WITH A BLADE AND ROLLER. THE SECOND LIFT SHALL BE PLACED WITH A SELF-PROPELLED MECHANICAL SPREADING AND PAVING MACHINE.

THE SECOND LIFT SHALL OVERLAP TRENCH EDGES 1' MINIMUM, AND EDGES SHALL BE FEATHERED TO MEET EXISTING PAVEMENT. AFTER PLACEMENT, PAVEMENT SHALL NOT VARY MORE THAN 0.01' FROM A STRAIGHT EDGE PLACED ACROSS ANY TRENCH.

PAVEMENT MATERIALS SHALL COMPLY WITH SSPWC SECTION 203-6. UNLESS NOTED OTHERWISE, THE FIRST LIFT SHALL BE B-P664-10 AND THE SECOND LIFT SHALL BE C2-P664-10.

D. REMOVAL OF EXISTING AC PAVEMENT

WHERE EXISTING ASPHALT CONCRETE PAVEMENT IS TO BE REMOVED FOR INSTALLATION OF BELOW GRADE PIPING AND ELECTRICAL CONDUIT, SAW CUT EXISTING ASPHALT PAVEMENT EDGES (PER ADDITIONAL EACH SIDE OF TRENCH) TO STRAIGHT, NEAT, VERTICAL EDGES, EITHER PERPENDICULAR TO OR PARALLEL WITH THE TRENCH. CONTRACTOR SHALL EXCAVATE UNDERLYING SUBGRADE TO PROPER GRADE AND COMPACT IT TO 95% RELATIVE COMPACTION MINIMUM.

E. INSTALLATION

FINISHED GRADE SHALL MATCH EXISTING GRADES WHERE NEW PAVING ABUTS EXISTING PAVING. UNLESS NOTED OTHERWISE, ALL EXPOSED PAVING EDGES SHALL BE PLACED AGAINST 2"x4" REDWOOD HEADERS.

F. SLURRY SEAL

SLURRY SEAL SHALL BE PROVIDED OVER EXISTING ASPHALT CONCRETE PAVEMENT WHERE SHOWN ON THE DRAWINGS. SLURRY SEAL MIX DESIGN SHALL CONFORM TO TYPE I COMPOSITION SPECIFIED IN SUBSECTION 203-5.2. ASPHALT CONCRETE PAVEMENT SHALL BE MIXED AND PLACED IN ACCORDANCE WITH SUBSECTION 302-4 OF THE SSPWC.

G. PAVEMENT STRIPING

ALL PAVEMENT STRIPING OR MARKINGS DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED FOLLOWING PLACEMENT OF PERMANENT ASPHALT CONCRETE PAVEMENT OR PLACEMENT OF SLURRY SEAL OVER EXISTING ASPHALT CONCRETE PAVEMENT.

PIPING/VALVES

- 1. PIPE MATERIALS AND TEST PRESSURES SHALL BE AS SHOWN ON THE PIPE MATERIAL SCHEDULE AND AS SPECIFIED HEREIN. PIPING HAS BEEN DESIGNED BASED ON SAID TABLE. ALL PIPING SHALL BE CONSTRUCTED WITH RESTRAINED JOINTS. RESTRAINED JOINTS SHALL BE FLANGED, VICTAULIC (GROOVED TYPE), WELDED, THREADED, OR EQUAL. FLANGED AND VICTAULIC JOINTS SHALL BE PROVIDED WHERE SHOWN.
2. PIPELINE ELEVATIONS SHOWN ARE FOR CENTERLINE OF PIPE UNLESS OTHERWISE NOTED. PIPELINES SHALL BE STRAIGHT GRADE BETWEEN ELEVATIONS SHOWN. CONTRACTOR SHALL PROVIDE ALL SHORTS, SPOOLS, AND FITTINGS NECESSARY TO MEET ELEVATIONS SPECIFIED.
3. VALVES SHALL BE AS SPECIFIED IN THE SPECIFICATIONS, AS LISTED IN EQUIPMENT AND MATERIALS DESCRIPTIONS, AS SHOWN BY SYMBOL ON THE DRAWINGS, AND AS SPECIFIED HEREON. UNO, VALVES 4" AND LARGER SHALL BE FLANGED AND FURNISHED WITH GEAR OPERATORS. ALL VALVES ABOVE GRADE SHALL BE FURNISHED WITH HAND WHEEL OPERATORS (8" MINIMUM DIAMETER). BURIED VALVES SHALL BE FURNISHED WITH HAND BOXES AND STEM EXTENSIONS PER DISTRICT STANDARD DRAWINGS. ALL BURIED VALVES SHALL BE INSTALLED IN ACCORDANCE WITH DISTRICT STANDARD DRAWINGS W1020 AND W1030. VALVE CAN LIDS SHALL BE MARKED ACCORDING TO THEIR RESPECTIVE SERVICE.
4. UNLESS OTHERWISE SPECIFIED, FLANGED BUTTERFLY VALVES SHALL BE PROVIDED WITH DUCTILE IRON BODIES AND DUCTILE IRON DISCS AS SPECIFIED IN SPECIFICATION SECTION 15100.
5. UNLESS OTHERWISE SPECIFIED, WAFER STYLE BUTTERFLY VALVES SHALL BE PROVIDED WITH GRAY IRON BODIES AND ALUMINUM-BRONZE DISCS AS SPECIFIED IN SPECIFICATION SECTION 15100.
6. ALL PIPE, FITTINGS, VALVES, AND APPURTENANCES SHALL BE CONSTRUCTED OF MATERIALS AND PROVIDED WITH INTERIOR COATINGS AND LININGS THAT ARE CERTIFIED BY THE NATIONAL SANITATION FOUNDATION TO BE IN ACCORDANCE WITH ANSI/NSF STANDARD 61 FOR POTABLE WATER CONTACT AND INDIRECT ADDITIVES.
7. ALL PIPE ZONE BEDDING AND TRENCH BACKFILL SHALL BE PER DISTRICT STANDARD DRAWING G20. UNLESS NOTED OTHERWISE, PIPE ZONE (BOTTOM OF TRENCH TO ONE FOOT OVER TOP OF PIPE) BACKFILL MATERIALS SHALL BE CLEAN COMMERCIAL IMPORTED SAND WITH A MINIMUM SAND EQUIVALENT OF 50 AS DETERMINED BY ASTM TEST METHOD D2419. SAID MATERIAL SHALL ALSO CONFORM WITH THE FOLLOWING CRITERIA:

D15 > 0.5 MM AND D50 < 5MM

WHERE D15 AND D50 REPRESENT BEDDING MATERIAL PARTICLE SIZE CORRESPONDING TO 15 AND 50 PERCENT PASSING BY WEIGHT, RESPECTIVELY.

BACKFILL ABOVE THE PIPE ZONE SHALL BE EITHER COMMERCIAL IMPORTED MATERIAL OR SELECT NATIVE MATERIAL (SCREENED OR WASHED).

- 8. PIPE SHALL BE INSTALLED IN TRENCH CONDITION AND AS SPECIFIED IN SPECIFICATION SECTION 15025. BACKFILL SHALL BE COMPLETED INCLUDING COMPACTION TESTS PRIOR TO PRESSURE TESTING. BACKFILL IN PIPE ZONE SHALL BE COMPACTED BY HAND TAMPING TO MINIMUM 90% COMPACTION. WHERE PIPE IS LOCATED UNDER CONCRETE SLABS, ALL TRENCH BACKFILL SHALL BE MINIMUM 95% COMPACTION.
9. PIPING WHERE STUBBED THROUGH SLABS/FOUNDATIONS SHALL BE DOUBLE WRAPPED WITH 33 MIL PVC TAPE.
10. CONTRACTOR SHALL BACKFILL WITH TWO SACK CEMENT/SAND SLURRY ALL PIPELINE CROSSINGS WITH EXISTING MAINLINE UTILITIES AND AT LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS. THE TWO SACK CEMENT/SAND SLURRY SHALL EXTEND FIVE FEET ON EACH SIDE OF THE EXISTING FACILITY AND EXTEND FROM THE BOTTOM OF THE PROPOSED PIPELINE TO THE SPRINGLINE OF THE EXISTING FACILITY TO BE SUPPORTED.
11. UNLESS OTHERWISE SHOWN, MINIMUM COVER ON BELOW GRADE PIPE SHALL BE 30".
12. UNLESS NOTED OTHERWISE, TRENCH BACKFILL SHALL BE COMPACTED TO 90% RELATIVE COMPACTION (MINIMUM).
13. ALL BELOW GRADE PIPE UNDER CONCRETE SLABS AND LESS THAN 30" BELOW THE TOP OF SLAB SHALL BE BACKFILLED WITH 2 SACK CEMENT/SAND SLURRY.
14. ALL BELOW GRADE PIPE UNDER CONCRETE FOUNDATIONS SHALL BE BACKFILLED WITH 2 SACK CEMENT/SAND SLURRY TO THE BOTTOM OF THE FOUNDATION AND 2' BEYOND THE FOUNDATION LIMITS.
15. UNLESS SPECIFIED OTHERWISE, PRESSURE RATING FOR ALL VALVES SHALL BE AS SPECIFIED IN PART 1.02 OF SPECIFICATION SECTION 15100.

CONCRETE CONSTRUCTION

- 1. ALL CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTIONS 03100, 03200, AND 03300, AND NOTES HEREON. UNLESS NOTED OTHERWISE, ALL CONCRETE FOUNDATIONS (INCLUDING, BUT NOT LIMITED TO, BUILDING FOUNDATIONS, TANK FOUNDATIONS, BELOW GRADE MANHOLE AND VAULT BASES, AND SLABS ON GRADE) SHALL BE PLACED ON SOIL SCARIFIED TO A MINIMUM DEPTH OF 12" AND THEN COMPACTED TO 95% RELATIVE COMPACTION. ALL CONCRETE SHALL BE CLASS "A" STRUCTURAL CONCRETE UNLESS INDICATED OTHERWISE ON DRAWINGS. FOR ALL CONCRETE, USE TYPE II PORTLAND CEMENT.
2. CONCRETE FINISHING
A. GRADE SLABS AND FLOOR SLABS SHALL RECEIVE A MONOLITHIC TROWEL FINISH FOLLOWED BY A LIGHT BROOM AS APPROVED BY DISTRICT.
B. ALL EXPOSED EXTERIOR FORMED CONCRETE SHALL RECEIVE A "SACKED" FINISH PER CAST-IN-PLACE CONCRETE SPECIFICATIONS.
3. THE LOCATION OF ALL CONSTRUCTION JOINTS NOT SPECIFICALLY NOTED OR SHOWN SHALL BE APPROVED BY THE DISTRICT.
4. ALL NON-SHRINK GROUT SHALL BE NON-METALLIC.
5. UNLESS NOTED OTHERWISE, WATERSTOP SHALL BE PVC WITH CENTERBULT AND RIBBING. 4" WATERSTOP SHALL BE GREENSTREAK STYLE 702, OR EQUAL. 6" WATERSTOP SHALL BE GREENSTREAK STYLE 732, OR EQUAL.

MASONRY CONSTRUCTION

- 1. ALL MASONRY SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION 04220, EXCEPT AS MODIFIED HEREAFTER.
2. GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI.
3. MORTAR SHALL BE TYPE S, CONFORMING TO ASTM C-270, WITH A MINIMUM COMPRESSIVE STRENGTH OF 1800 PSI AT 28 DAYS.
4. MASONRY WALLS SHALL CONSIST OF MEDIUM WEIGHT 8"x8"x16" COLORED CONCRETE MASONRY BLOCK (AVERAGE OWEN-DRY WEIGHT NOT TO EXCEED 120 POUNDS/CUBIC FOOT). ALL CONCRETE MASONRY UNITS (CMU) SHALL BE GRADE N, TYPE I PER ASTM C90, WITH A MINIMUM COMPRESSIVE STRENGTH ON NET AREA OF BLOCK OF 1900 PSI AND MINIMUM COMPRESSIVE STRENGTH OF GROUTED CMU ASSEMBLY (F'm) OF 1500 PSI AT 28 DAYS. BLOCK COLOR, STYLE, AND TEXTURE SHALL BE AS SPECIFIED ON THE DRAWINGS. CONTRACTOR SHALL SUBMIT BLOCK SAMPLES AND CERTIFICATION TO THE OWNER FOR APPROVAL AND CONFIRMATION OF COLOR SELECTION.
5. HEIGHT OF GROUT POUR SHALL NOT EXCEED 4'. ALL POURS SHALL BE STOPPED 1- 1/2" BELOW TOP OF COURSE TO FORM A KEY AT ALL POUR JOINTS.
6. ALL MASONRY WALLS SHALL BE CONSTRUCTED TRUE, LEVEL, AND PLUMB. MORTAR JOINTS SHALL BE COLORED (AS SPECIFIED ON THE DRAWINGS), STRAIGHT, CLEAN, AND UNIFORM IN THICKNESS.
7. UNLESS NOTED OTHERWISE, BLOCK MODULES SHALL BE U-LINTEL BLOCK ABOVE ALL OPENINGS (DOORS, WINDOWS, LOUVERS, ETC.).
8. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, ALL WALL OPENINGS WITH A DIMENSION GREATER THAN 16" SHALL BE REINFORCED WITH A MINIMUM OF TWO (2) #5 REINFORCING BARS PLACED TOP AND BOTTOM, AND TWO (2) #5 REINFORCING BARS ON EACH SIDE OF OPENING.

STRUCTURAL AND MISCELLANEOUS STEEL

- 1. ALL STRUCTURAL AND MISCELLANEOUS STEEL CONSTRUCTION SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 05100.
2. STRUCTURAL STEEL SHOP DRAWINGS SHALL BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL PRIOR TO FABRICATION AND ERECTION.
3. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS, LATEST EDITION. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO THE FOLLOWING SPECIFICATION (UNLESS NOTED OTHERWISE):
WIDE FLANGE (W AND WT) SECTIONS: ASTM A992 Fy=36 KSI
CHANNELS AND MISC. SHAPES (C,MC,S,M,HP): ASTM A36 Fy=36 KSI
ANGLES AND PLATES: ASTM A36 Fy=36 KSI
PIPE COLUMNS (STANDARD,X-STRG, XX-STRG): ASTM A53 TYPE E, GR B Fy=36 KSI
ASTM A500, OR B Fy=46 KSI
4. BOLTS FOR EQUIPMENT BUILDING AND CHEMICAL STORAGE BUILDING ROOF AND WALL FRAMING SHALL CONFORM TO ASTM A307, UNLESS NOTED OTHERWISE. WHERE THE USE OF ASTM A325 OR ASTM A490 BOLTS IS SPECIFIED, SPECIAL INSPECTION IS REQUIRED DURING INSTALLATION. SPECIAL INSPECTION PROVIDED SHALL BE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS" AS PUBLISHED BY AISC.

Table with 4 columns: SYM, REVISIONS, DATE, BY. Row 1: RECORD DRAWING, 05/21/13, BCV

KRIEGER & STEWART INCORPORATED
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900
APPROVED BY: [Signature] REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE AS NOTED
FLD. BK. NA
DESIGN PES
DRAWN TMW
CHECKED JCR

RUBIDOUX COMMUNITY SERVICES DISTRICT
WELLS No.17 AND No.18 IRON AND MANGANESE REMOVAL FACILITY
CONSTRUCTION NOTES

DRAWING G-2
2 OF 69 SHEETS
1172
R.C.S.D. PLAN NO.



# CONSTRUCTION NOTES (CONT'D)

## STRUCTURAL AND MISCELLANEOUS STEEL (CONT'D)

- ALL WELDING SHALL COMPLY WITH AMERICAN WELDING SOCIETY (AWS) SPECIFICATIONS AND SHALL BE DONE BY ELECTRIC ARC PROCESS WITH E70XX ELECTRODES. COMPLETE AND PARTIAL PENETRATION GROOVE WELDS SHALL BE PERFORMED USING "INNERSHIELD" AND "ML-2" SEMI-AUTOMATIC EQUIPMENT. ALL WELDERS SHALL BE AWS CERTIFIED FOR THE TYPE OF WELDING PERFORMED.
- WHERE FILLET WELD SYMBOL IS GIVEN WITHOUT INDICATION OF SIZE, USE MINIMUM SIZE WELDS AS SPECIFIED IN THE AISC MANUAL OF STEEL CONSTRUCTION, 9th EDITION, SPECIFICATION J2.2.B.
- NUTS ON BOLTS OF SLOTTED CONNECTIONS SHALL BE INSTALLED FINGER-TIGHT ONLY, WITH THREADS SPOILED, UNLESS NOTED OTHERWISE.
- STRUCTURAL STEEL EMBEDDED IN CONCRETE OR MASONRY SHALL BE UNPAINTED.
- UNLESS NOTED OTHERWISE, ALL MACHINE BOLTS, ANCHOR BOLTS, DEFERRED BOLTING DEVICES, AND FASTENERS SHALL BE 316 STAINLESS STEEL. UNLESS NOTED OTHERWISE, ALL ANCHOR BOLTS FOR ROTATING OR VIBRATING EQUIPMENT SHALL BE CAST-IN-PLACE OR DRILLED AND EPOXIED. EPOXY ANCHORS SHALL BE HILTI HIT C-100 SYSTEM, RED HEAD EPOX SYSTEM, OR EQUAL. PRIOR TO INJECTING EPOXY, EACH DRILLED HOLE SHALL BE CLEANED OUT WITH A NYLON BRUSH. CONTRACTOR SHALL INSTALL DOWELS AND ANCHOR BOLTS IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS.

## METAL DECKING

- CONTRACTOR SHALL FURNISH AND INSTALL ALL MATERIALS AND LABOR NECESSARY TO COMPLETE METAL DECKING INSTALLATION PER SPECIFICATION SECTION 05300. WELDING SHALL BE PERFORMED BY CERTIFIED LIGHT GAUGE WELDERS.
- METAL DECKING SHALL BE MINIMUM 18 GAGE STEEL WITH 3 INCH HIGH RIBS AND 24 INCH WIDE PANELS. METAL DECKING SHALL BE IMSA BUILDING PRODUCTS TYPE NF-24 DECK, OR APPROVED EQUAL, WITH THE FOLLOWING MINIMUM STRUCTURAL PROPERTIES:  
S+ = 0.861 IN3  
S- = 1.228 IN3
- ALL DECKING SHALL CONFORM TO ASTM A446 WITH MINIMUM YIELD STRENGTH OF 38 KSI. ALL DECKING SHALL BE COATED WITH A G-90 (0.90 OZ./SQ.FT) GALVANIZED COATING IN ACCORDANCE WITH ASTM A525.
- ALL DECKING SHALL BE CONTINUOUS OVER AT LEAST TWO SPANS, UNLESS NOTED OTHERWISE.

## ELECTRICAL

- CONTRACTOR SHALL CONSTRUCT POWER SERVICE FACILITIES IN ACCORDANCE WITH SCE REQUIREMENTS AND SHALL PERFORM ALL COORDINATION WITH SCE. CONTRACTOR SHALL FURNISH AND INSTALL TRANSFORMER SLAB, SERVICE SECTION, CONDUITS, GROUNDING FACILITIES, AND GUARD POSTS, SHALL COORDINATE ALL WORK WITH SCE, AND VERIFY ALL FACILITIES LOCATIONS WITH SCE PRIOR TO INSTALLATION. ALL SERVICE EQUIPMENT AND PANELS SHALL BE IN STRICT ACCORDANCE WITH SCE REQUIREMENTS. SHOP DRAWINGS FOR ALL SCE FACILITIES SHALL BE SUBMITTED AND APPROVED BY DISTRICT AND SCE.
- CONTRACTOR SHALL INSTALL CONDUIT AND ELECTRICAL EQUIPMENT IN LOCATIONS THAT WILL CAUSE MINIMAL INTERFERENCE WITH THE MAINTENANCE AND REMOVAL OF MECHANICAL EQUIPMENT. CONDUITS AND FLEX CONNECTIONS ARE SHOWN SCHEMATICALLY. CONTRACTOR SHALL RUN CONDUIT IN A NEAT MANNER AND ROUTE TOGETHER WHERE THERE ARE PARALLEL RUNS, SUPPORTING EXPOSED CONDUITS WITH UNISTRUT TYPE SUPPORT SYSTEM.
- GROUNDING SHALL BE AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE, LATEST EDITION.
- UNO, UNDERGROUND CONDUIT SHALL BE MINIMUM 3/4" DIA. SCHED. 40 PVC, EXCEPT THAT VERTICAL RISERS AND ELBOWS SHALL BE PVC COATED GALVANIZED RIGID STEEL. MINIMUM COVER SHALL BE 30" UNLESS SHOWN OTHERWISE ON DRAWINGS.

CONDUIT CAST IN CONCRETE, UNDER CONCRETE SLABS OR FOOTINGS, OR IN MASONRY WALLS SHALL BE MINIMUM 3/4" DIA. PVC COATED GALVANIZED RIGID STEEL. CONDUITS SHALL BE CAST IN CONCRETE ONLY WHERE SPECIFIED ON DRAWINGS. U.N.O. CONDUITS INSTALLED BENEATH CONCRETE SLABS, FOOTINGS OR TRENCHES SHALL BE PROVIDED WITH A MINIMUM OF 6" CLEARANCE BETWEEN CONDUIT AND BOTTOM OF CONCRETE. CONDUIT BACKFILL WHERE INSTALLED BENEATH CONCRETE SHALL BE TWO (2) SACK CEMENT/SAND SLURRY.

WHERE CONDUIT IS STUBBED UP THROUGH CONCRETE SLABS OR FOOTINGS INTO MCC/ ELECTRICAL PANELS, PROVIDE A MINIMUM OF 1 1/2" CLEARANCE BETWEEN REBAR AND CONDUIT AND A MINIMUM OF 1" CLEARANCE BETWEEN CONDUITS. ADJUST REBAR SPACING AS NECESSARY TO A MAXIMUM OF ONE-HALF THE NOMINAL SPACING SUCH THAT MAXIMUM REBAR SPACING DOES NOT EXCEED 1 1/2" TIMES THAT SPECIFIED. THE TOTAL AMOUNT OF REINFORCING STEEL SHALL NOT BE REDUCED.

EXPOSED CONDUITS INDOOR OR OUTDOORS SHALL BE MINIMUM 3/4" GALVANIZED RIGID STEEL (SCHED. 40), EXCEPT FOR EXPOSED CONDUITS IN THE EQUIPMENT BUILDING CHEMICAL ROOMS. EXPOSED CONDUITS, CONDULETS, AND CAST DEVICE BOXES INSIDE THE EQUIPMENT BUILDING CHLORINE GENERATION ROOM AND WITHIN THE TANK ENCLOSURE AREA (ENCLOSING THE BRINE AND CHLORINE STORAGE TANKS) SHALL BE PVC COATED GALVANIZED RIGID STEEL (SCHED. 40). UNO, CONDUITS SHALL NOT BE RUN CONCEALED IN WALLS OR ROOFS. CONDUITS SHALL BE SURFACE MOUNTED ON WALLS, ROOFS, OR COLUMNS. EXPOSED CONDUITS SHALL BE PLUMB, PARALLEL, AND PERPENDICULAR TO BUILDING WALLS, EQUIPMENT, AND PIPING.

ALL CONDUITS SHALL, UNLESS SPECIFIED AS FLUSH, EXTEND 2 INCHES ABOVE SLAB, GRADE, OR WALL. SPARE CONDUITS SHALL BE PROVIDED WITH THREADED CAPS OR PLUGS AND PULL CHORDS.

UNDERGROUND POWER FEED CONDUITS FROM VARIABLE FREQUENCY DRIVES TO ELECTRIC MOTORS SHALL BE PVC COATED SCHED. 40 RIGID STEEL (HDG).

CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT/CONFIGURATION OF DUCT BANKS AND COORDINATION OF PULL BOX SIZES. PROPOSED DUCT BANK LAYOUTS AND CROSS SECTIONS SHALL BE SUBMITTED TO THE OWNER FOR REVIEW PRIOR TO COMMENCING INSTALLATION. CONTRACTOR'S AS-BUILT DRAWINGS SHALL INCLUDE CROSS SECTIONS (DRAWN BY CONTRACTOR) OF ALL ELECTRICAL DUCT BANKS. SAID DUCT BANK CROSS SECTIONS AND AS-BUILT DRAWINGS SHALL BE PREPARED AS THE PROJECT PROCEEDS AND SHALL BE REVIEWED BY THE CONTRACTOR WITH THE OWNER AT LEAST MONTHLY.

COMPLETE AS-BUILT ELECTRICAL DRAWINGS SHALL BE SUBMITTED TO THE OWNER UPON COMPLETION OF CONSTRUCTION.

- UNLESS NOTED OTHERWISE, EXPOSED CONDUITS SHALL BE MOUNTED WITH UNISTRUT SUPPORTS OR CONDUIT CLAMPS AT 8'-0" MAXIMUM SPACING. PROVIDE 3/8" STAINLESS STEEL WEDGE ANCHORS FOR SUPPORTS OR CLAMPS ATTACHED TO CONCRETE OR MASONRY. UNLESS NOTED OTHERWISE, ALL UNISTRUT SUPPORTS SHALL BE 12 GAUGE 304 STAINLESS STEEL.
- ALL CONDUIT CAST DEVICE BOXES, JUNCTION BOXES, AND CONDULETS SHALL BE ADEQUATELY SIZED FOR REQUIRED CIRCUITRY. ALL CAST DEVICE BOXES SHALL BE CONSTRUCTED OF MALLEABLE IRON (HDG) AND SHALL BE "DEEP" STYLE. EXCEPT AS NOTED HEREINAFTER, ALL BOXES SHALL BE SUPPORTED WITH UNISTRUT SUPPORTS.  
HDG CAST MALLEABLE IRON BOXES AND CONDULETS SHALL BE MANUFACTURED BY CROUSE-HINDS, APPLETON, OR EQUAL. PVC COATED HDG CAST MALLEABLE IRON BOXES AND CONDULETS SHALL BE MANUFACTURED BY ROBROY, OR EQUAL. HOWEVER, ALL BOXES AND CONDULETS OF THE SAME TYPE SHALL BE FURNISHED BY A SINGLE MANUFACTURER. SURFACE MOUNTING TO WALLS SHALL BE PROVIDED BY EXPANSION ANCHORS.

- UNLESS NOTED OTHERWISE ON THE DRAWINGS, JUNCTION BOXES SHALL BE NEMA 12 WHERE LOCATED INDOORS AND NEMA 4X STAINLESS STEEL OUT OF DOORS. MINIMUM JUNCTION BOX SIZE SHALL BE 4" X 4" X 3". BOXES SHALL BE SUPPORTED BY CONDUITS THROUGH FLOOR SLAB, ON STANCHIONS AS SPECIFIED, PROVIDED WITH FEET FOR WALL MOUNTING, OR MOUNTED WITH UNISTRUT SUPPORTS. ALL BOXES SHALL BE ADEQUATELY SIZED FOR REQUIRED CIRCUITRY. MOUNTING TO WALLS SHALL BE PROVIDED BY STAINLESS STEEL WEDGE ANCHORS.

- CONNECTION FROM JUNCTION BOX OR CONDUIT TO MOTOR OR EQUIPMENT TERMINAL BOX SHALL BE WITH FLEXIBLE CONDUIT. ALL FLEXIBLE CONDUIT SHALL BE LIQUID-TIGHT AND SHALL HAVE AN INTERLOCKED FLEXIBLE GALVANIZED STEEL CORE WITH PERMANENTLY BONDED CONTINUOUS EXTERIOR GRAY POLYVINYL CHLORIDE JACKET. EXTERIOR FLEXIBLE CONDUIT SHALL BE UV PROTECTED.

- UNLESS NOTED OTHERWISE, CONTRACTOR SHALL USE 316 STAINLESS STEEL EXPANSION ANCHORS (WEDGE OR SLEEVE TYPE) FOR MOUNTING ELECTRICAL CONDUIT, BOXES, AND EQUIPMENT. NO TYPE OF EXPLOSIVE ANCHOR WILL BE PERMITTED.

- NAMEPLATES SHALL BE PROVIDED IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS AND SHALL BE LAMINATED PLASTIC WITH WHITE LETTERING ON BLACK BACKGROUND, FASTENED WITH STAINLESS STEEL DRIVE SCREWS OR ESCUTCHEON PINS. NAMEPLATES SHALL BE PROVIDED FOR ALL LOCAL CONTROL STATIONS, FIELD INSTRUMENTS, PANELS, MCC SECTIONS, AND ELECTRICAL EQUIPMENT.

- CONTRACTOR SHALL FIELD NUMBER AND LABEL ALL CONDUCTORS AND CONDUITS AND PROVIDE COMPLETE AS-BUILT DRAWINGS TO THE OWNER. ALL CONDUITS WITHIN MANHOLES/PULL BOXES SHALL BE PERMANENTLY LABELED THEREIN AND LABELED WHERE THEY STUB UP INTO AN MCC OR PANEL. STATUS, ALARM, AND CONTROL SIGNAL (IO) CONDUCTORS TO AND FROM THE RTU TERMINAL STRIPS SHALL BE IDENTIFIED USING THE LABELING DESIGNATION.

- UNLESS NOTED OTHERWISE ON THE DRAWINGS, CONDUCTORS 250 MCM OR SMALLER SHALL BE STRANDED COPPER WITH 75° C THIN INSULATION AND MINIMUM CONDUCTOR SIZE SHALL BE #12 AWG. UNLESS NOTED OTHERWISE ON THE DRAWINGS, CONDUCTORS LARGER THAN 250 MCM SHALL BE STRANDED COPPER WITH 75° C XHHW INSULATION.

- UNLESS NOTED OTHERWISE, PROVIDE 3C (MINIMUM) #16 SHIELDED BELDEN CABLE FOR ALL 4 TO 20 MA SIGNALS.

- CONTROL (LADDER) DIAGRAMS ARE PROVIDED TO DESCRIBE DESIRED OPERATION AND INTERCONNECT DIAGRAMS ARE SHOWN REGARDLESS OF NUMBER OF CONTACTS REQUIRED AND MULTIPLE EQUIPMENT UNITS ARE SHOWN AS TYPICAL. CONTRACTOR SHALL FURNISH THE NUMBER OF RELAYS, AUXILIARY CONTACTS, AND CONTROL EQUIPMENT NECESSARY TO PROVIDE THE OPERATION AS SPECIFIED.

- ALL FIELD WIRING TO CONTROL PANEL(S), VFD(S), AND TO SECTIONS OF THE MCC SHALL TERMINATE AT TERMINAL STRIPS IN THE RESPECTIVE PANELS AND BUCKETS.

- CONTRACTOR SHALL SUBMIT ELECTRICAL SHOP DRAWINGS INCLUDING COMPLETE CONTROL LADDER DIAGRAMS AND COMPLETE INTERCONNECT DIAGRAMS WITH APPROPRIATE WIRE AND TERMINAL NUMBERING. LADDER DIAGRAMS SHALL BE PROVIDED WITH NUMBERS FOR EACH LINE INCLUDING REFERENCES TO THE LINE NUMBER WHERE CONTACTS FOR EACH RELAY ARE SHOWN. LADDER DIAGRAMS SHALL SHOW WIRE NUMBERS, TERMINAL BLOCKS, AND TERMINAL BLOCK NUMBERS.

INTERCONNECT DIAGRAMS SHALL SHOW ALL INTERCONNECTIONS BETWEEN EQUIPMENT, CONTROL PANELS, RTU, MCC, AND INSTRUMENTATION. DIAGRAMS SHALL BE PROVIDED WITH WIRE NUMBERS AND TERMINAL BLOCK NUMBERS. STATUS, ALARM, AND CONTROL SIGNAL (IO) CONDUCTORS TO AND FROM THE RTU TERMINAL STRIPS SHALL BE IDENTIFIED USING THE LABELING DESIGNATION.

- ELECTRICAL MCC/PANEL ELEVATIONS HEREIN SHOW APPROXIMATE SPACE REQUIREMENTS FOR EQUIPMENT. LAYOUTS SHALL BE MODIFIED AS REQUIRED FOR THE MANUFACTURER'S SPECIFIC EQUIPMENT. ADDITIONAL PANEL SECTIONS OR WIDER SECTIONS SHALL BE PROVIDED AS NECESSARY. CONTRACTOR SHALL SUBMIT FOR DISTRICT APPROVAL. COMPLETE SHOP DRAWINGS WHICH SHALL INCLUDE ELEVATIONS VIEWS OF ALL ELECTRICAL PANELS. EXTERIOR COLOR OF ALL ELECTRICAL PANELS SHALL BE LIGHT GRAY.

CONDUITS SHALL TERMINATE WITHIN THE RESPECTIVE MCC/PANEL SECTION, OR IN ADJACENT SECTION IF ADDITIONAL SPACE IS REQUIRED. CONTRACTOR SHALL ADJUST LOCATION OF CONDUIT TERMINATIONS BASED ON THE APPROVED MCC/PANEL LAYOUT.

- AFTER INSTALLATION IS COMPLETE THE CONTRACTOR SHALL CHECK ALL CONTROLS BY SIMULATING ALL OPERATING CONDITIONS WITH THE DISTRICT PRESENT. SUBSEQUENT START-UP OF FACILITIES SHALL BE PERFORMED BY THE CONTRACTOR AND SHALL INCLUDE OPERATION OF ALL EQUIPMENT IN ALL MODES OF CONTROL INCLUDING START, STOP, SHUTDOWN AND ALARM CONDITIONS.

- CONTROL RELAYS SHALL BE RATED 120 VOLTS A.C. WITH MINIMUM 10 AMP CONTACTS UNLESS OTHERWISE SHOWN.

- UPON COMPLETION OF START-UP AND TESTING, CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED PARTS OF ELECTRICAL INSTALLATION, INCLUDING PANEL INTERIORS. CONTRACTOR SHALL REMOVE ALL TRACES OF DIRT, OIL, GREASE, ETC.

- CONTRACTOR SHALL PERFORM SHORT CIRCUIT STUDY, ARC FLASH STUDY, SET ALL PROTECTIVE DEVICES, AND PROVIDE LABELING ACCORDING TO STUDIES. PRIOR TO ENERGIZING ANY FACILITIES, CONTRACTOR SHALL PROVIDE SERVICES OF AN INDEPENDENT TESTING CONSULTANT TO PERFORM TESTING TO VERIFY SETTINGS, GROUNDING, AND COMPLIANCE WITH CONTRACT DOCUMENTS. REFER TO TECHNICAL SPECIFICATIONS SECTION 16040.

- UNDERGROUND PULL BOXES (MANHOLE) SHALL BE SIZED AND LOCATED AS SHOWN ON THE DRAWINGS AND INDICATED ON THE ELECTRICAL PULL BOX SCHEDULE. ADDITIONAL PULL BOXES SHALL BE PROVIDED AS NECESSARY FOR CONDUCTOR PULLING. PULL BOX SIZES SHOWN ARE MINIMUM SIZES. DEPENDING UPON THE CONTRACTORS DUCT BANK CONFIGURATION AND PULL BOX KNOCKOUT AREA, LARGER SIZE PULL BOXES MAY BE NECESSARY. COST OF ADDITIONAL OR LARGER PULL BOXES SHALL BE BORNE BY THE CONTRACTOR. PULL BOXES SHALL BE PRECAST CONCRETE WITH REQUIRED KNOCKOUTS AND CONCRETE SUMP (BROKEN OUT). PULL BOXES SHALL BE SET ON MINIMUM OF 12" THICK OF 3/4" CRUSHED ROCK. UNLESS NOTED OTHERWISE, PULL BOXES SHALL BE PROVIDED WITH ONE PIECE, HDG STEEL, BOLT DOWN TYPE TRAFFIC COVERS WITH LIFTING HOLES. PULL BOXES AND COVERS SHALL BE AS MANUFACTURED BY JENSEN, OR EQUAL.

- CONTRACTOR SHALL FURNISH AND INSTALL CONDUIT AND CONDUCTORS AS SHOWN ON THE DRAWINGS, AS SHOWN ON THE CONTROL DIAGRAMS, AND AS LISTED ON THE "SCHEDULE OF CONDUIT AND CONDUCTORS" DRAWING. CONTRACTOR IS ADVISED THAT NOT ALL CONDUIT AND CONDUCTORS ARE LISTED IN THE SCHEDULE (PARTICULARLY 120V LIGHTING AND RECEPTACLES) AND THAT NOT ALL CONDUIT AND CONDUCTORS LISTED IN THE SCHEDULE ARE SPECIFICALLY SHOWN, LABELED, OR CALLED OUT INDIVIDUALLY ON OTHER DRAWINGS.

- CONTRACTOR IS ADVISED THAT INTERCONNECTING WIRING WITHIN AND BETWEEN LINEUPS (ASSEMBLED PANELS WITH COMMON INTERCONNECTING HORIZONTAL WIREWAYS) OF MCC'S, DISTRIBUTION PANELS, MCP'S, AND CONTROL PANELS IS NOT SPECIFICALLY LISTED OR SHOWN ON THE DRAWINGS. CONTRACTOR IS DIRECTED TO CONTROL DIAGRAMS AND RTU CONNECTION DIAGRAMS ON THE DRAWINGS FOR THESE CONNECTIONS, WHICH ARE SUBJECT TO CHANGE ACCORDING TO APPROVED SHOP DRAWINGS. CONTRACTOR SHALL INSTALL WIRING FOR SAID CONNECTIONS WITHIN THE BOTTOM WIREWAY OF MCC'S AND PANELS.

## PIPE DUTY DESIGNATION

ABBR.	DESCRIPTION (1)	COLOR CODE (1) (2) (Δ)
AV	AIR VENT	TAN OR SAFETY BLUE
BA	BLOWER AIR	SAFETY GREEN
BS	BRINE SOLUTION	LIGHT BLUE/GREEN BANDS
BTV	BRINE TANK VENT	SAFETY WHITE
BWS	BACKWASH SUPPLY	SAFETY BLUE
BWW	BACKWASH WASTE	SAFETY RED
CLRS	CHLORINE RESIDUAL SAMPLE	SAFETY BLUE/YELLOW BANDS
CLS	CHLORINE SOLUTION	SAFETY YELLOW
CLSOFF	CHLORINE SOLUTION OVERFLOW	SAFETY YELLOW
CLV	CHLORINE VENT	SAFETY YELLOW
D	DRAIN	GRAY
GS	GRAVITY SEWER	N/A
HPA	HIGH PRESSURE AIR	LIGHT GREEN/YELLOW BANDS
HPR	HIGH PRESSURE RELIEF	TAN
HV	HYDROGEN VENT	SAFETY YELLOW
OF	OVER FLOW	TAN
PD	PRESSURE DRAIN	GRAY
PW	POTABLE WATER	SAFETY BLUE
RCW	RECYCLE WATER	TAN
RSW	RINSE WATER	TAN
RW	RAW WATER	TAN
RWB	RAW WATER BYPASS	TAN
S	SEWER	N/A
SFW	SOFTENED WATER	SAFETY BLUE
SI	SALT INLET	N/A
TD	TANK DRAIN	MATCH TANK
TW	TREATED WATER	SAFETY BLUE
VTR	VENT TO ROOF	GRAY
WBO	WELL BLOW OFF	TAN
WF	WASTE FILTRATE	BROWN
WW	WASH WATER	SAFETY BLUE

### NOTES:

- USE FULL DESCRIPTION FOR PIPE LABELING PER COATING AND PAINTING NOTES HEREIN.
- FINAL COLORS TO BE SELECTED BY OWNER. CONTRACTOR SHALL SUBMIT COLOR CHARTS.

## DRAWING NUMBER ABBREVIATIONS

G	GENERAL
C	CIVIL
M	MECHANICAL
A	ARCHITECTURAL
S	STRUCTURAL
E	ELECTRICAL

FOR PURPOSES OF ORGANIZATION, DRAWINGS ARE ARRANGED PER ABOVE DISCIPLINES. HOWEVER, TO REDUCE THE NUMBER OF DRAWINGS, MULTIPLE TYPES OF WORK MAY BE SHOWN ON ANY DRAWING.

## ABBREVIATIONS AND NOTATIONS

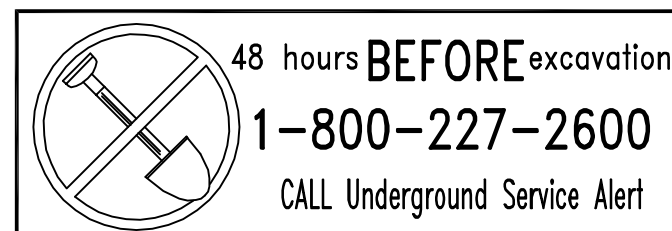
A/C	AIR CONDITIONER	MANUF.	MANUFACTURER
A.C.AC	ASPHALT CONCRETE	MAX.	MAXIMUM
A.S.	AS SHOWN	MGD	MILLION GALLONS PER DAY
AV	AIR VALVE	MH	MANHOLE
BFV	BUTTERFLY VALVE	MIN.	MINIMUM
BOT	BOTTOM	MIP	MALE IRON PIPE
BC	BEGINNING CURVE	MISC.	MISCELLANEOUS
CG	CENTER GRADE	MJ	MECHANICAL JOINT CONNECTION
CJ	CONSTRUCTION JOINT	N.#	NORTH COORDINATE
CL, C	CENTERLINE	N/A	NOT APPLICABLE, NOT AVAILABLE
CL EL	CENTERLINE ELEVATION	NIC	NOT IN CONTRACT
CLR	CLEAR, CLEARANCE	NPT	AMERICAN NATION STANDARD TAPER PIPE THREADS
CMU	CONCRETE MASONRY UNIT	OFCl, O.F.C.I.	OWNER FURNISHED EQUIPMENT, CONTRACTOR TO INSTALL
CONC.	CONCRETE	OFOL, O.F.O.I.	OWNER FURNISHED OWNER INSTALLED EQUIPMENT
CONT.	CONTINUOUS	OH	OPPOSITE HAND
C.O.T.G.	CLEAN-OUT TO GRADE	OHE	OVERHEAD ELECTRICAL
CTF	CUT-TO-FIT	PE	PLAIN END
CTRL JT	CONTROL JOINT	PORC	POINT OF REVERSE CURVE
E.#	EAST COORDINATE	PL, P	PROPERTY LINE
EC	END CURVE	PS1	PIPE SUPPORT TYPE 1, 2, ETC., REFER TO MISCELLANEOUS DETAILS AND STANDARD DRAWINGS
EG	EXISTING GRADE ELEVATION	PT	PRESSURE TRANSMITTER
EL	ELEVATION	R	RADIUS
EMH	ELECTRICAL MANHOLE	RC, R.C.	RELATIVE COMPACTION
EP	EDGE OF PAVING	REQ.	REQUIRED, REQUIREMENTS
EQ.	EQUAL, EQUALLY	RBPFD	REDUCED PRESSURE BACKFLOW DEVICE
E.W.	EACH WAY	R/W	RIGHT OF WAY
EXIST, E	EXISTING	SCH, SCHED	SCHEDULE
EXP.	EXPANSION	SPEC	BOUND SPECIFICATIONS
FD1	FLOOR DRAIN, TYPE 1, 2, ETC., REFER TO MISCELLANEOUS SYMBOLS	SQ.	SQUARE
FF, FIN, FLR	FINISH FLOOR ELEVATION	SSPWC	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (LATEST EDITION)
F.F.C.O.	FLUSH FLOOR CLEAN-OUT	ST.STL.S.S.	STAINLESS STEEL
FG	FINISH GRADE ELEVATION	STD DWG	STANDARD DRAWING-- REFER TO BOUND SPECIFICATION
FIP	FEMALE IRON PIPE	T&B	TOP AND BOTTOM
FL, F	FLOW LINE ELEVATION	TB	TOP OF BERM ELEVATION
FLG	FLANGE	TC, TOC	TOP OF CONCRETE ELEVATION, TOP OF CURB ELEVATION
FRP	FIBERGLASS REINFORCED PLASTIC	TD	TOP OF DRAIN ELEVATION
FS	FINISH SURFACE ELEVATION	TEL.	TELEPHONE
FSS	FILTRATION SYSTEM SUPPLIER	TELM.	TELEMETRY
FTG	FOOTING	TF	TOP OF FOOTING ELEVATION
FUT.	FUTURE CONSTRUCTION	TG	TOP OF GRADE ELEVATION, TOP OF GRATING
GA.	GAUGE	TP	TOP OF PAVING
GB	GRADE BREAK	TS	TOP OF SLAB, TOP OF STEEL
GSM	GALVANIZED SHEET METAL	TW, TOW	TOP OF WALL ELEVATION
HB	HOSE BIBB	TYP	TYPICAL
HDG	HOT DIPPED GALVANIZED	UNO, U.N.O.	UNLESS NOTED OTHERWISE
HOPE	HIGH DENSITY POLYETHYLENE	VPI	VERTICAL POINT OF INFLECTION
H-HWL	HIGH HIGH WATER LEVEL	VTR	VENT TO ROOF
HP	HIGH POINT	WS	WATER SURFACE
HPI	HORIZONTAL POINT OF INFLECTION	*	DENOTES A DIMENSION DEPENDENT UPON THE EQUIPMENT FURNISHED. CONTRACTOR TO VERIFY DIMENSION WITH ACTUAL EQUIPMENT DELIVERED TO SITE. SEE GENERAL CONSTRUCTION NOTES. DIMENSION TO BE VERIFIED PRIOR TO CONSTRUCTION AND PRIOR TO ORDERING EQUIPMENT DEPENDENT UPON DIMENSION.
HWL	HIGH WATER LEVEL		
INV.	INVERT ELEVATION		
LF	LINEAR FEET		
LLH	LONG LEG HORIZONTAL		
LLV	LONG LEG VERTICAL		
LLWL	LOW LOW WATER LEVEL		
LWL	LOW WATER LEVEL		

## ABBREVIATIONS FOR PIPE MATERIALS

ABS	ACRYLONITRILE BUTADIENE STYRENE	FRP	FIBERGLASS REINFORCED PLASTIC
BSP	BLACK STEEL PIPE	GIP	GALVANIZED IRON PIPE (STD.WT.)
CIP	CAST IRON PIPE	HOG	HOT DIPPED GALVANIZED (SCH.40 STEEL UNO)
CISP	CAST IRON SOIL PIPE	HOPE	HIGH DENSITY POLYETHYLENE
CMC	CEMENT MORTAR COATED	PTFE	POLYTETRAFLUOROETHYLENE
CML	CEMENT MORTAR LINED	PVC	POLYVINYL CHLORIDE
CMLC, CML&C	WELDED STEEL PIPE CEMENT MORTAR LINED AND COATED	PVDF	POLYVINYLIDENE FLOURIDE
CML&TC	WELDED STEEL PIPE CEMENT MORTAR LINED, TAPE WRAPPED, AND CEMENT MORTAR COATED	RCP	REINFORCED CONCRETE PIPE
OMP	CORRUGATED METAL PIPE	SCS	SEAMLESS CARBON STEEL
CPVC	CHLORINATED POLYVINYL CHLORIDE	SS, S.STL.	STAINLESS STEEL (SCH.40 UNO)
DI	DUCTILE IRON	STD.WT.	STANDARD WEIGHT
DIP	DUCTILE IRON PIPE	STL.	STEEL
ECTFE	ETHYLENE-CHLOROTRIFLUOROETHYLENE	VCP	VITRIFIED CLAY PIPE (EXTRA-STRENGTH)
		WSP	WELDED STEEL PIPE
		1/4"CT	WSP WITH 1/4" STEEL CYLINDER THICKNESS

## RECORD DRAWING

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Phillip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**CONSTRUCTION NOTES AND ABBREVIATIONS**  
3 OF 69 SHEETS  
11713  
R.C.S.D. PLAN NO.

**DRAWING**  
**G-3**  
3 OF 69 SHEETS  
11713  
R.C.S.D. PLAN NO.

**SYMBOLS AND LEGEND**

	SECTION VIEW SECTION "C", CUT ON DRAWING M-6.
	SECTION CUT SECTION "M" SHOWN ON DRAWING E-4.
	DETAIL 2 SHOWN ON DRAWING S-5.
	STANDARD STRUCTURAL DETAIL S1, REFER TO MISCELLANEOUS AND STANDARD STRUCTURAL DETAILS
	STANDARD MECHANICAL DETAIL M2, REFER TO MISCELLANEOUS AND STANDARD MECHANICAL DETAILS
	STANDARD ELECTRICAL DETAIL E3, REFER TO MISCELLANEOUS AND STANDARD ELECTRICAL DETAILS
	30= DIAMETER OF PIPELINE RW= DUTY OF PIPELINE
	PROPOSED FINISH CONTOUR.
	EXISTING CONTOUR.
	CHAIN LINK FENCE, 6' HIGH W/3 STRANDS BARBED WIRE PER SPECIFICATIONS.
	PROPOSED FACILITY
	EXISTING FACILITY

**FITTING SYMBOLS**

	<b>WELDED</b>		<b>FLANGED</b>
			FLANGED TEE
			FLANGED ELBOW (ANGLE AS SHOWN)
			FLANGED JOINT
			REDUCER
			VICTAULIC GROOVED PIPE COUPLING
			BLIND FLANGE
	<b>MECHANICAL JOINT</b>		

**THREADED AND SOLVENT-WELDED FITTING SYMBOLS**

	ELBOW		UNION
	ELBOW UP		END CAP
	ELBOW DOWN		REDUCER
	REDUCER		
	TEE		
	TEE BRANCH UP		
	TEE BRANCH DOWN		

(ANGLES AS SHOWN, ALL EVEN INCREMENTS OF 90° I.E. 90°, 45°, 22 1/2°, 11 1/4°, ETC.)

**VALVES, UNO**

	<b>SINGLE LINE</b>		<b>DOUBLE LINE</b>
			SHORT BODY FLANGED BUTTERFLY VALVE, A.W.W.A. C504, SHOWING ORIENTATION OF OPERATOR
			WAFER STYLE BUTTERFLY VALVE
			GATE VALVE (USE THREADED VALVE FOR 3" OR SMALLER UNLESS OTHERWISE NOTED)
			CPVC (UNO) BALL VALVE, TRUE UNION (1" AND UNDER) OR FLANGED TYPE (OVER 1")
			STAINLESS STEEL BALL VALVE
			ECCENTRIC PLUG VALVE
			CHECK VALVE
			CHECK VALVE
			AUTOMATIC OPERATED VALVE
			SOLENOID OPERATED VALVE
			MULTIPOINT VALVE 3-WAY
			PRESSURE RELIEF VALVE
			HYDRAULICALLY OPERATED VALVE
			PRESSURE REGULATING VALVE
			BACK-PRESSURE VALVE
			ANTI-SIPHON VALVE

**MISCELLANEOUS SYMBOLS**

	ROTAMETER		HANDRAIL PER STANDARD DETAIL, ALUMINUM UNLESS NOTED OTHERWISE
	FLOW SWITCH		GRATING PER STANDARD DETAIL, FIBERGLASS UNLESS NOTED OTHERWISE
	FLOW METER		CAST IRON FLOOR DRAIN WITH 8" BRONZE STRAINER, THREADED OUTLET AND POWDER EPOXY COATING (ZURN Z415, TYPE B, OR EQUAL). PROVIDE WITH P-TRAP (ZURN Z1000, OR EQUAL)
	FLEX COUPLING		316 STAINLESS STEEL FLOOR DRAIN WITH 6" STRAINER AND THREADED OUTLET (ZURN Z1726, OR EQUAL). PROVIDE WITH PVC P-TRAP
	GRAVITY CLEAN OUT		CAST IRON DRUM TRAP DRAIN WITH 8" BRONZE STRAINER AND THREADED OUTLET. (ZURN Z450 TYPE B, OR EQUAL)
	PRESSURE CLEAN OUT		CAST IRON FLOOR DRAIN WITH BRONZE FUNNEL STRAINER, THREADED OUTLET, AND POWDER EPOXY COATING (ZURN Z415 TYPE E, OR EQUAL). PROVIDE WITH P-TRAP (ZURN Z1000 OR EQUAL)
	FIRE HYDRANT		2" DIAMETER EQUIPMENT DRAIN WITH 6" LONG SCH. 40, 304 STAINLESS STEEL NIPPLE (PLAIN END x THREADED) EXTENDING 3" ABOVE F.F. AND SLIP x FEMALE THREADED ADAPTER COUPLING TO 2" DRAIN PIPE RISER. WHERE NOTED, PROVIDE WITH P-TRAP (ZURN Z1000, OR EQUAL).
	HOSE BIB (SIZE NOTED)		

**FINISH AND PROTECTIVE COATING SCHEDULE (UNLESS OTHERWISE NOTED)**

ITEM	COATING (1) (2)
EXTERIOR CONCRETE SURFACES	NO COATING REQUIRED.
EXPOSED EXTERIOR FORMED CONCRETE SURFACES	SMOOTHED SACKED FINISHED. (4)
EXPOSED FERROUS METAL PIPING, VALVES, FITTINGS, AND APPURTENANCES (INDOORS AND OUTDOORS)	COAT PER SERVICE CONDITION A. COLOR COAT AND LABEL PER SPECIFICATION REQUIREMENTS.
BELOW GRADE FERROUS METAL	COAT PER SERVICE CONDITION D.
EQUIPMENT AND MOTORS, UNO	FACTORY COATING. TOUCH UP WHERE DAMAGED PER MANUFACTURER'S REQUIREMENTS.
MISCELLANEOUS FERROUS METAL (INDOORS AND OUTDOORS)	COAT PER SERVICE CONDITION A.
FILTER VESSELS (INTERIOR)	FACTORY COATING. PROTECT FROM DAMAGE
FILTER VESSELS (EXTERIOR)	FACTORY PRIMED. CLEAN PRIME COAT AND FIELD COAT PER SERVICE CONDITION A.
RECYCLE WATER PUMPS	FACTORY COATING WITH FIELD FINISH COAT PER SERVICE CONDITION B. (3)
WELL PUMPS 17 AND 18	FINISH COAT PER SERVICE CONDITION B. (3)
GENERATOR SET ENCLOSURE	FACTORY COATING. TOUCH UP WHERE DAMAGED.
STAINLESS STEEL	NO COATING REQUIRED.
EXPOSED PVC OR CPVC PIPING	COAT PER SERVICE CONDITION O. (4)
ALUMINUM	NO COATING, EXCEPT WHERE AGAINST CONCRETE COAT AREA PER SPECIFICATION. ANODIZE WHERE SPECIFIED.
BUILDING CONCRETE MASONRY UNITS (INTERIOR AND EXTERIOR)	CLEAR COAT PER SERVICE CONDITION M.
SITE WALL CONCRETE MASONRY UNITS (INTERIOR AND EXTERIOR FACES)	CLEAR COAT PER SERVICE CONDITION M.
BUILDING METAL TRIM (LOUVERS, DOOR, ETC.)	COAT PER SERVICE CONDITION B. IF FURNISHED GALVANIZED OR ELECTROPLATE, COAT PER SERVICE CONDITION F FOLLOWED BY SERVICE CONDITION B.
ELECTRICAL PANELS	FACTORY COATING, BAKED ENAMEL. TOUCH UP WHERE DAMAGED.
ELECTRICAL DEVICE BOXES IN CHEMICAL ROOM	FACTORY PVC COATING.
FERROUS METAL PIPE OR CONDUIT SUPPORTS	HOT DIPPED GALVANIZED, UNO.
EXPOSED ELECTRICAL CONDUIT	NO ADDITIONAL COATING REQUIRED.

**NOTES:**

- UNLESS NOTED OTHERWISE, SURFACE PREPARATION AND COATING SHALL BE PER SPECIFICATION SECTION 09900, "PAINTING AND PROTECTIVE COATINGS". WHERE ITEM NOT SPECIFICALLY INCLUDED IN TABLE, REFER TO SPECIFICATION.
- ALL COLORS SHALL BE SELECTED BY DISTRICT.
- WIRE BRUSH AND/OR SAND FACTORY FINISH (NO SANDBLASTING) TO CREATE PROFILE FOR FIELD FINISH COATS.
- ARCHITECTURAL FINISHED PER SPECIFICATION SECTION 03300.

**DESIGNATIONS/ABBREVIATIONS FOR EQUIPMENT SUPPLIERS AND SUBCONTRACTORS**

- FILTRATION SYSTEM SUPPLIER (FILTRONICS, INC.) IS DESIGNATED BY FSS. THE FSS HAS BEEN PRESELECTED BY OWNER TO FURNISH THE FILTRATION SYSTEM TO THE CONTRACTOR A PRENEGOTIATED COST. REFER TO SPECIFICATIONS AND DRAWINGS FOR SCOPE OF SUPPLY. BY FSS OR (FSS) NOTED ON DRAWINGS INDICATES EQUIPMENT FURNISHED BY FILTRATION SYSTEM SUPPLIER.
- CHEMICAL SYSTEM SUPPLIER IS DESIGNATED BY CSS. REFER TO SPECIFICATIONS AND DRAWINGS FOR SCOPE OF SUPPLY. BY CSS OR (CSS) NOTED ON DRAWINGS INDICATES EQUIPMENT FURNISHED BY THE CHEMICAL SYSTEM SUPPLIER TO MAINTAIN UNIT RESPONSIBILITY AND COMPATIBILITY.
- INSTRUMENTATION/SCADA SUBCONTRACTOR (CENTER ELECTRIC) IS DESIGNATED BY SSC. THE SSC HAS BEEN PRESELECTED BY THE OWNER. THE SSC SHALL BE A SUBCONTRACTOR TO THE CONTRACTOR TO FURNISH AND INSTALL THE MCP AND SCADA FACILITIES. REFER TO SPECIFICATIONS AND DRAWINGS FOR SCOPE OF SUPPLY. BY SSC OR (SSC) NOTED ON DRAWINGS INDICATES EQUIPMENT FURNISHED BY THE INSTRUMENTATION/SCADA SUBCONTRACTOR.

**RECORD DRAWING**

BY: *[Signature]* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

RECORD DRAWING	05/21/13	BCV
SYMBOLS	REVISIONS	DATE BY



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *[Signature]*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**LEGENDS, SYMBOLS,  
AND COATING SCHEDULE**

DRAWING  
**G-4**  
4 OF 69 SHEETS  
11714  
R.C.S.D. PLAN No.

DWG. NO.: re-987-19.54-04 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:18PM PLOT SCALE: 1=1



PIPE MATERIAL SCHEDULE (UNLESS NOTED OTHERWISE)

DUTY	PIPE DIAMETER	BELOW GRADE (1)	ABOVE GRADE OR EXPOSED (1) (3)	HYDROSTATIC & LEAKAGE TEST PRESSURE (PSI) (2)	DISINFECTION REQUIRED (13)	NOTES
AV	ALL	PVC SCH. 80	ST. STL. SCH. 40	150	YES	(6) (10)
BA	ALL	N/A	CPVC SCH. 80	10 (4)	NO	(6)
BS	ALL	CPVC SCH. 80	CPVC SCH. 80	150	NO	(6)
BTV	ALL	N/A	CPVC SCH. 80	5 (4)	NO	(6)
△ BWS	ALL	STD. WT. WSP	STD. WT. WSP	225	YES	(5) (7)
BWW, RSW	ALL	PVC (C900 OR C905)	STD. WT. WSP	150	YES	(5) (7) (12)
CLS, CLSOF	ALL	CPVC SCH. 80	CPVC SCH. 80	225	NO	(6)
CLV	ALL	CPVC SCH. 80	CPVC SCH. 80	5 (4)	NO	(6)
CLRS	ALL	△ ST. STL. SCH. 40	△ ST. STL. SCH. 40	225	YES	△ (10)
D	ALL	PVC SCH. 40	ST. STL. SCH. 40	(14)	NO	(6) (10)
GS, S	ALL	PVC GRAVITY SEWER PIPE	N/A	(14)	NO	(9)
HPA	ALL	ST. STL. SCH. 40	ST. STL. SCH. 40	225 (4)	NO	(10)
△ HPR, WBO	ALL	STD. WT. WSP	STD. WT. WSP	225	YES	(5) (7)
HV	ALL	N/A	CPVC SCH. 80	10 (4)	NO	(6)
OF	ALL	N/A	STD. WT. WSP	10	YES	(5) (7)
PD	ALL	PVC (C900 OR C905)	DIP	50	NO	(5) (8) (12)
PW	LESS THAN 4"	TYPE "K" COPPER TUBING	BRASS SCH. 40	225	YES	(11) (15)
PW	4" AND GREATER	DIP	STD. WT. WSP	225	YES	(5) (7) (8)
△ RW, RWB	ALL	STD. WT. WSP	STD. WT. WSP	225	YES	(5) (7) (17)
RCW	ALL	DIP	DIP	225	YES	△ (5) (8) (18)
SI	ALL	N/A	ST. STL. SCH. 10	10 (4)	NO	(10)
SFW	ALL	TYPE "K" COPPER TUBING	BRASS SCH. 40	225	YES	(11) (15)
TD	ALL	N/A	CPVC SCH. 80	10	NO	(6)
△ TW	ALL	STD. WT. WSP	STD. WT. WSP	225	YES	(5) (7) (17)
VTR	ALL	PVC, SCH. 40	PVC SCH. 80	(14)	NO	(6)
WF	ALL	DIP	DIP	50	NO	(5) (8)
△ WW	ALL	DIP	ST. STL. SCH. 40	225	YES	(5) (8) (10)

NOTES:

- DIP SHALL BE MINIMUM CLASS 50. FLANGED OR GROOVED DIP SHALL BE MINIMUM CLASS 53, PER AWWA C151. FLANGED DIP SHALL BE PROVIDED WITH THREADED FLANGES PER AWWA C115. GROOVED DIP AND FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF AWWA C606.
- DUCTILE IRON FITTINGS SHALL BE CLASS 250 (FLANGED) OR CLASS 350 (MECHANICAL JOINT) AND SHALL CONFORM TO AWWA C110 AND C111. INTERIOR OF DIP AND FITTINGS SHALL BE FUSION BONDED EPOXY LINED AS SPECIFIED IN SPECIFICATION SECTION 09915.
- C900 PVC PIPE SHALL MEET AWWA C900 STANDARDS AND HAVE A MAXIMUM DIMENSION RATION (DR) OF 14 (CLASS 200). C905 PVC PIPE SHALL MEET AWWA C905 STANDARDS AND HAVE A MAXIMUM DR OF 18 (CLASS 235). C900 AND C905 PVC PIPE SHALL BE PROVIDED IN ACCORDANCE WITH SPECIFICATION SECTION 15064 WITH DUCTILE IRON FITTINGS.
- BELOW GRADE CAST IRON OR DUCTILE IRON PIPE, FITTINGS, AND VALVES SHALL BE ENCASED WITH 8 MIL (MIN.) POLYETHYLENE PER AWWA C105/ A21.5-99 AND SPECIFICATION SECTION 15025.
- TRANSITION FROM ABOVE GRADE PIPE TO BELOW GRADE PIPE SHALL OCCUR AT THE FIRST ELBOW BELOW GRADE; ELBOW SHALL BE CONSIDERED ABOVE GRADE PIPING.
- UNLESS NOTED OTHERWISE, ALL FLANGE BOLTS, NUTS, AND FASTENERS SHALL BE A325. NUTS SHALL BE HEAVY HEX COLD-PRESS SEMI-FINISHED STEEL PER ASTM A194-2, 2H. THREADS SHALL BE LUBRICATED WITH AN APPROVED ANTI-SEIZE COMPOUND.

- PIPE MATERIAL AND FITTINGS SHALL BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATIONS, UNLESS NOTED OTHERWISE. PIPE CLASS OR THICKNESS SPECIFIED ON DRAWINGS ARE MINIMUM.
- UNO, LEAKAGE AND HYDROSTATIC TESTS SHALL BE PERFORMED IN ACCORDANCE WITH DISTRICT STANDARDS AND SPECIFICATION SECTION 15025. TEST PRESSURES SHALL BE AS LISTED HEREON. CONTRACTOR SHALL FURNISH ALL TESTING EQUIPMENT, INCLUDING CALIBRATED TEST GAUGES WITH PROVISIONS FOR OWNER'S TEST GAUGES. NO LEAKAGE IS PERMITTED ON EXPOSED PIPING. TESTING AGAINST VALVES IS NOT PERMITTED; CONTRACTOR SHALL INSTALL TEST PLATES, BULKHEADS, AND TOP OUTLETS AS REQUIRED FOR TESTING. ALL PIPING UNDER CONCRETE SLABS/FOUNDATIONS SHALL PASS PRESSURE TESTING PRIOR TO PLACING CONCRETE.
- UNO, ALL ABOVE GRADE PIPING SHALL BE COATED AND LABELED. PIPE COATING AND LABELING SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 09900 AND AS SPECIFIED IN THE "FINISH & PROTECTIVE COATING SCHEDULE", HEREON.
- TEST WITH AIR, NO LEAKAGE FOR 4 HOURS.
- △ ALL PIPE AND FITTING JOINTS SHALL BE RESTRAINED. FOR WSP, JOINTS SHALL BE FULLY WELDED, FLANGED, OR GROOVED (WHERE SHOWN). WELDED PIPE JOINTS SHALL BE PROVIDED IN ACCORDANCE WITH SPECIFICATION SECTION 15025, PART 3.09B **FIELD WELDING**; DOUBLE PASS WELDS SHALL BE REQUIRED FOR ALL JOINTS. FOR DIP, JOINTS SHALL BE FLANGED, OR GROOVED (WHERE SHOWN). FOR PVC AND DI PIPE, BELL AND SPIGOT JOINTS AND MECHANICAL JOINTS SHALL BE PROVIDED WITH RESTRAINING DEVICES AS SPECIFIED IN SPECIFICATION SECTION 15025. RESTRAINING DEVICES SHALL BE RATED FOR 250 PSI WORKING PRESSURE AND SHALL BE EPOXY COATED.
- △ PVC AND CPVC SCHEDULE 40 AND SCHEDULE 80 PIPE SHALL BE PROVIDED PER SPECIFICATION SECTION 15070. UNO, PIPE LESS THAN 8" IN DIAMETER SHALL BE SOLVENT WELDED OR THREADED. PIPE 8" IN DIAMETER AND GREATER SHALL BE FLANGED.
- △ (7) STANDARD WEIGHT STEEL PIPE SHALL BE PROVIDED IN ACCORDANCE WITH SPECIFICATION SECTIONS 15025 AND 15070, AND STANDARD DRAWINGS. STANDARD WEIGHT STEEL PIPE SHALL CONFORM TO ASTM A53, ELECTRO RESISTANCE WELDED (ERW). PIPE DIMENSIONS SHALL CONFORM TO ANSI B36.10. PIPE FITTINGS SHALL BE STANDARD WEIGHT STEEL FITTINGS CONFORMING TO ANSI B16.9 AND ASTM A234. FLANGES FOR STANDARD WEIGHT PIPE SHALL BE ANSI B16.5 AND B16.47, CLASS 150. BELOW GRADE WSP SHALL BE PROVIDED WITH FLANGED JOINTS (WHERE SHOWN) OR FULLY WELDED JOINTS. FIELD WELDED BELOW GRADE JOINTS SHALL BE BUTT STRAP JOINTS WITH HANDHOLES PER DISTRICT STD. DWG. W1220.

ABOVE GRADE STANDARD WEIGHT STEEL PIPE AND FITTINGS SHALL BE CEMENT MORTAR LINED (CML) PER SPECIFICATION SECTION 15025. OUTSIDE SHALL BE COATED IN ACCORDANCE WITH THE PROTECTIVE COATING SCHEDULE. BELOW GRADE STANDARD WEIGHT STEEL PIPE AND FITTINGS SHALL BE CEMENT MORTAR LINED AND COATED (CML&C) PER SPECIFICATION SECTION 15025. CEMENT MORTAR COATING SHALL EXTEND 3" ABOVE CONCRETE SLABS AND 6" ABOVE FINISHED GRADE WHERE OUTDOORS.

- DIP SHALL BE CLASS 53 PER AWWA C151 AND SHALL BE PROVIDED PER SPECIFICATION SECTION 15025 AND AS SPECIFIED HEREON. FLANGED DIP SHALL BE PROVIDED WITH THREADED FLANGES PER AWWA C115. GROOVED DIP AND FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF AWWA C606. DIP AND FITTINGS SHALL BE CEMENT MORTAR LINED PER SPECIFICATION SECTION 15025. DUCTILE IRON FITTINGS SHALL BE CLASS 250 (FLANGED) OR CLASS 350 (MECHANICAL JOINT) AND SHALL CONFORM TO AWWA C110 AND C111. BELOW GRADE DIP AND FITTINGS SHALL BE ENCASED WITH 8 MIL (MIN.) POLYETHYLENE PER AWWA C105/A21.5-99 AND SPECIFICATION SECTION 15025.
- PVC GRAVITY SEWER PIPE AND FITTINGS (SDR 35) SHALL CONFORM TO ASTM D3034 WITH INTEGRAL BELL GASKET JOINTS.
- STAINLESS STEEL PIPE AND FITTINGS SHALL BE TYPE 316. PIPE AND FITTINGS SHALL BE PROVIDED IN ACCORDANCE WITH SPECIFICATION SECTION 15070. UNO, ALL PIPE AND FITTINGS SHALL BE THREADED.
- TYPE "K" COPPER TUBING SHALL BE PROVIDED IN ACCORDANCE WITH SPECIFICATION SECTION 15070. BELOW GRADE COPPER TUBING AND SHALL BE COATED WITH 25 MIL (MIN.) AQUA SHIELD OR STREAM LINE PROTEC.
- PVC C900 PIPE SHALL MEET AWWA C900 STANDARDS AND HAVE A MAXIMUM DIMENSION RATIO (DR) OF 18 (CLASS 235). PVC C905 PIPE SHALL MEET AWWA C905 STANDARDS AND HAVE A MAXIMUM DR OF 18 (CLASS 235). PVC C900 OR C905 PIPE SHALL BE PROVIDED PER SPECIFICATION SECTION 15025 AND AS SPECIFIED HEREON. FITTINGS SHALL BE DUCTILE IRON, CLASS 250 (FLANGED) OR CLASS 350 (MECHANICAL JOINT), PER AWWA C110 AND C111. ALL DUCTILE IRON FITTINGS SHALL BE CEMENT MORTAR LINED PER SPECIFICATION SECTION 15025.
- DISINFECTION SHALL BE PERFORMED PER SPECIFICATION SECTION 15025, INCLUDING CHLORINATION, FLUSHING, AND BACTERIOLOGICAL TESTING.
- LOW PRESSURE AIR TEST FOR GRAVITY SEWERS (5 PSI FOR 10 MINUTES WITH NO PRESSURE DROP).
- BRASS PIPE AND FITTINGS SHALL CONFORM TO ASTM B43. FITTINGS SHALL BE THREADED, UNO. ABOVE GRADE BRASS PIPE SHALL BE COATED PER SPECIFICATION SECTION 09900, SERVICE CONDITIONS F AND A. BELOW GRADE BRASS PIPE SHALL BE COATED WITH 25 MIL (MIN.) AQUA SHIELD OR STREAM LINE PROTEC.
- PVC TUBING SHALL BE "HIGH PURITY PVC WATER HOSE" AS SUPPLIED BY RYAN HERCO FLOW SOLUTIONS. PVC TUBING SHALL BE PROVIDED WITH CLEAR PVC INNER TUBE WITH NON-TOXIC GRAY PVC JACKET. TUBING MATERIAL SHALL COMPLY WITH FDA AND NSF61 STANDARDS AND SHALL BE RATED FOR 200 PSI WORKING PRESSURE AT 70°F. BELOW GRADE PVC TUBING SHALL BE INSTALLED IN A 2" PVC SCH. 40 CONDUIT WITH LONG RADIUS BENDS.
- FILTER VESSEL SHALL BE TESTED AT 175 PSI. PROVIDE ISOLATION TEST PLATES WHEN PRESSURE TESTING PIPE CONNECTIONS AT 225 PSI.
- △ (18) RCW PUMP SUCTION PIPING AND CANS SHALL BE TESTED AT 20 PSI.

DWG. NO.: 05-20-13\_PLOT DATE: 05/20/13\_PLOT TIME: 2:19PM\_PLOT SCALE: 1"=1'

RECORD DRAWING

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



RECORD DRAWING	05/21/13	BCV
ADDENDUM No.1	3/21/11	BCV
SYMBOL	REVISIONS	DATE BY



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Philip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

RUBIDOUX COMMUNITY SERVICES DISTRICT

WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

PIPE MATERIAL SCHEDULE

DRAWING

**G-5**

5 OF 69 SHEETS

11715

R.C.S.D. PLAN No.

VALVE STATUS DURING VARIOUS CYCLES OF FILTER OPERATION

VALVE	FILTERING OFF	FILTERING ON	BACKWASH	RINSE
V1	CLOSED	OPEN	CLOSED	OPEN
V2	CLOSED	CLOSED	OPEN	CLOSED
V3	CLOSED	CLOSED	CLOSED	OPEN
V4	CLOSED	CLOSED	OPEN	CLOSED
V5	CLOSED	OPEN	CLOSED	CLOSED

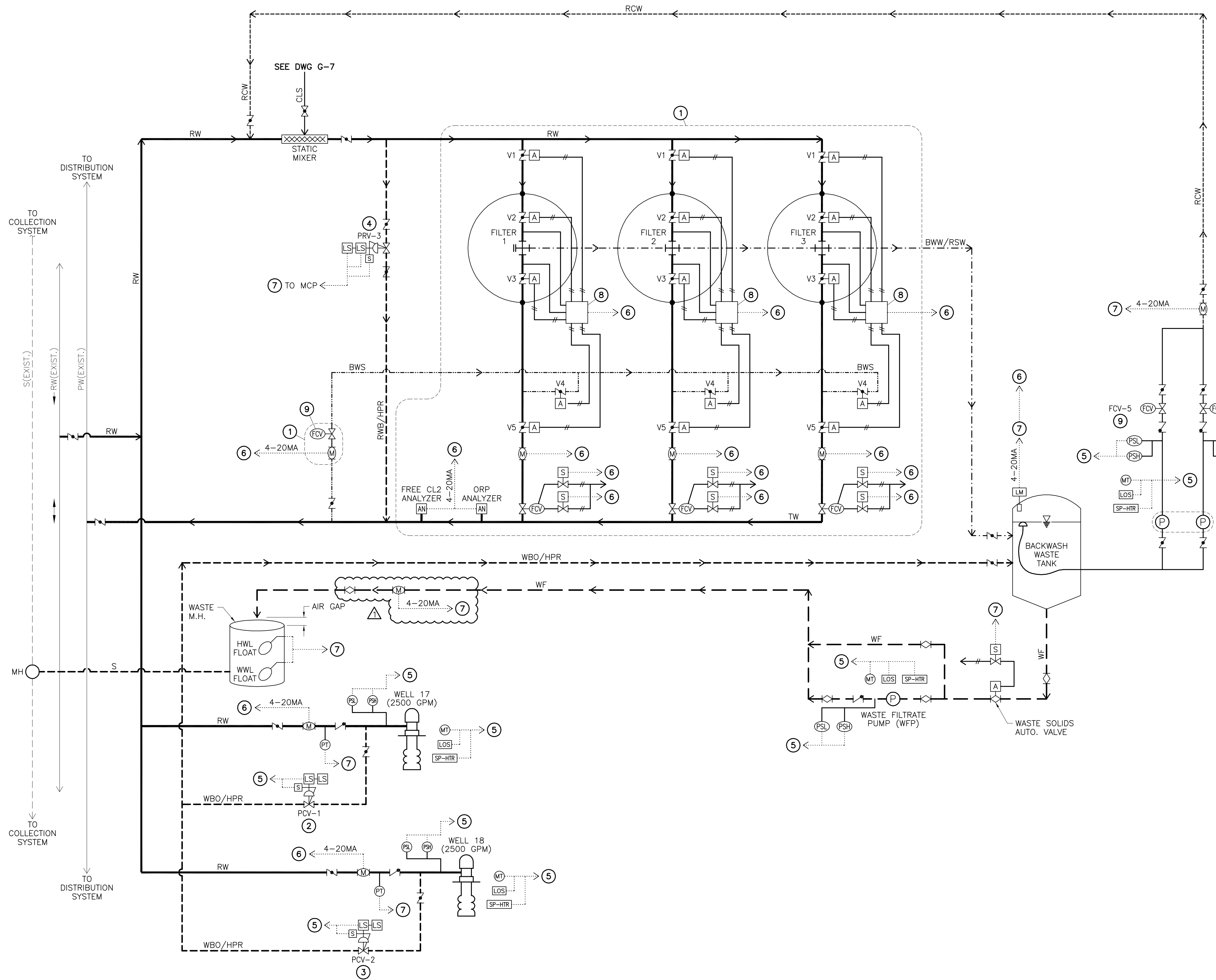
LEGEND

- ① FURNISHED BY FSS.
- ② PCV-1 PUMP CONTROL VALVE FOR WELL BLOWOFF. SOLENOID OPERATED TO SLOWLY CLOSE UPON WELL STARTUP AND SLOWLY OPEN UPON WELL SHUTDOWN; HYDRAULIC HIGH PRESSURE RELIEF OVERRIDE INITIALLY SET AT 160 PSI FOR UPSTREAM PRESSURE, AND ATMOSPHERE FOR DOWNSTREAM PRESSURE.
- ③ PVC-2 PUMP CONTROL VALVE FOR WELL BLOWOFF. SOLENOID OPERATED TO SLOWLY CLOSE UPON WELL STARTUP AND SLOWLY OPEN UPON WELL SHUTDOWN; HYDRAULIC HIGH PRESSURE RELIEF OVERRIDE INITIALLY SET AT 165 PSI FOR UPSTREAM PRESSURE, AND ATMOSPHERE FOR DOWNSTREAM PRESSURE.
- ④ PRV-3 BYPASS AND PRESSURE RELIEF VALVE, SOLENOID OPERATED PRESSURE SUSTAINING INITIALLY SET AT 150 PSI; HYDRAULIC ACTIVATED HIGH PRESSURE RELIEF OVERRIDE INITIALLY SET AT 170 PSI.
- ⑤ SIGNAL TO MCC.
- ⑥ SIGNAL TO FCP.
- ⑦ SIGNAL TO MCP.
- ⑧ REMOTE SOLENOID PANEL WITH DIFFERENTIAL PRESSURE SWITCH.
- ⑨ HYDRAULICALLY OPERATED RATE OF FLOW CONTROL VALVE, MANUALLY ADJUSTED.

- MAIN PLANT FLOW
- - - BYPASS WATER, WELL BLOWOFF, AND HIGH PRESSURE RELIEF
- - - WASTE FILTRATE
- - - BACKWASH WASTE WATER AND RINSE (PURGE) WATER
- - - BACKWASH SUPPLY WATER
- - - RECYCLE WATER
- - - POTABLE WATER
- ... ELECTRICAL SIGNAL
- PNEUMATIC
- EXISTING FACILITIES
- FLOW METER
- AUTOMATIC VALVE
- MANUAL BUTTERFLY VALVE
- PLUG VALVE
- BALL VALVE
- GATE VALVE
- SWING CHECK VALVE
- BALL CHECK VALVE
- MODULATING RATE OF FLOW CONTROL VALVE (ADJUSTABLE FLOW RATE VIA FCP)
- ANALYZER: ORP/PH/CHLORINE
- STATIC MIXER
- FILTER IN/OUT
- PUMP
- PRESSURE RELIEF VALVE
- WATER SURFACE
- STRAINER
- PRESSURE TRANSMITTER
- LEVEL MONITOR
- LEAK DETECTION
- LIMIT SWITCH
- LEVEL SWITCH
- FLOW SWITCH
- SOLENOID VALVE
- PRESSURE RELIEF VALVE
- SOLENOID OPERATED PRESSURE SUSTAINING VALVE
- PRESSURE SUSTAINING VALVE
- MOTOR THERMAL PROTECTION
- LOCK-OUT-SWITCH
- MOTOR SPACE HEATER

ABBREVIATIONS

- BWS BACKWASH SUPPLY
- BWW BACKWASH WASTE
- CLS CHLORINE SOLUTION
- HPR HIGH PRESSURE RELIEF
- PW POTABLE WATER
- RCW RECYCLE WATER
- RSW RINSE WATER
- RW RAW WATER
- RWB RAW WATER BYPASS
- TW TREATED WATER
- WBO WELL BLOW OFF
- WF WASTE FILTRATE



FE/MN FILTRATION SYSTEM

RECORD DRAWING

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

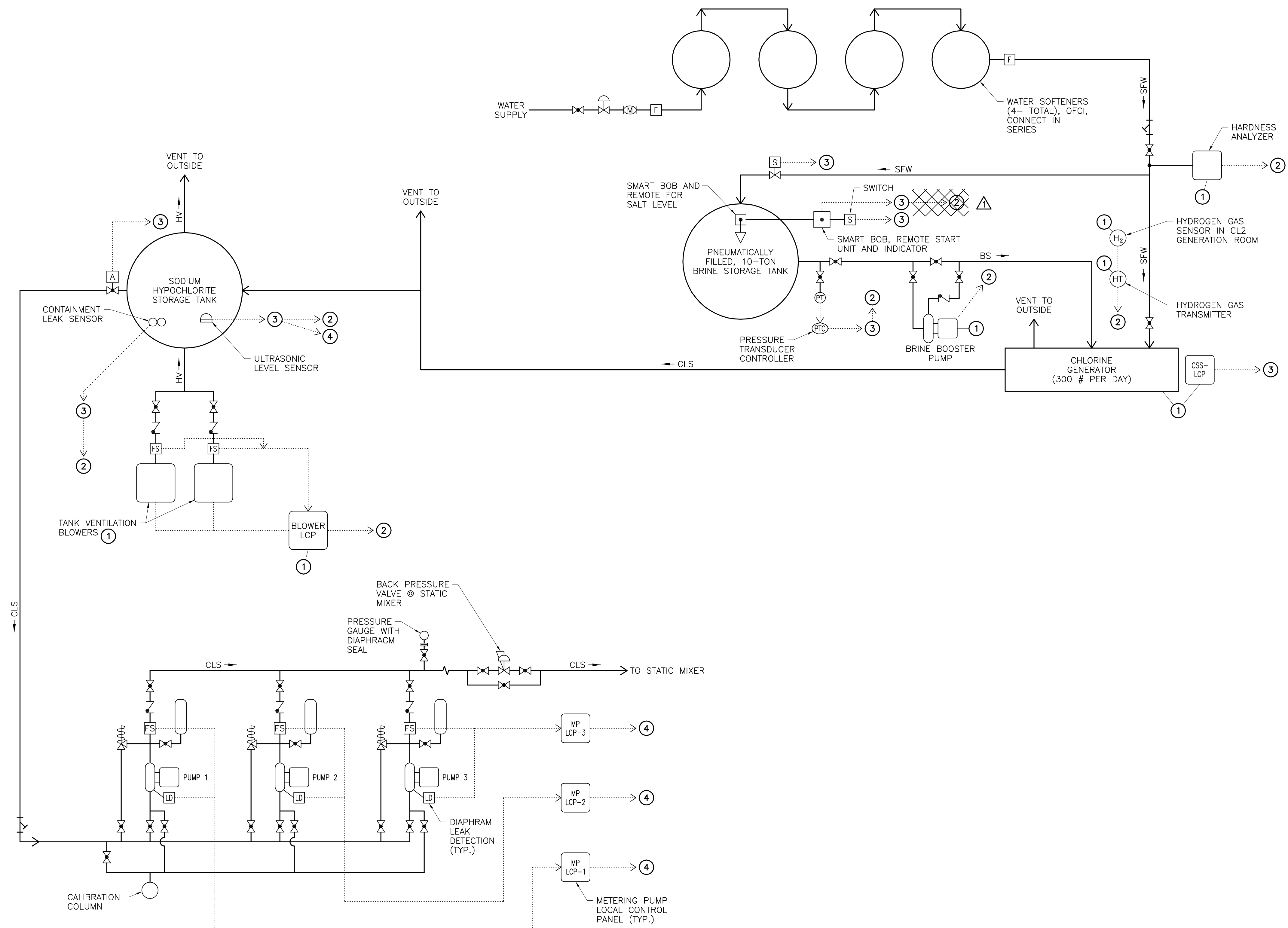
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
TREATMENT PROCESS SCHEMATIC

DRAWING  
**G-6**  
6 OF 69 SHEETS  
11716  
R.C.S.D. PLAN No.

DWG. NO.: 05-587-19.54-06 FILE NO.: 05-587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:20PM PLOT SCALE: 1=1

- LEGEND**
- ① FURNISHED BY CSS.
  - ② SIGNAL TO/FROM CSS-LCP.
  - ③ SIGNAL TO/FROM MCP.
  - ④ SIGNAL TO/FROM FCP.
  - DIAPHRAGM METERING PUMP
  - PRESSURE REGULATING VALVE
  - BACK PRESSURE VALVE
  - PRESSURE REGULATOR
  - PRESSURE RELIEF VALVE
  - FLOW SWITCH
  - PULSATION DAMPENER
  - CALIBRATION COLUMN
  - CARTRIDGE FILTER
  - PRESSURE TRANSDUCER
  - WYE STRAINER
  - BALL VALVE
  - AUTOMATIC BALL VALVE
  - SOLENOID VALVE
  - BALL CHECK VALVE
  - VENTILATION BLOWERS
  - ULTRASONIC LEVEL SENSOR
  - WATER SOFTENERS
  - ..... ELECTRICAL SIGNAL



DWG. NO.: 05-987-19.54-Q1 FILE NO.: 587-19.54\_UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:21PM PLOT SCALE: 1=1

**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

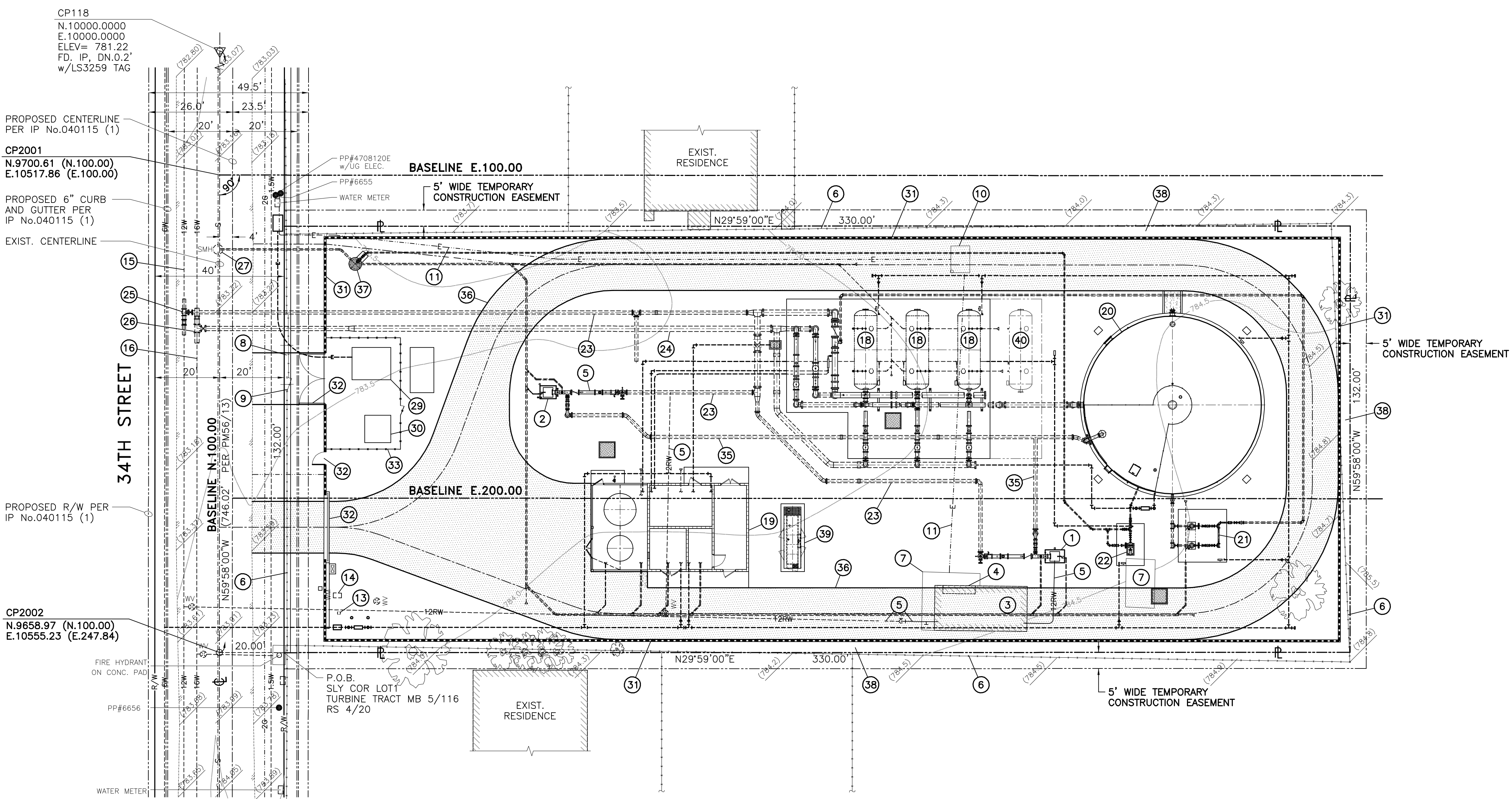
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**CHEMICAL SYSTEMS SCHEMATIC**

DRAWING  
**G-7**  
7 OF 69 SHEETS  
11717  
R.C.S.D. PLAN No.



DWG. NO.: 587-19.54-1 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:31PM PLOT SCALE: 1"=20'



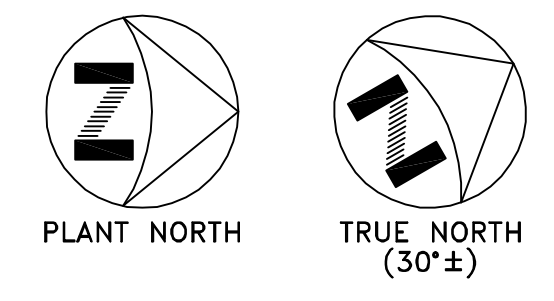
- EXISTING FACILITIES:**
- WELL 17 PUMPING UNIT.
  - WELL 18 PUMPING UNIT.
  - CONCRETE MASONRY BLOCK BUILDING.
  - OUTDOOR ELECTRICAL SWITCHGEAR FOR WELLS 17 AND 18.
  - WELL DISCHARGE PIPING.
  - 6" HIGH CHAIN LINK FENCE WITH REDWOOD SLATS.
  - REINFORCED CONCRETE SLAB ON GRADE.
  - 20' WIDE SITE ACCESS GATE.
  - 4' WIDE SITE ACCESS GATE
  - SCE PAD MOUNTED TRANSFORMER.
  - UNDERGROUND ELECTRICAL SERVICE.
  - NOT USED.
  - WATER SAMPLING STATION.
  - TELEMETRY CABLE ELECTRICAL HANDHOLE.
  - 12" RAW WATER TRANSMISSION PIPELINE FROM WELL 8.
  - 16" POTABLE WATER TRANSMISSION PIPELINE
  - NOT USED.
- PROPOSED FACILITIES:**
- IRON AND MANGANESE (FE/MN) REMOVAL FILTERS.
  - EQUIPMENT BUILDING.
  - BACKWASH WASTE TANK.
  - RECYCLE WATER PUMP STATION.
  - WASTE FILTRATE TRANSFER PUMP STATION.
  - FILTRATION PLANT INFLUENT PIPING.
  - FILTRATION PLANT EFFLUENT PIPING.
  - CONNECTION TO 12" RAW WATER PIPELINE FROM WELL 8.
  - CONNECTION TO 16" TRANSMISSION PIPELINE.
  - CONNECTION TO EXISTING SEWER MANHOLE.
  - NOT USED.
  - SCE SERVICE TRANSFORMER FOR FE/MN REMOVAL FACILITIES AND EXISTING WELLS 17 AND 18.
  - SCE METERING PANEL FOR FE/MN REMOVAL FACILITIES AND EXISTING WELLS 17 AND 18.
  - CONCRETE MASONRY BLOCK RETAINING WALL AND ORNAMENTAL STEEL FENCING.
  - SITE ACCESS GATE.
  - 6" HIGH CHAIN LINK FENCING.
  - 4" POTABLE WATER SERVICE.
  - WELL BLOW-OFF PIPING TO BACKWASH WASTE TANK.
  - ASPHALT CONCRETE PAVED DRIVEWAY.
  - WASTE FILTRATE DISCHARGE MANHOLE.
  - 3'± WIDE DRAINAGE SWALE, UNLINED.
  - EMERGENCY STANDBY GENERATOR SET.
- FUTURE FACILITIES:**
- 2500 GPM FILTER VESSEL FOR FUTURE WELL.

**NOTE:**  
 FOR IMPROVEMENTS WITHIN ROAD R.O.W., SEE STREET IMPROVEMENT PLANS FOR ECONOMIC DEVELOPMENT AGENCY OF RIVERSIDE COUNTY, STREET REVISION 2, FILE 947-D DRIVEWAY APPROACHES AND WATER/SEWER LATERALS PER MS4258, IP110007.

**BENCHMARK:**  
 FD. R.R. SPIKE, DN. 0.1' AT C/L INTERSECTION OF 34TH STREET AND DALY AVE. "TGT NO.2" PER R.C.S.D. 34TH ST. PPLN DWG. W-96-003 (REF. K&S W.O. 587-19.31) ELEV = 782.21 (NAVD 29)

**BASIS OF BEARINGS:**  
 BASIS OF BEARINGS IS THE CENTERLINE OF 34TH STREET BEING N.59°58'00"W. PER PARCEL MAP 10879 (PM 56/13)

BOUNDARY SHOWN HEREON WAS COMPILED FROM RECORD DATA PER PM 56/13 AND DEED RECORDED AS DOC# 260731 DATED 6/14/1999. RIV. CO.



**RECORD DRAWING**  
 BY: *B. C. V. J.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV
▲	FUTURE STREET IMPROVEMENTS	03/01/11	



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Philip L. Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	1"=20'
FLD. BK.	NA
DESIGN	PES
DRAWN	TMM
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY

**GENERAL SITE PLAN**

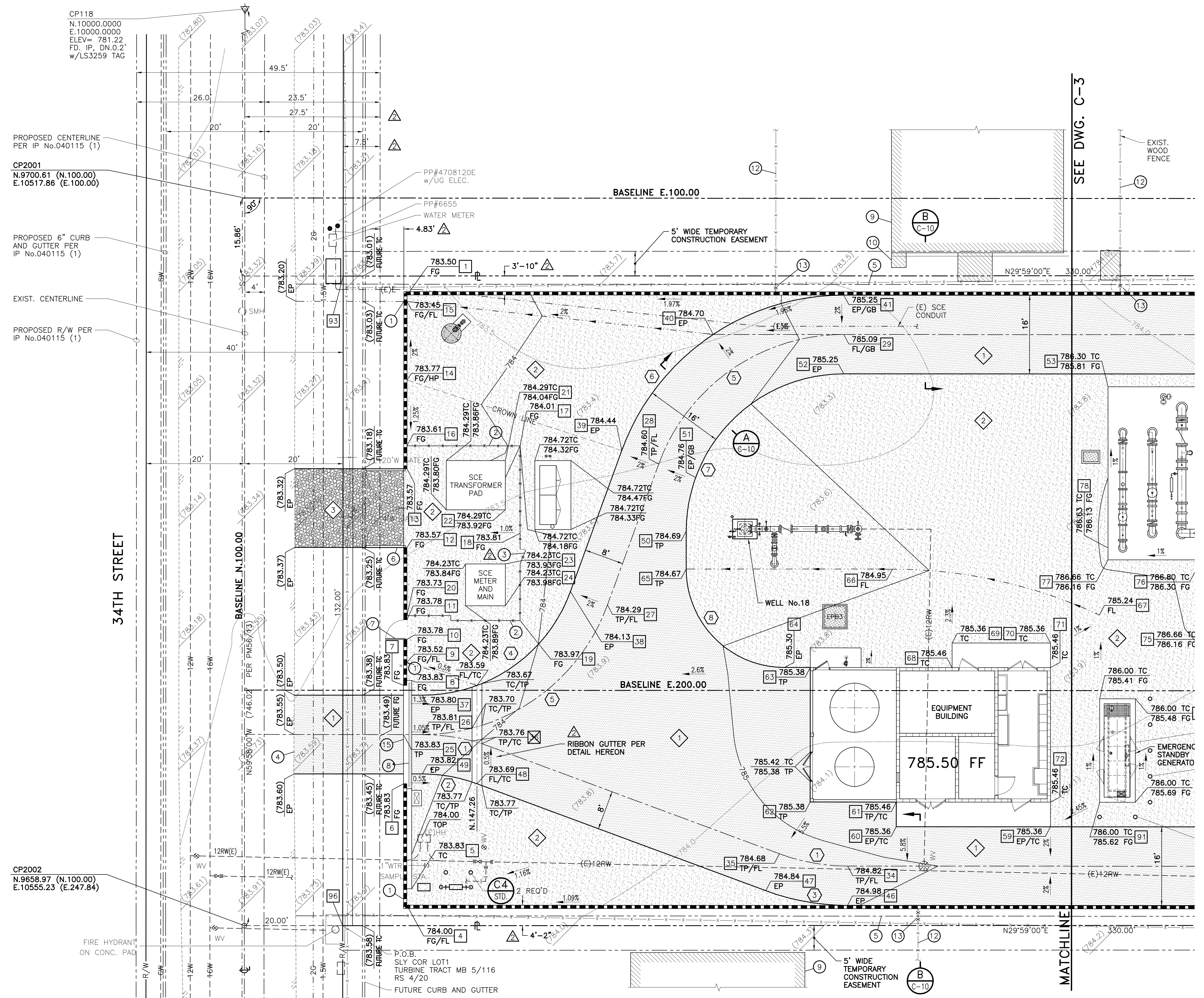
DRAWING  
**C-1**  
 8 OF 69 SHEETS  
 11718  
 R.C.S.D. PLAN No.



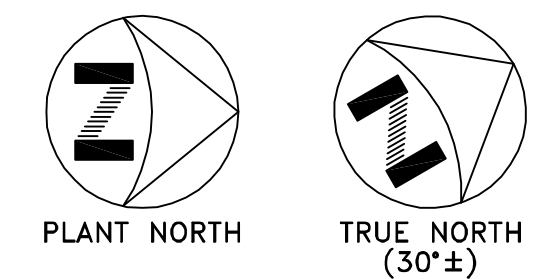
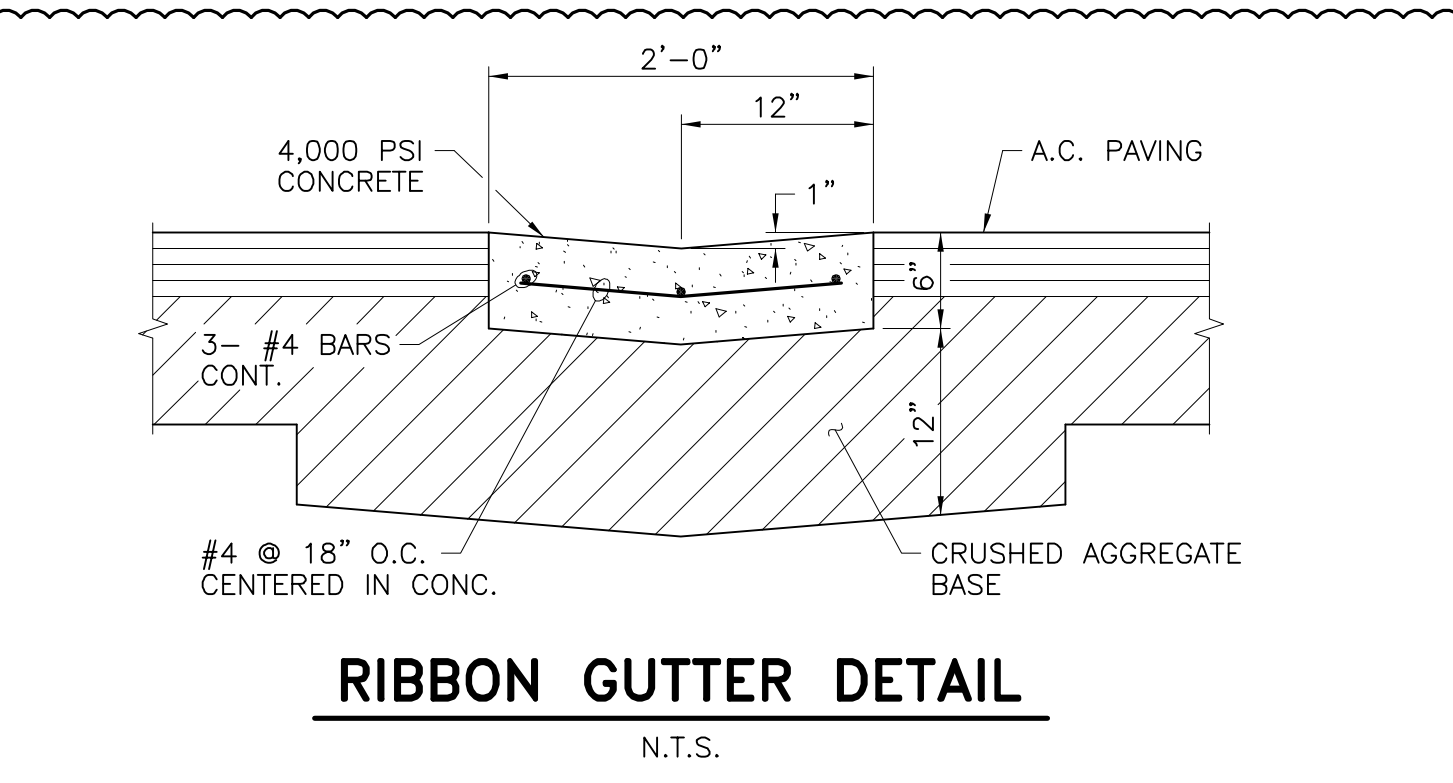
DWG. NO.: 587-19.54-2 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:34PM PLOT SCALE: 1"=1'

CURVE DATA				
No.	DELTA	R	T	L
1	20°17'09"	40.00'	7.16'	14.16'
2	20°17'09"	32.00'	5.73'	11.33'
3	20°17'09"	48.00'	8.59'	16.99'
4	70°02'00"	32.00'	22.42'	39.11'
5	70°02'00"	40.00'	28.03'	48.89'
6	70°02'00"	48.00'	33.63'	58.67'
7	90°00'00"	32.00'	32.00'	50.27'
8	90°00'00"	20.00'	20.00'	31.42'
9	90°00'00"	32.00'	32.00'	50.27'
10	90°00'00"	40.00'	40.00'	62.83'
11	90°00'00"	48.00'	48.00'	75.40'

SITE COORDINATE DATA					
POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
1	133.00	120.33	49	136.17	217.67
2	446.33	120.33	50	189.77	168.33
3	446.33	244.33	51	191.69	157.41
4	133.00	244.33	52	221.77	136.33
5	134.00	241.00	53	275.50	138.25
6	132.33	219.67	54	338.50	138.25
7	132.33	199.67	55	398.33	138.33
8	134.00	198.67	56	430.33	168.33
9	133.00	195.00	57	430.33	196.33
10	133.00	191.33	58	398.33	228.33
11	133.00	186.33	59	263.83	228.33
12	133.00	171.67	60	232.50	228.33
13	133.00	155.67	61	232.50	222.67
14	133.00	137.67	62	215.00	222.67
15	133.00	121.67	63	215.00	195.33
16	133.00	151.00	64	209.77	195.33
17	156.00	151.00	65	189.77	175.33
18	156.00	168.75	66	231.68	175.33
19	156.00	185.83	67	273.76	184.62
20	133.00	185.50	68	243.33	195.33
21	153.00	154.00	69	243.33	190.33
22	153.00	164.00	70	263.83	190.33
23	153.00	175.00	71	263.83	195.33
24	153.00	183.50	72	263.83	222.67
25	132.33	209.67	73	338.50	171.00
26	136.17	209.67	74	338.50	187.63
27	173.76	183.33	75	294.50	187.63
28	184.17	154.68	76	294.50	173.42
29	221.77	128.33	77	275.50	173.42
30	398.33	128.33	78	275.50	171.00
31	438.33	168.33	79	395.00	142.50
32	438.33	196.33	80	423.50	171.00
33	398.33	236.33	81	395.00	199.50
34	222.62	236.33	82	366.50	171.00
35	208.76	233.86	83	377.75	207.75
36	136.17	201.67	84	386.25	207.75
37	166.24	180.60	85	386.25	220.75
38	176.65	151.95	86	377.75	220.75
39	195.24	128.33	87	396.83	203.33
40	221.77	120.33	88	411.83	203.33
41	398.33	120.33	89	411.83	219.67
42	446.33	120.33	90	396.83	219.67
43	446.33	168.33	91	273.83	222.67
44	446.33	196.33	92	281.17	201.67
45	398.33	244.33	93	120.00	116.51
46	222.62	244.33	94	450.00	116.35
47	205.98	241.36	95	450.00	248.35
48	147.26	219.66	96	120.00	248.51



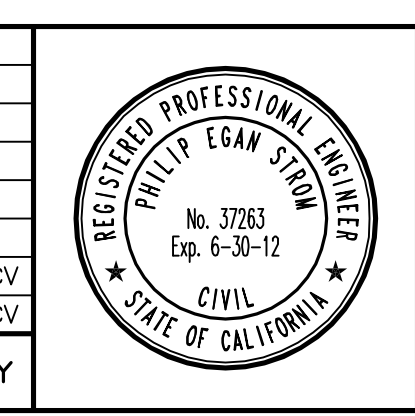
LEGEND	
	1 ASPHALT CONCRETE PAVEMENT PER CONSTRUCTION NOTES ON DRAWING G-2
	2 3/4" GRADED CRUSHED ROCK (6" THICK) OVER SUBGRADE COMPACTED TO 90% RELATIVE COMPACTION (MIN.). PROVIDE 2"x4" REDWOOD HEADER ALONG CRUSHED ROCK EDGES WHERE PLACED AGAINST SOIL.
	3 CLASS II BASE (6" THICK) COMPACTED TO 95% RELATIVE COMPACTION (MIN.) OVER SUBGRADE COMPACTED TO 90% RELATIVE COMPACTION (MIN.).
	784 PROPOSED CONTOURS
	784 EXISTING CONTOURS



**RECORD DRAWING**  
 BY: *B. C. V. J.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
 1-800-227-2600  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
	RECORD DRAWING	05/21/13	BCV
	REVISED SITE COORDINATE DATA	9/19/11	BCV



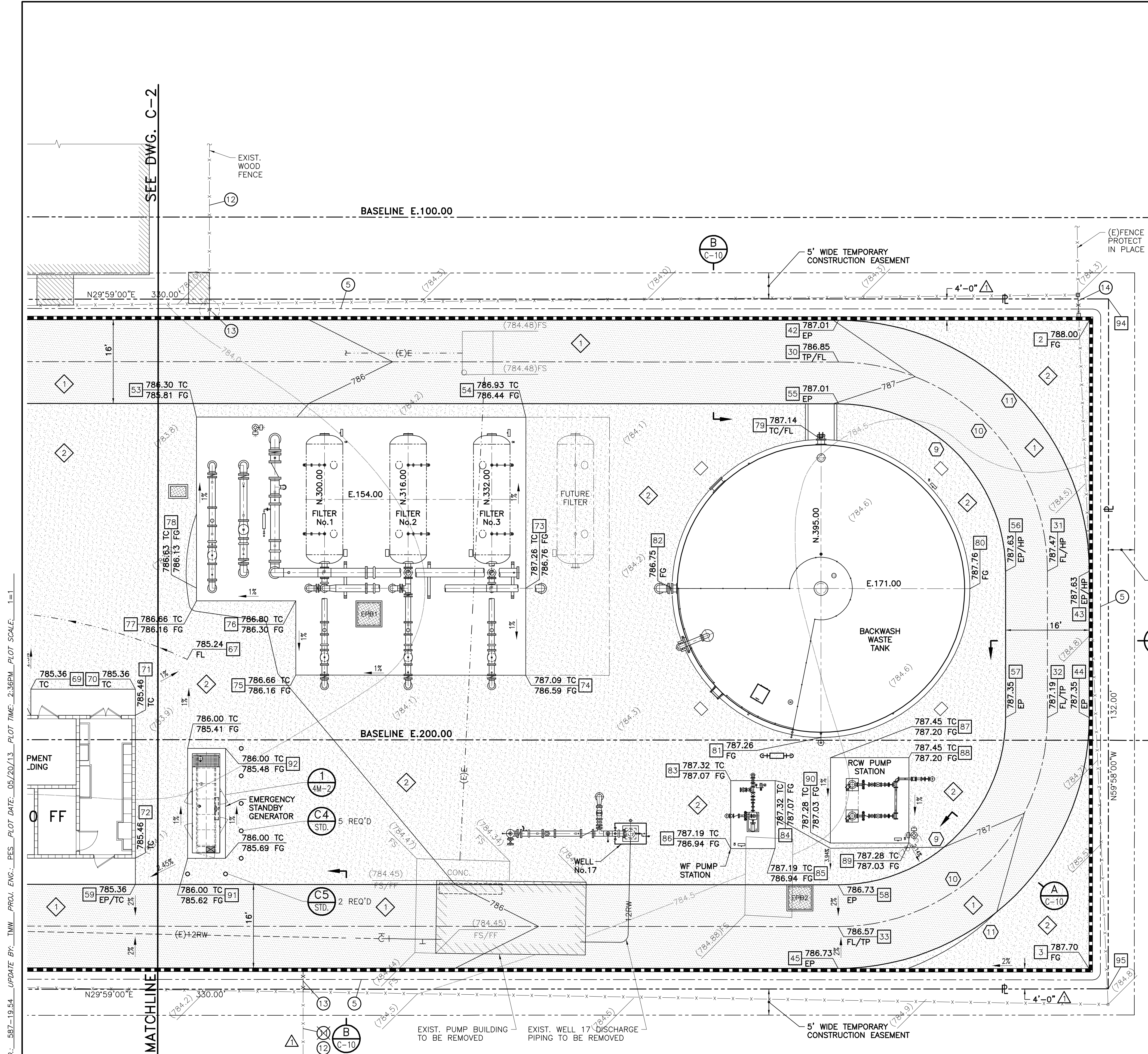
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Whip L. Green*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	1"=10'
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

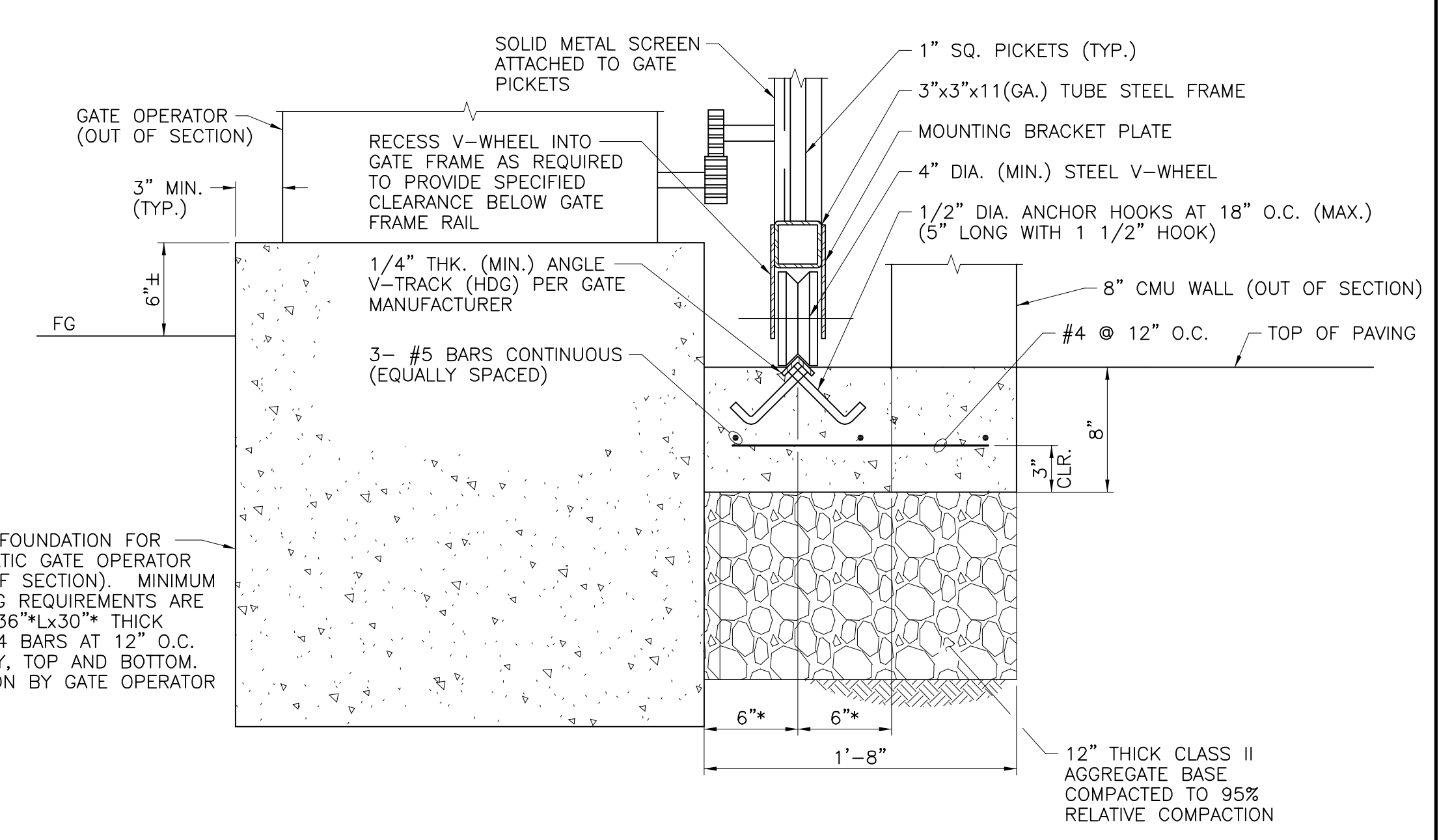
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**GRADING PLAN SOUTH**

DRAWING  
**C-2**  
 9 OF 69 SHEETS  
 11719  
 R.C.S.D. PLAN NO.



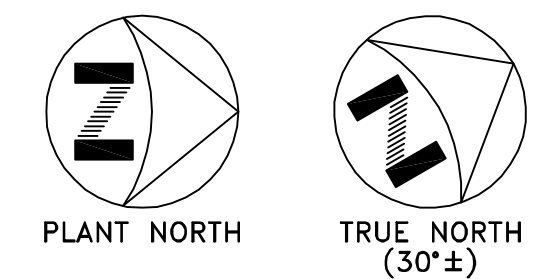


- ⑥ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS C-2 AND C-3:**
- CORE DRILL MASONRY BLOCK WALL AND INSTALL 2- 4" SCH. 40 PVC SLEEVES, FILL ANNULUS WITH NON-SHRINK GROUT. SLEEVES SHALL BE SPACED 12"± APART AND LOCATED TO NOT INTERFERE WITH VERTICAL REBAR. SLEEVE INVERTS SHALL MATCH DRAINAGE FLOW LINE.
  - CONSTRUCT 6'-0" HIGH CHAIN LINK FENCE FOR SCE SERVICE EQUIPMENT. JOG FENCE TO MAINTAIN SCE METER CLEARANCE.
  - CONSTRUCT 4'-0" WIDE CHAIN LINK PEDESTRIAN GATE.
  - SAW CUT EXISTING PAVING AND REMOVE TO CREATE A CLEAN STRAIGHT EDGE FOR ABUTTING NEW PAVING. TOP OF NEW ASPHALT CONCRETE PAVING TO MATCH TOP OF EXISTING PAVING.
  - 3'-0" WIDE EARTHEN DRAINAGE SWALE, 3" DEEP. GRADE SWALE FLOW LINE TO DRAIN.
  - 16'-0" WIDE DOUBLE SWING GATE PER DETAIL 7 ON DRAWING C-8.
  - 4'-0" WIDE SWING GATE PER DETAIL 6 ON DRAWING C-7.
  - 20'-0" WIDE AUTOMATIC ROLLING GATE PER DETAIL 8 ON DRAWING C-8.
  - EXISTING RESIDENCE, PROTECT IN PLACE.
  - EXISTING SHED, PROTECT IN PLACE.
  - EXISTING CHAIN LINK FENCE. REMOVE PORTION AS NECESSARY TO CONNECT TO TEMPORARY FENCE.
  - EXISTING WOOD FENCE. REMOVE PORTION AS NECESSARY TO CONNECT TO TEMPORARY FENCE.
  - INSTALL STEEL PICKET FENCE FROM EXISTING FENCE TO NEW BLOCK RETAINING WALL PER DETAIL 12 ON DRAWING C-8.
  - REMOVE PORTION OF EXISTING CHAIN LINK FENCE AS NECESSARY TO CONNECT TO TEMPORARY FENCE. INSTALL NEW CHAIN LINK FENCE FROM EXISTING TO NEW BLOCK WALL. PROVIDE NEW POSTS AT EXISTING FENCE CONNECTION AND AT BLOCK WALL.
  - V-TACK AND CONCRETE FOOTING FOR ROLLING GATE PER SECTION A ON DRAWING C-3.



**ROLLING GATE/TRACK SECTION**  
N.T.S. (A-A) C-2 C-8

DWG. NO.: 587-19.54-3 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:36PM PLOT SCALE: 1"=1'



**RECORD DRAWING**  
BY: *B. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	1"=10'
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**GRADING PLAN**  
NORTH AND SECTION

DRAWING  
**C-3**  
10 OF 69 SHEETS  
11720  
R.C.S.D. PLAN No.

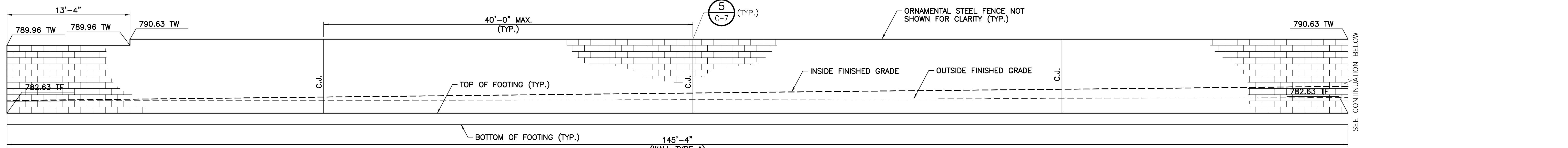




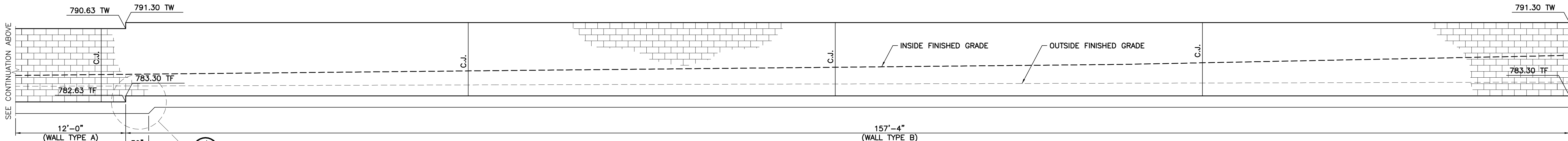




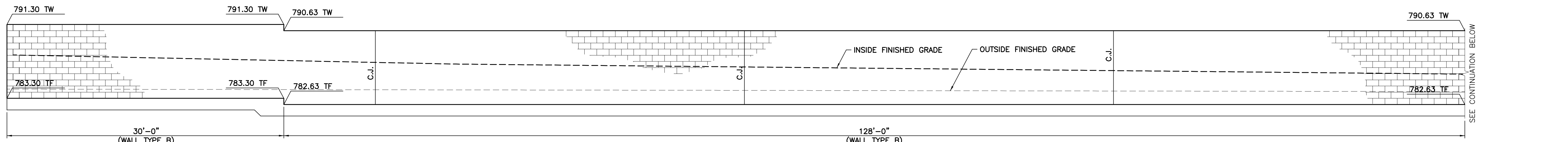
DWG. NO.: 19-54-05 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 2:57PM PLOT SCALE: 1=1



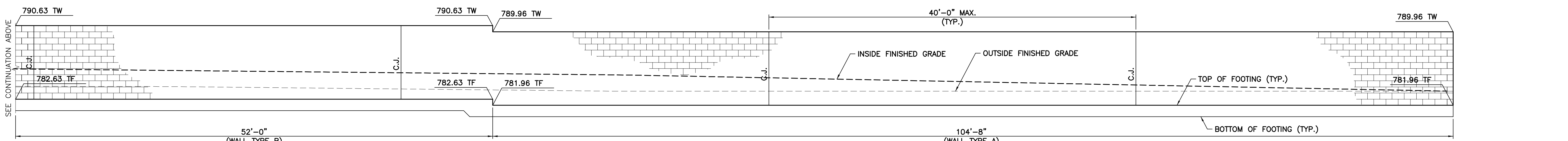
**EAST WALL ELEVATION**  
SCALE: 3/16"=1'-0"



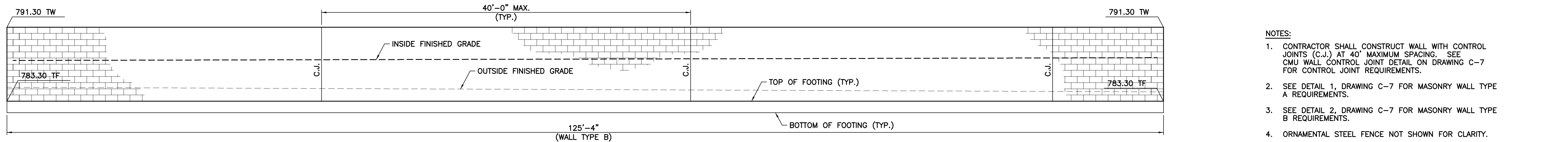
**EAST WALL ELEVATION**  
SCALE: 3/16"=1'-0"



**WEST WALL ELEVATION**  
SCALE: 3/16"=1'-0"



**WEST WALL ELEVATION**  
SCALE: 3/16"=1'-0"



**NORTH WALL ELEVATION**  
SCALE: 3/16"=1'-0"

- NOTES:**
- CONTRACTOR SHALL CONSTRUCT WALL WITH CONTROL JOINTS (C.J.) AT 40' MAXIMUM SPACING. SEE CMU WALL CONTROL JOINT DETAIL ON DRAWING C-7 FOR CONTROL JOINT REQUIREMENTS.
  - SEE DETAIL 1, DRAWING C-7 FOR MASONRY WALL TYPE A REQUIREMENTS.
  - SEE DETAIL 2, DRAWING C-7 FOR MASONRY WALL TYPE B REQUIREMENTS.
  - ORNAMENTAL STEEL FENCE NOT SHOWN FOR CLARITY.

**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

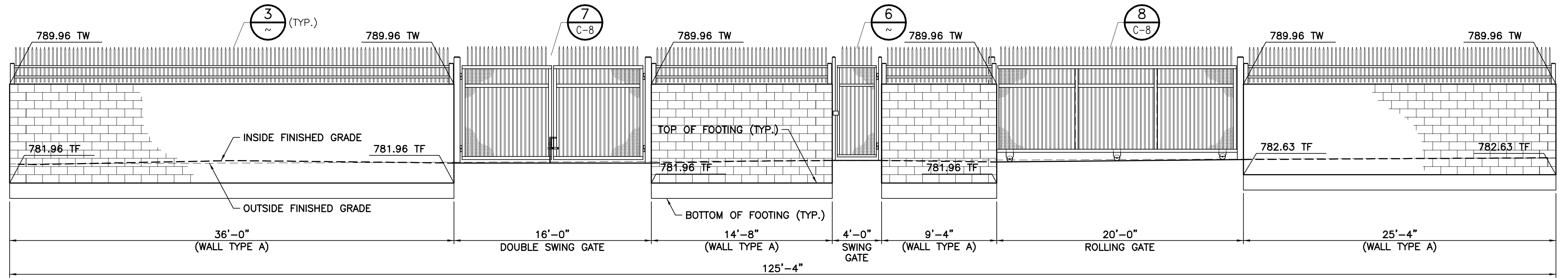
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**WALL ELEVATIONS**

DRAWING  
**C-6**  
13 OF 69 SHEETS  
11723  
R.C.S.D. PLAN No.

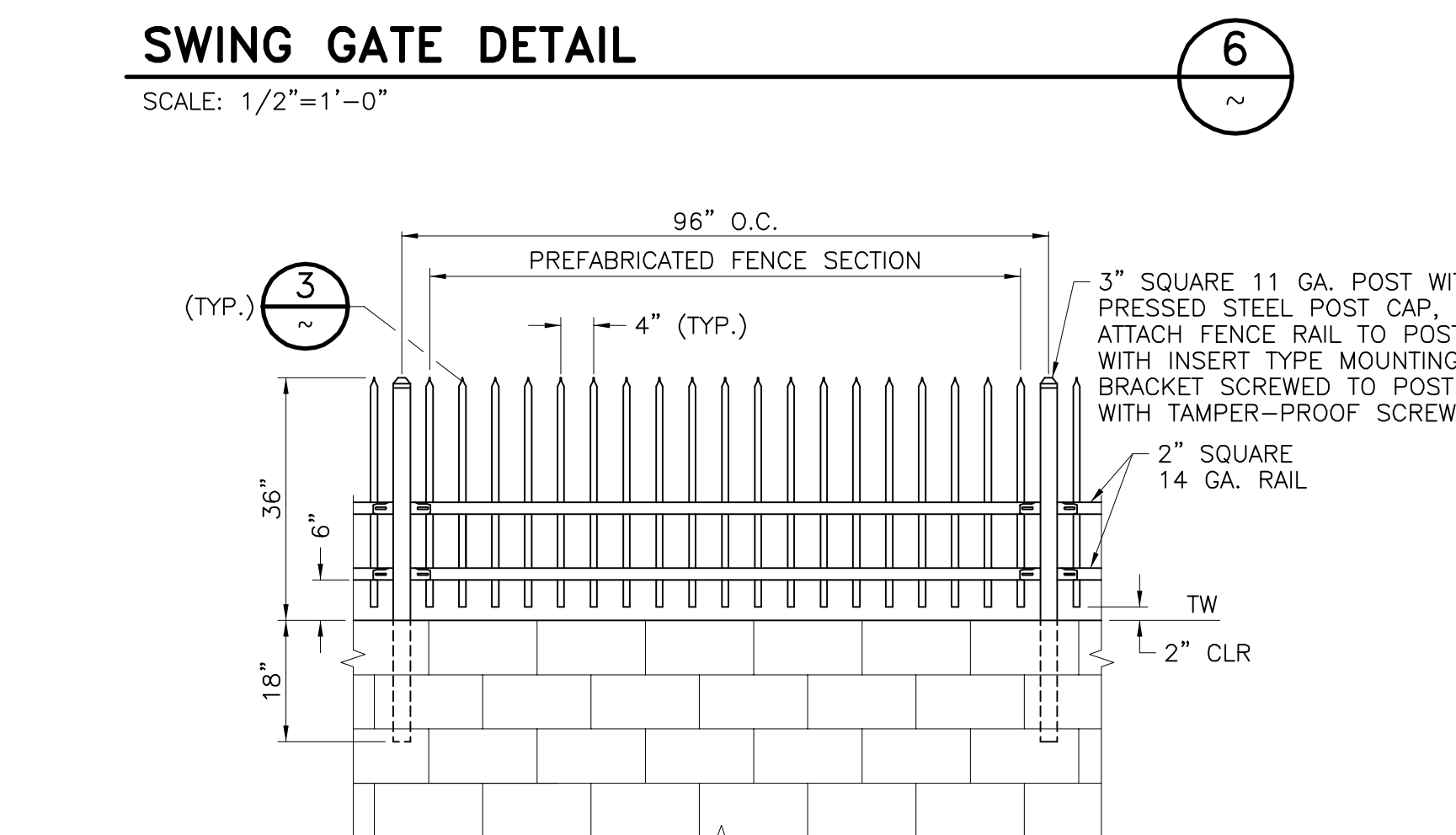
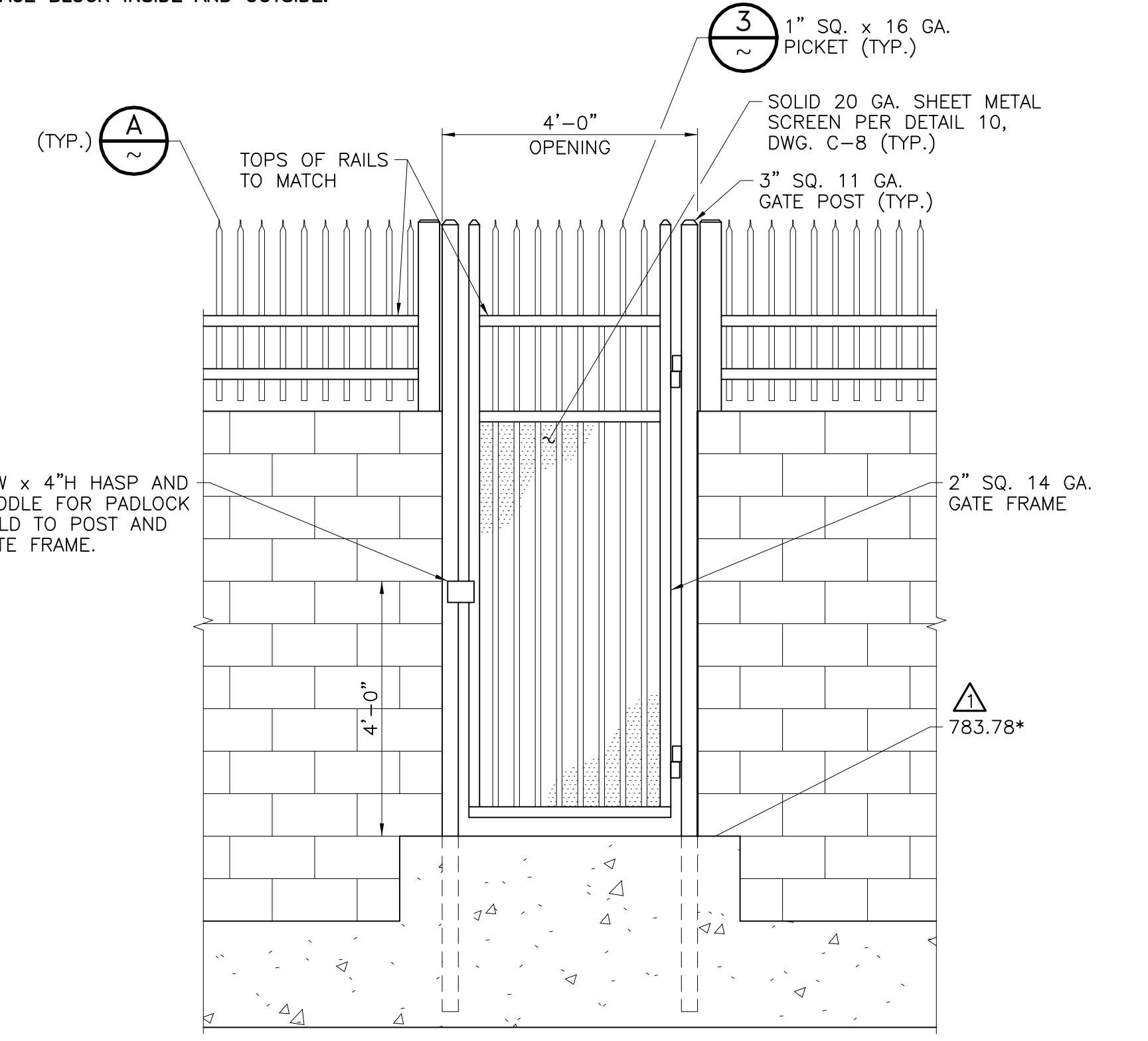
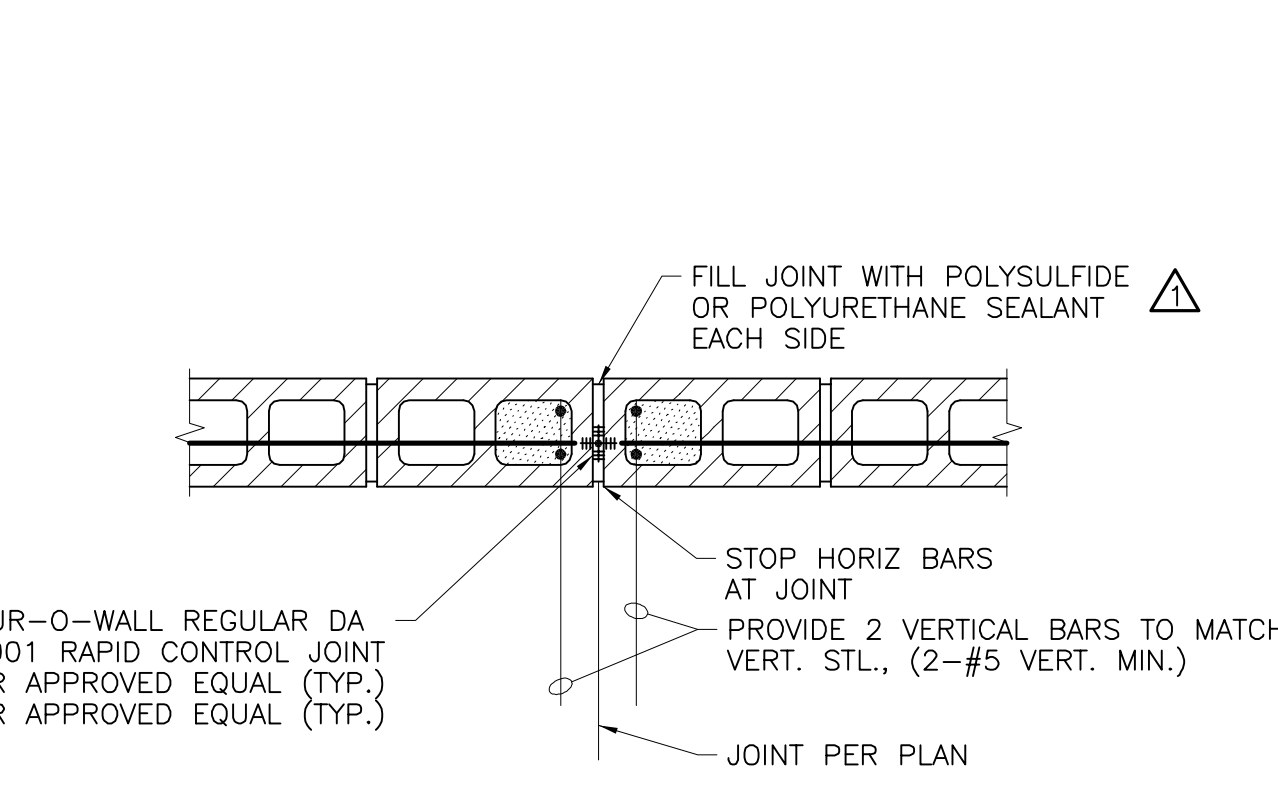
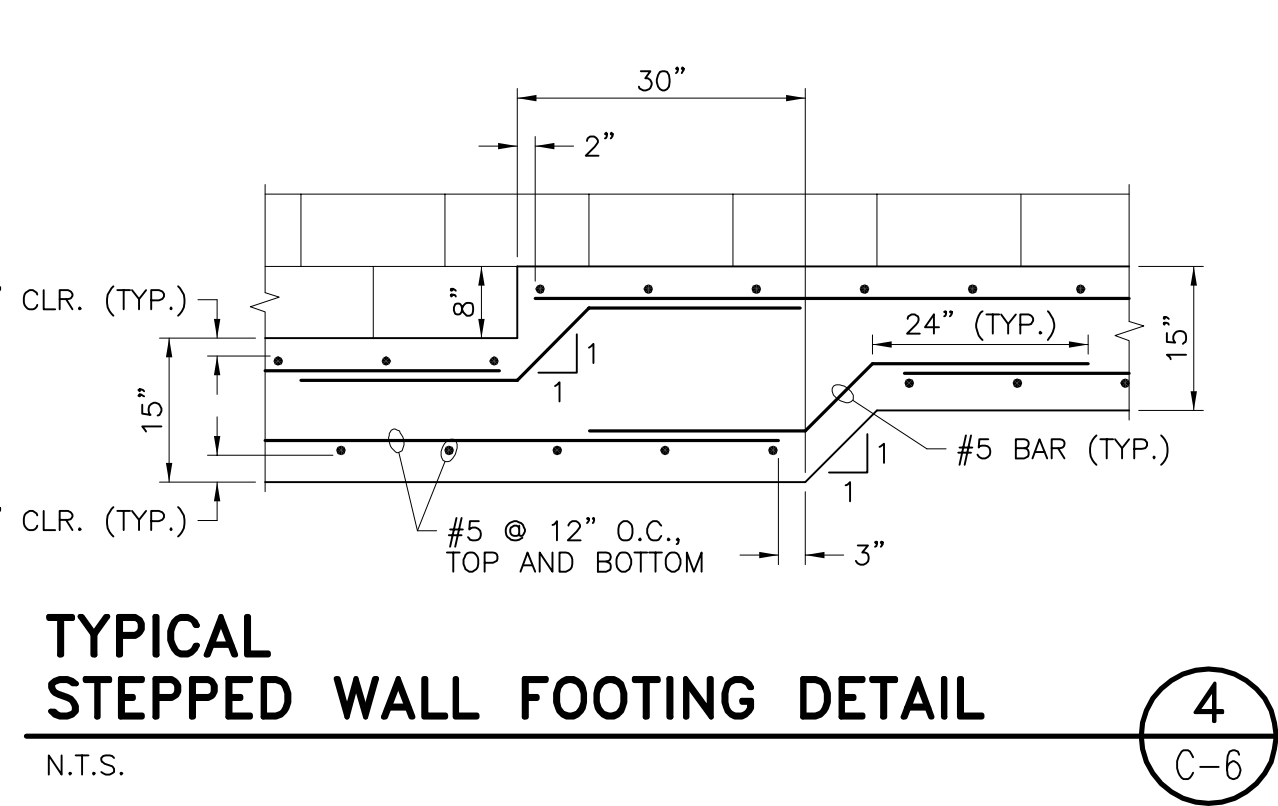
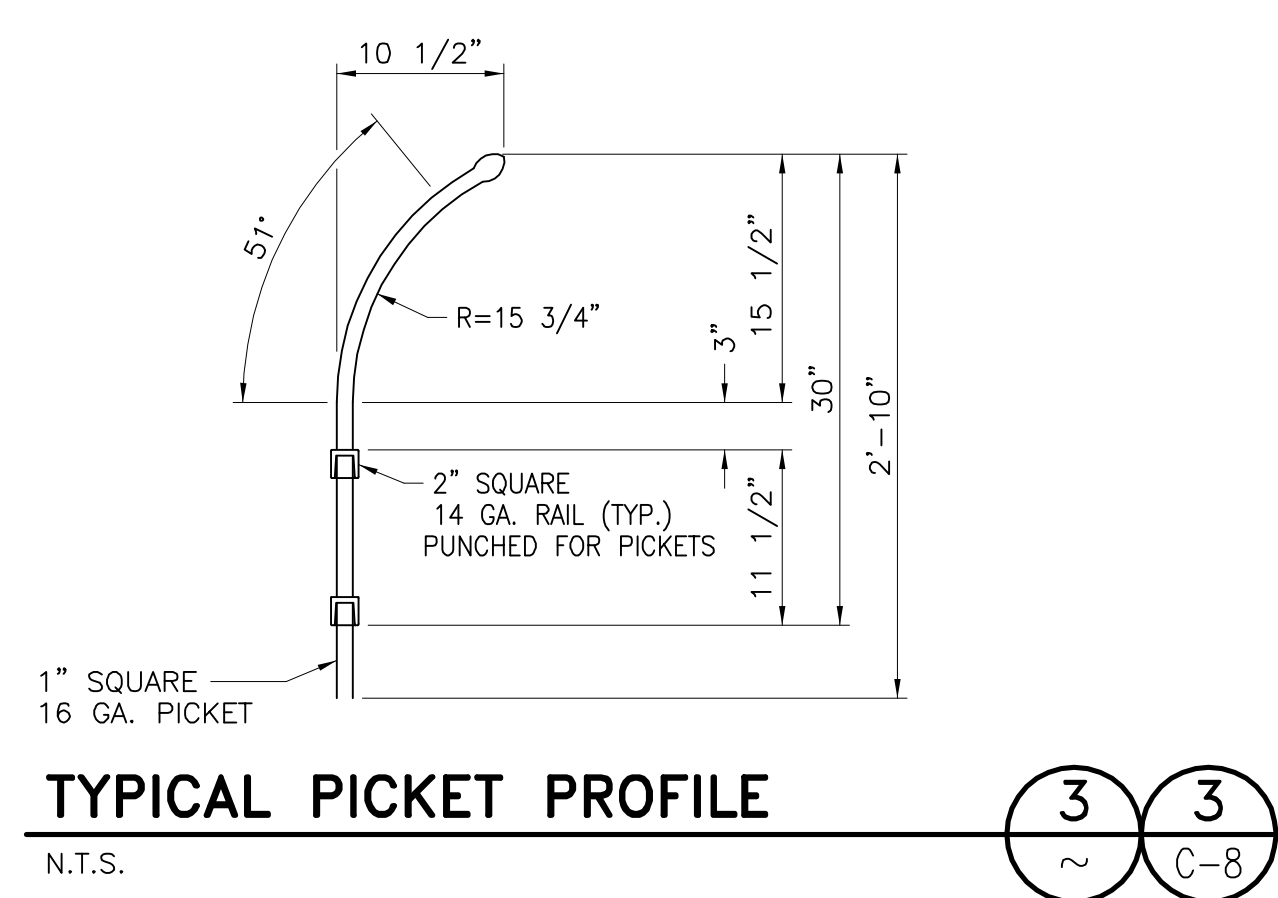
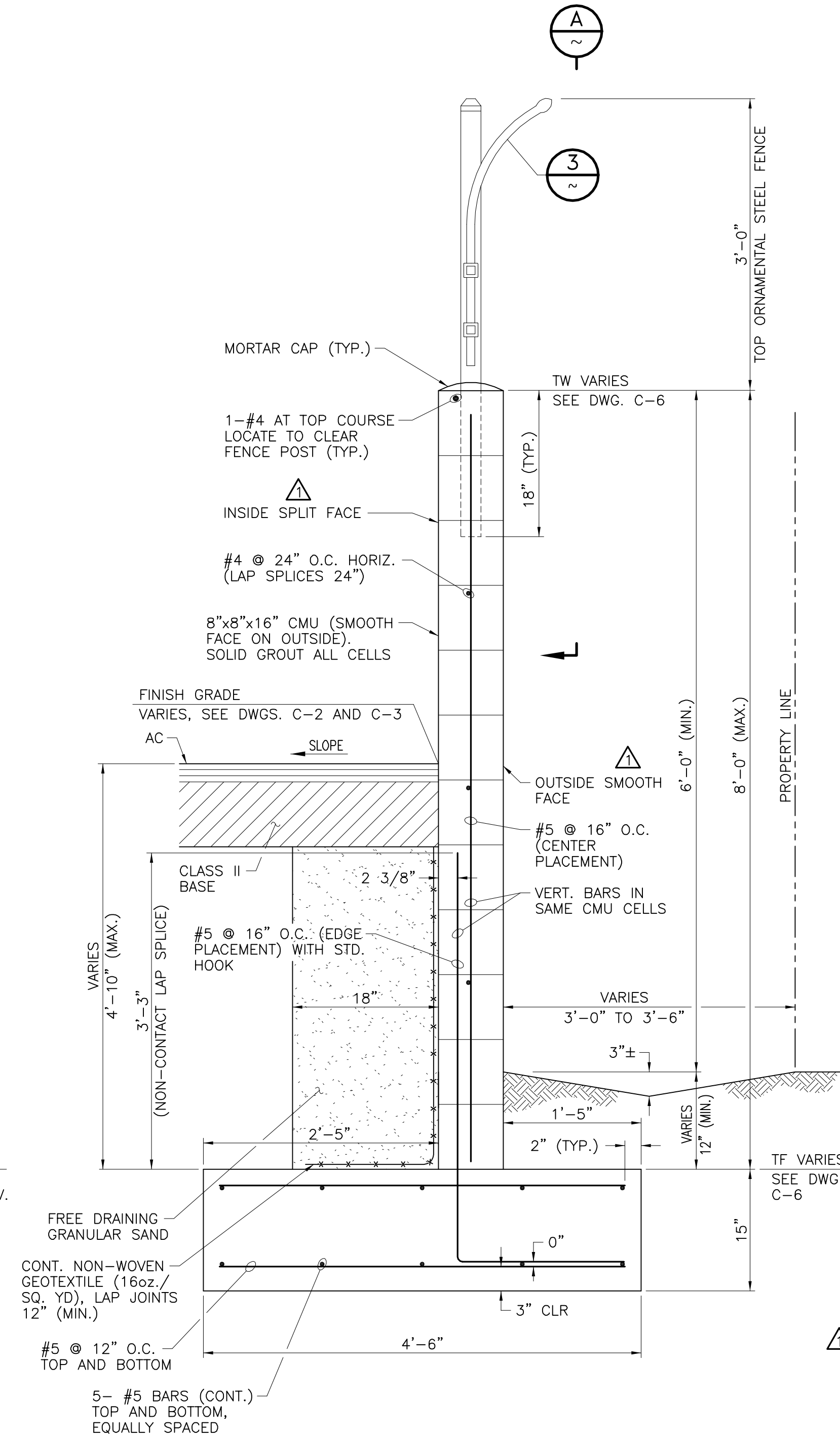
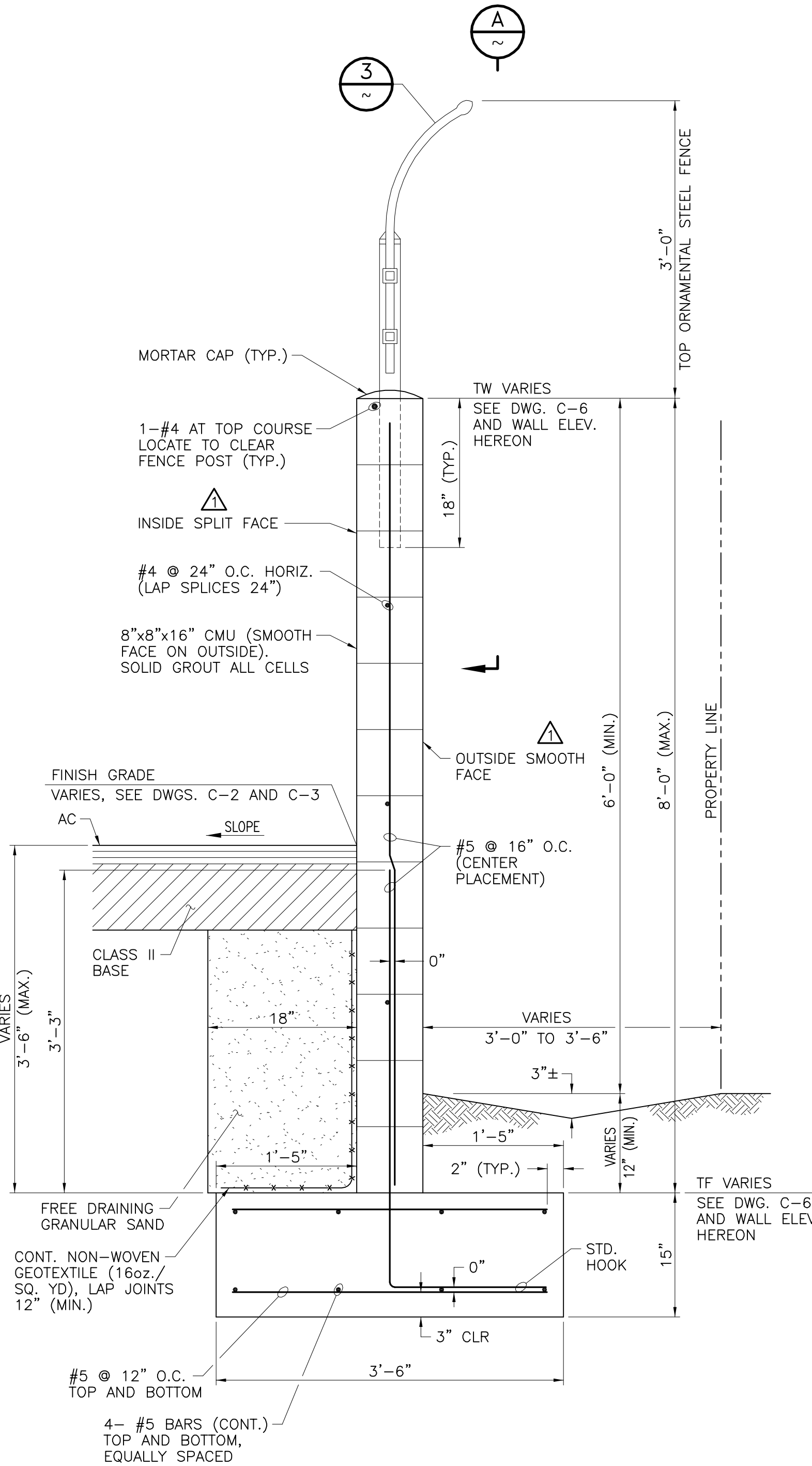


NOTES FOR DETAILS 1 AND 2 HEREON:

1. PROVIDE EXPANSION JOINTS IN WALL @ 40'-0" MAXIMUM SPACING ALONG WALL PER DETAIL 5 HEREON.
2. PROVIDE 2- #5 AT ALL WALL CORNERS AND AT EACH SIDE OF EXPANSION JOINTS.
3. PROVIDE 2" DIA. PVC PIPE SLEEVE AT 4' INTERVALS OF THE FIRST COURSE ABOVE OUTSIDE FINISHED GRADE FOR DRAINAGE IF INSIDE FINISH GRADE IS HIGHER THAN OUTSIDE FINISHED GRADE.
4. CONTRACTOR SHALL PROVIDE CONTINUOUS SPECIAL INSPECTION (ICBO CERTIFIED) FOR GROUTED CONCRETE MASONRY SITE WALLS DURING PREPARATION OF REQUIRED PRISM OR TEST SPECIMENS, SAMPLING AND PLACING ALL MASONRY UNITS, PLACEMENT OF REINFORCING STEEL, INSPECTION OF GROUT SPACES PRIOR TO EACH GROUTING OPERATION, AND DURING ALL GROUTING OPERATIONS.



- NOTES:
1. SEE DETAIL 1 HEREON FOR MASONRY WALL TYPE A REQUIREMENTS.
  2. SOUTH WALL SHALL BE PROVIDED WITH SPLIT FACE BLOCK INSIDE AND OUTSIDE.



RECORD DRAWING

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Shaw*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

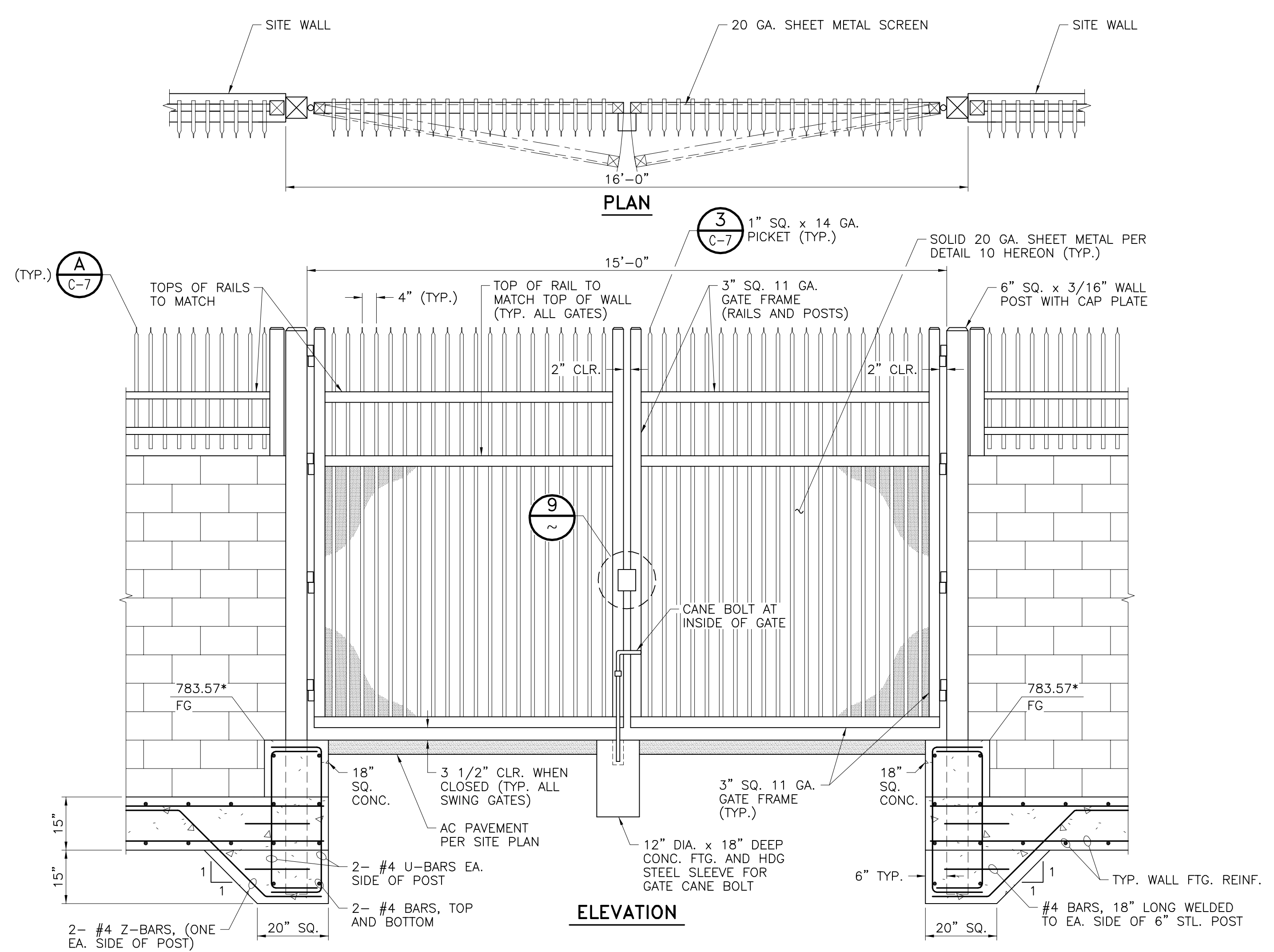
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**WALL ELEVATION AND  
MISCELLANEOUS DETAILS**

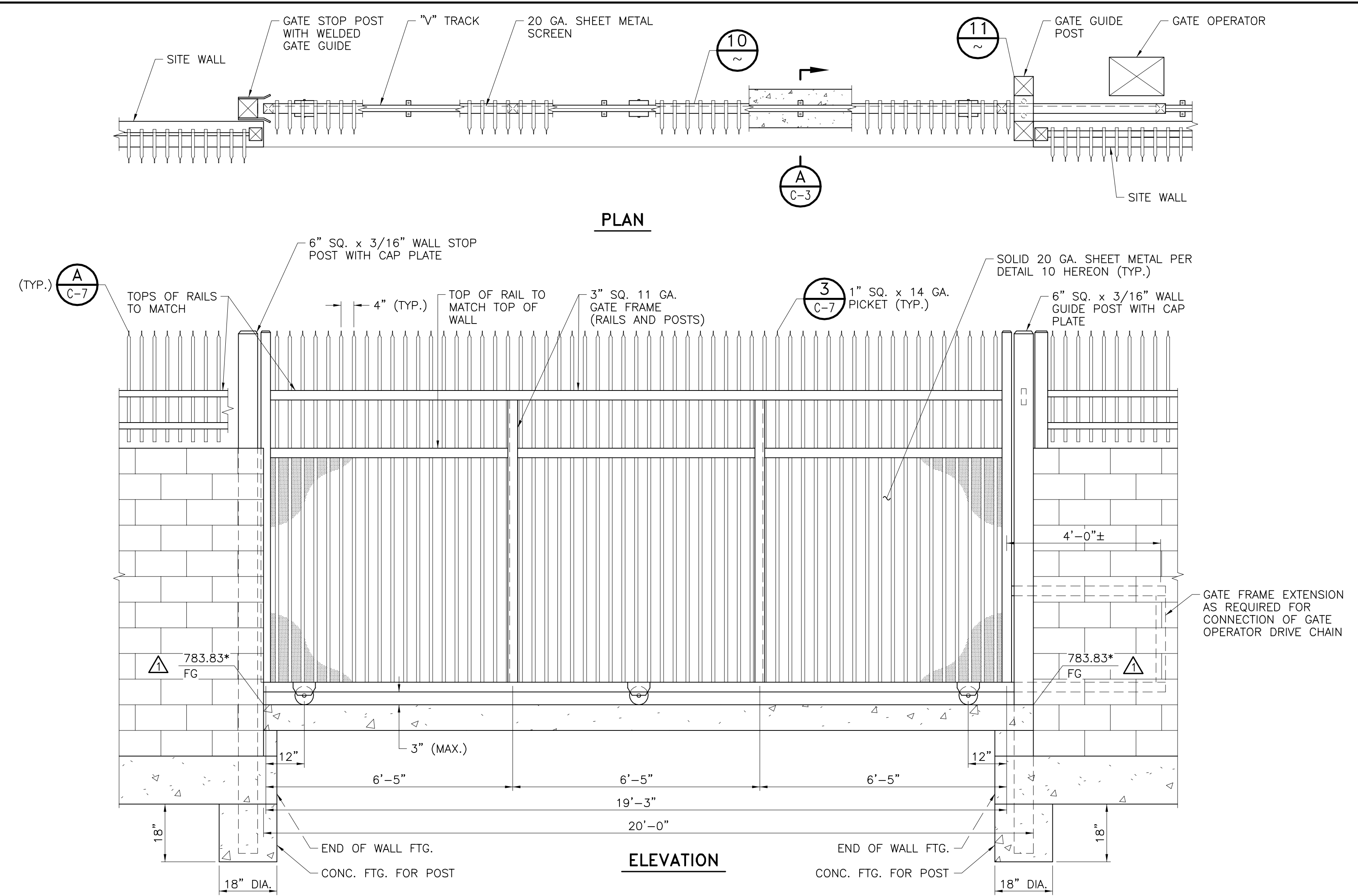
DRAWING  
**C-7**  
14 OF 69 SHEETS  
11724  
R.C.S.D. PLAN No.

DWG. NO.: 05-987-19.54-03 FILE NO.: 05-987-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 3:13PM PLOT SCALE: 1"=1'-0"

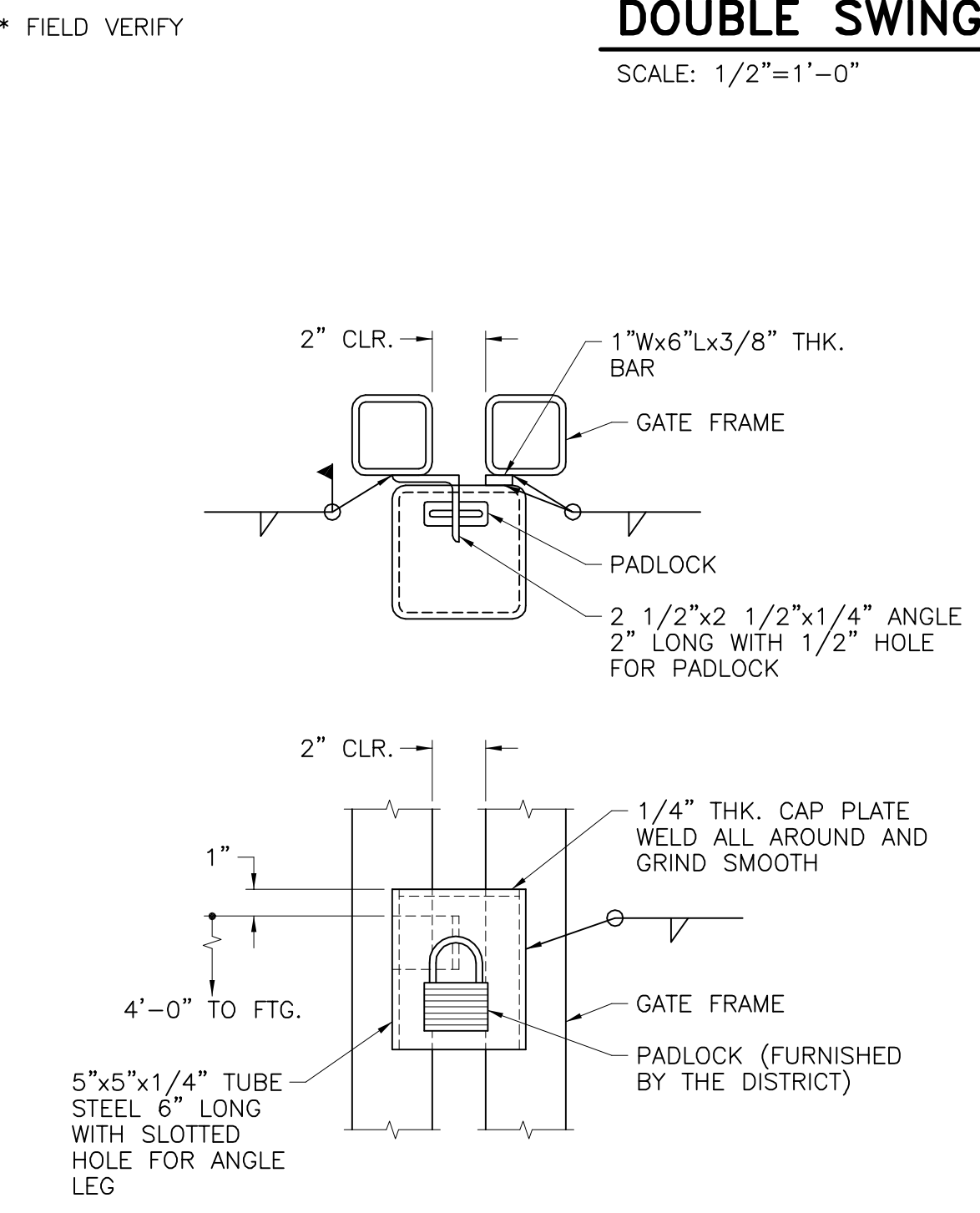
DWG. NO.: 587-19.54-8 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 3:14PM PLOT SCALE: 1/2"=1'-0"



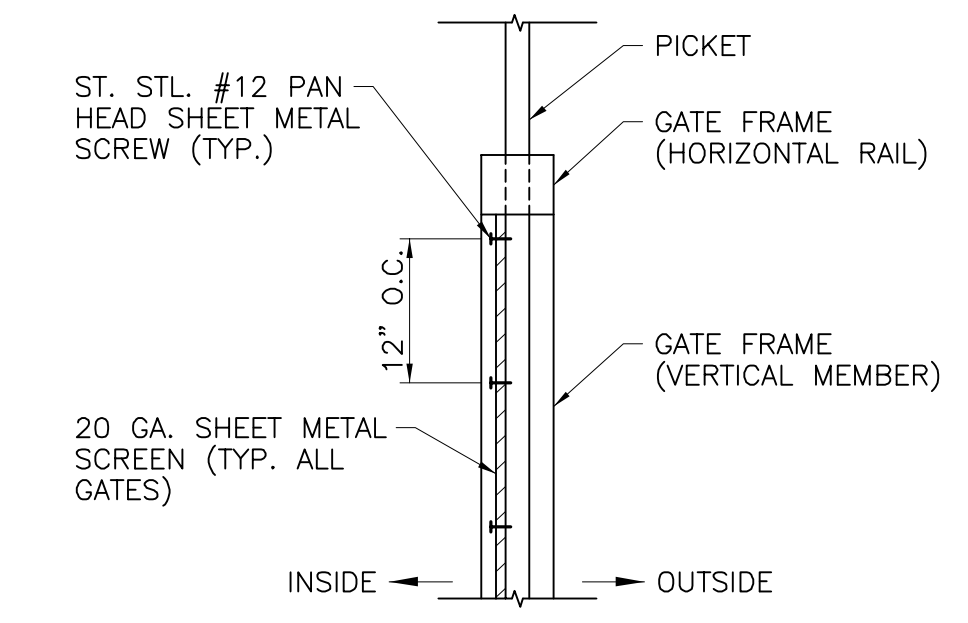
**DOUBLE SWING GATE DETAIL**  
SCALE: 1/2"=1'-0"



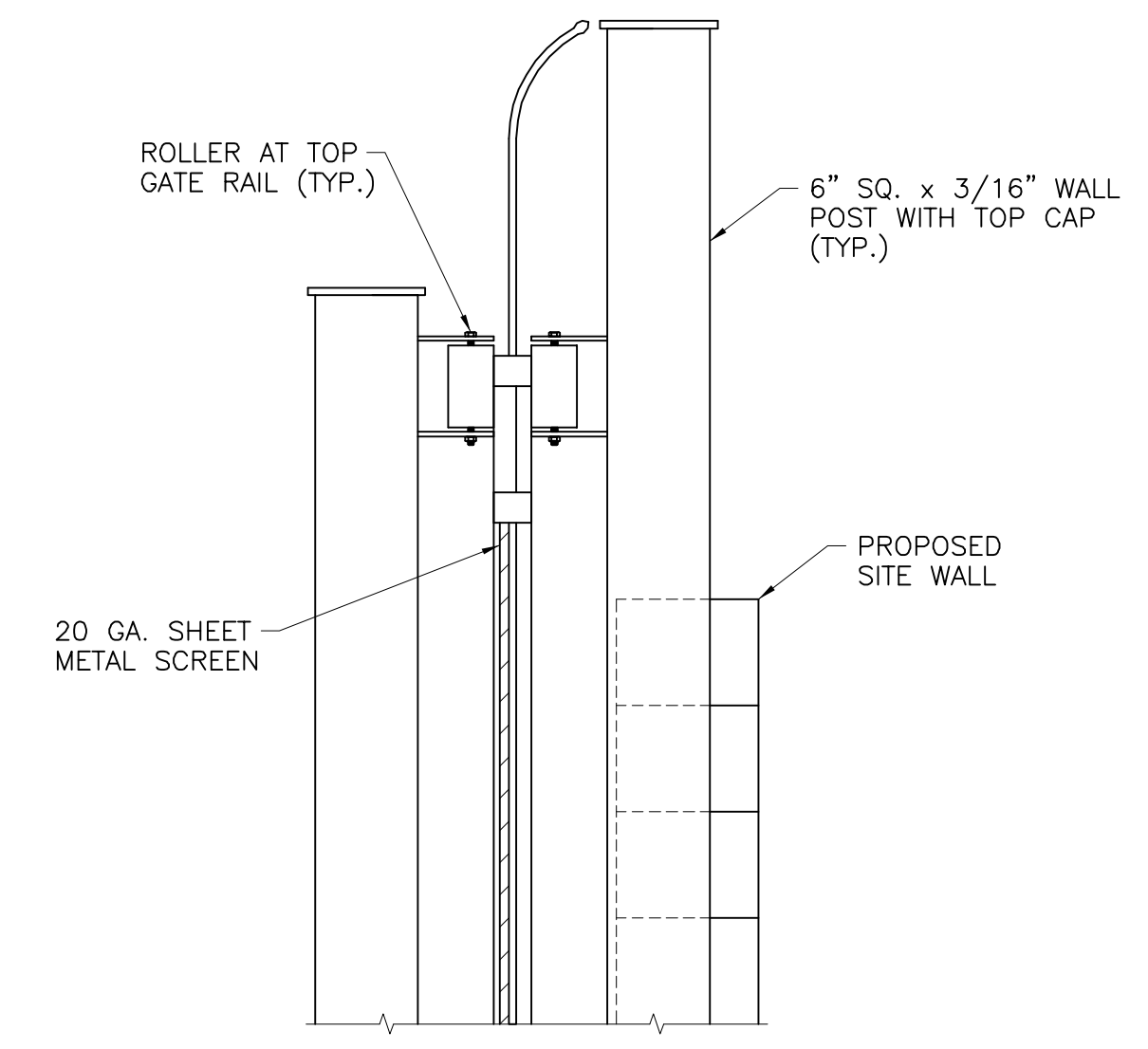
**ROLLING GATE DETAIL**  
SCALE: 1/2"=1'-0"



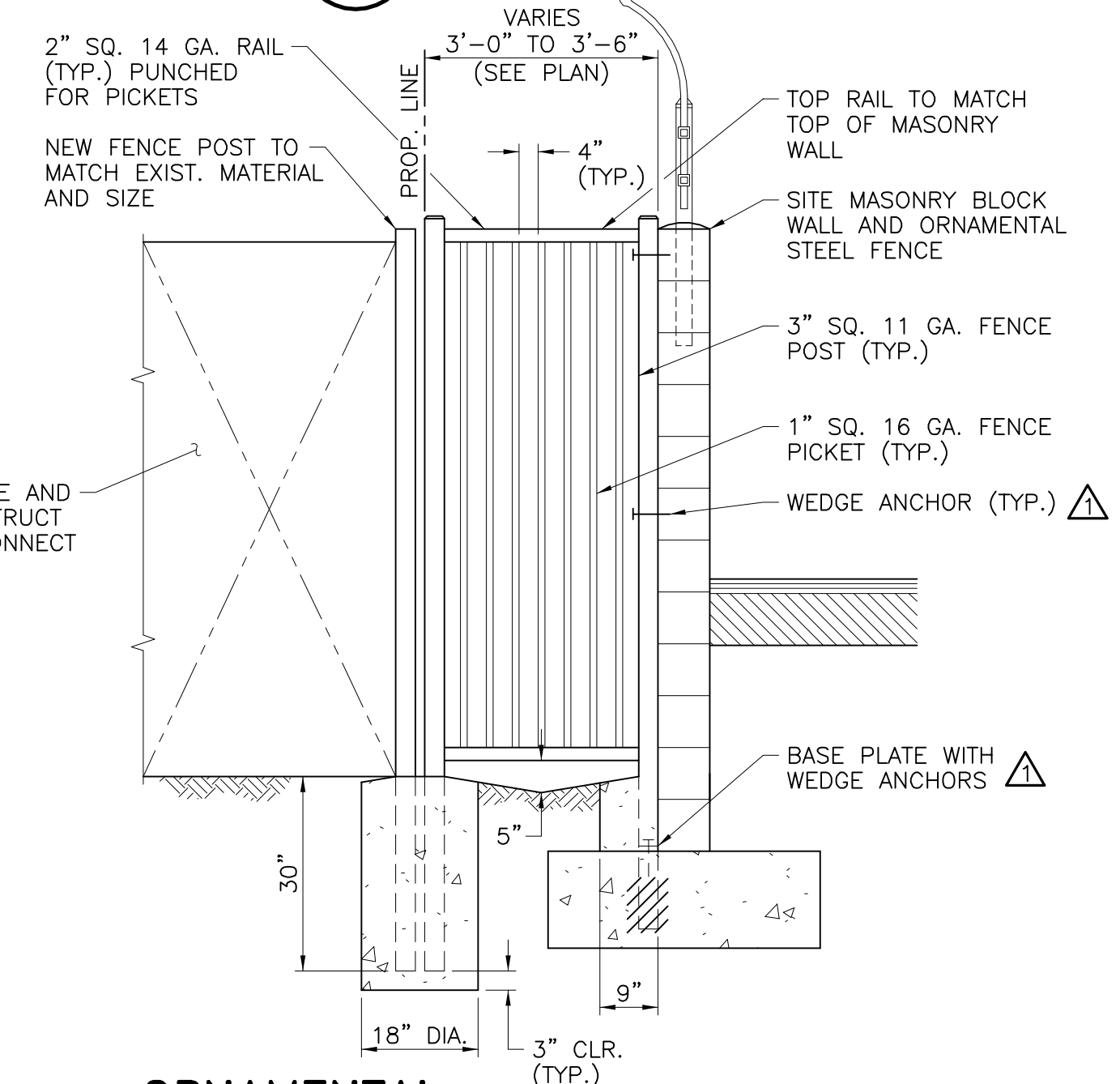
**GATE LOCK DETAIL**  
N.T.S.



**GATE SCREEN DETAIL**  
N.T.S.



**GATE GUIDE POST DETAIL**  
N.T.S.



**ORNAMENTAL STEEL FENCE DETAIL**  
N.T.S.

- NOTES:**
- INSTALL SCREWS IN EVERY OTHER PICKET AND PLACE ROWS AT 12" MAXIMUM SPACING.
  - SPACE SCREWS AT 6" O.C. AT SCREEN SEAMS AND VERTICAL EDGES.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

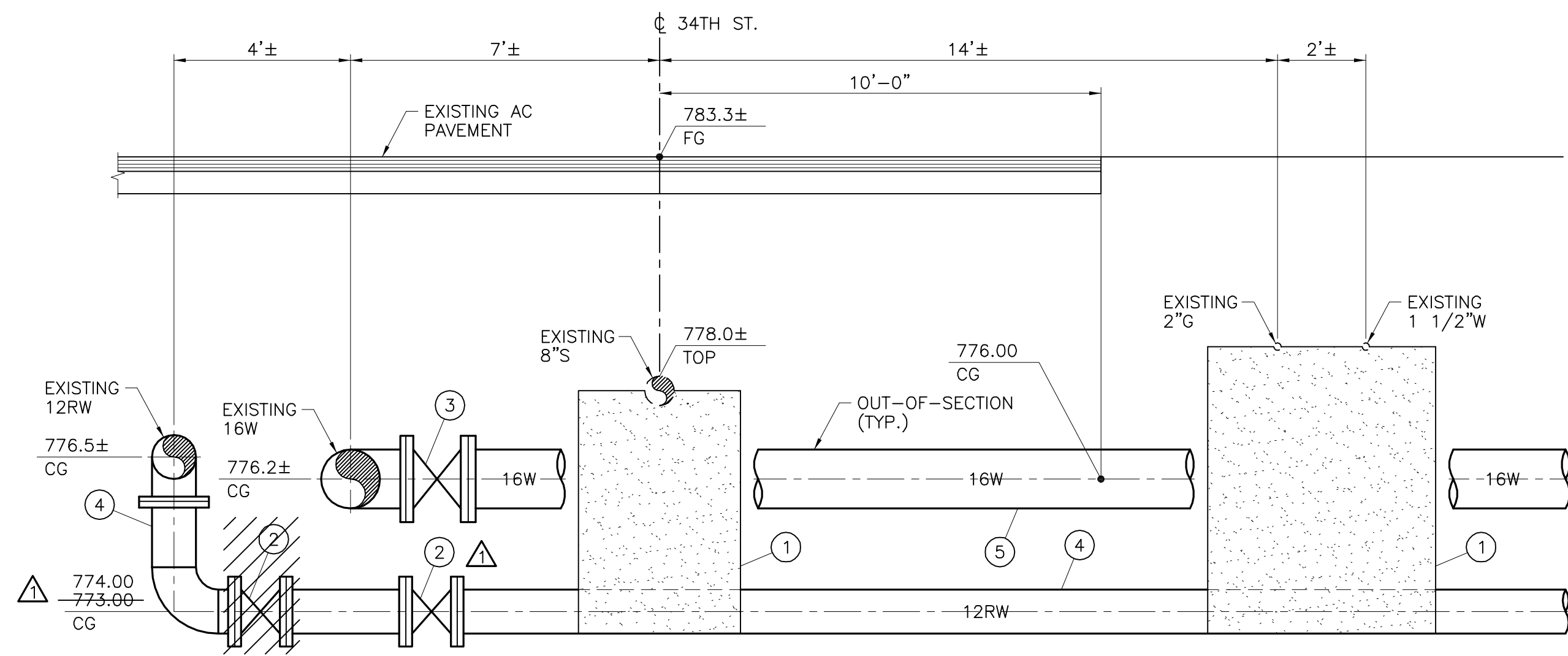
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**WALL AND GATE DETAILS**

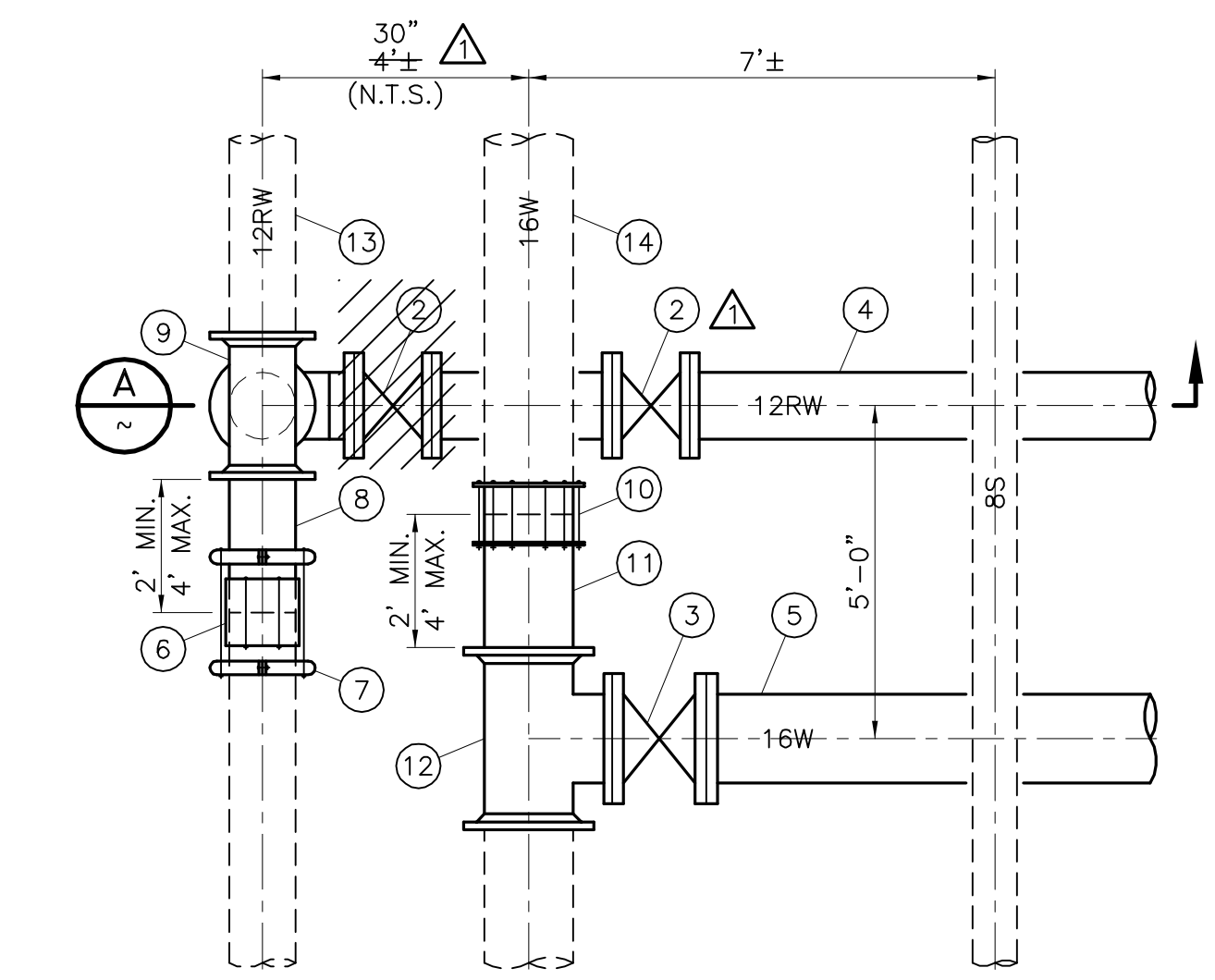
DRAWING  
**C-8**  
15 OF 69 SHEETS  
11725  
R.C.S.D. PLAN No.

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV

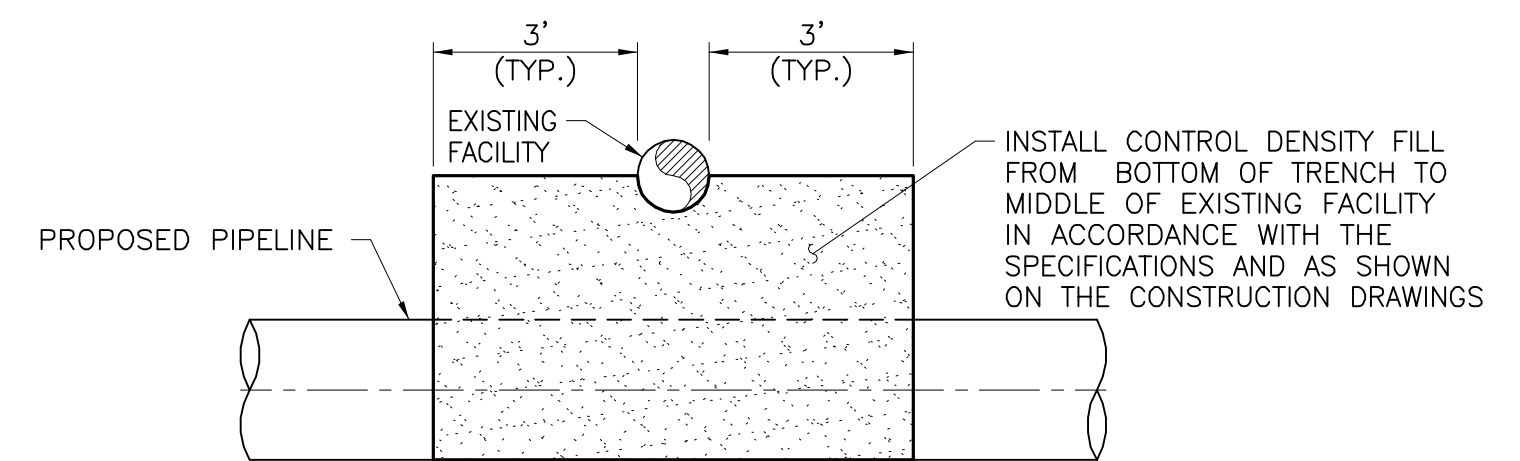
DWG. NO.: 16-587-19.54-9B FILE NO.: 16-587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 3:15PM PLOT SCALE: 1"=1'



**SECTION A**  
SCALE: 3/8"=1'-0"

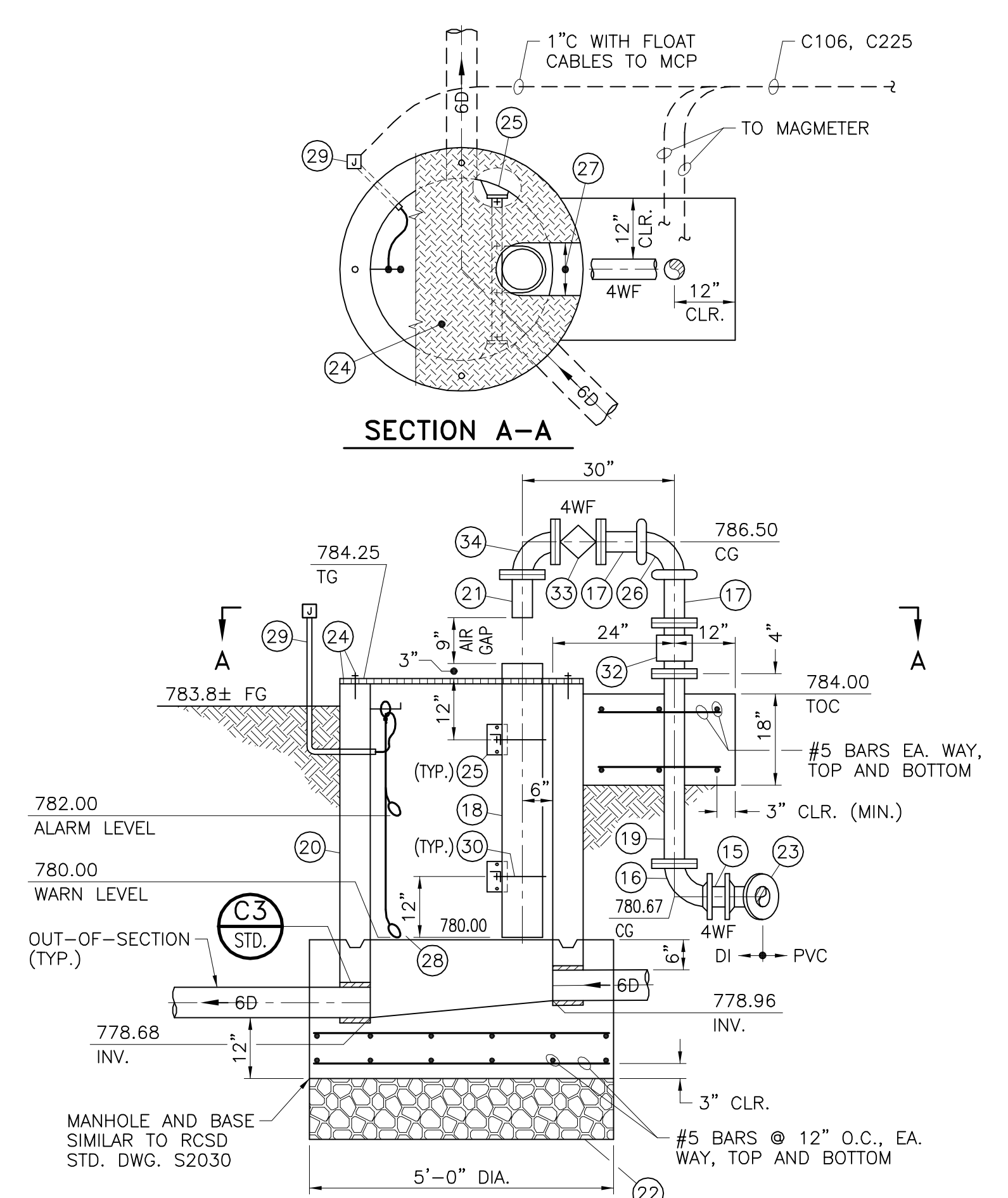


**CONNECTION DETAIL 1**  
SCALE: 3/8"=1'-0"

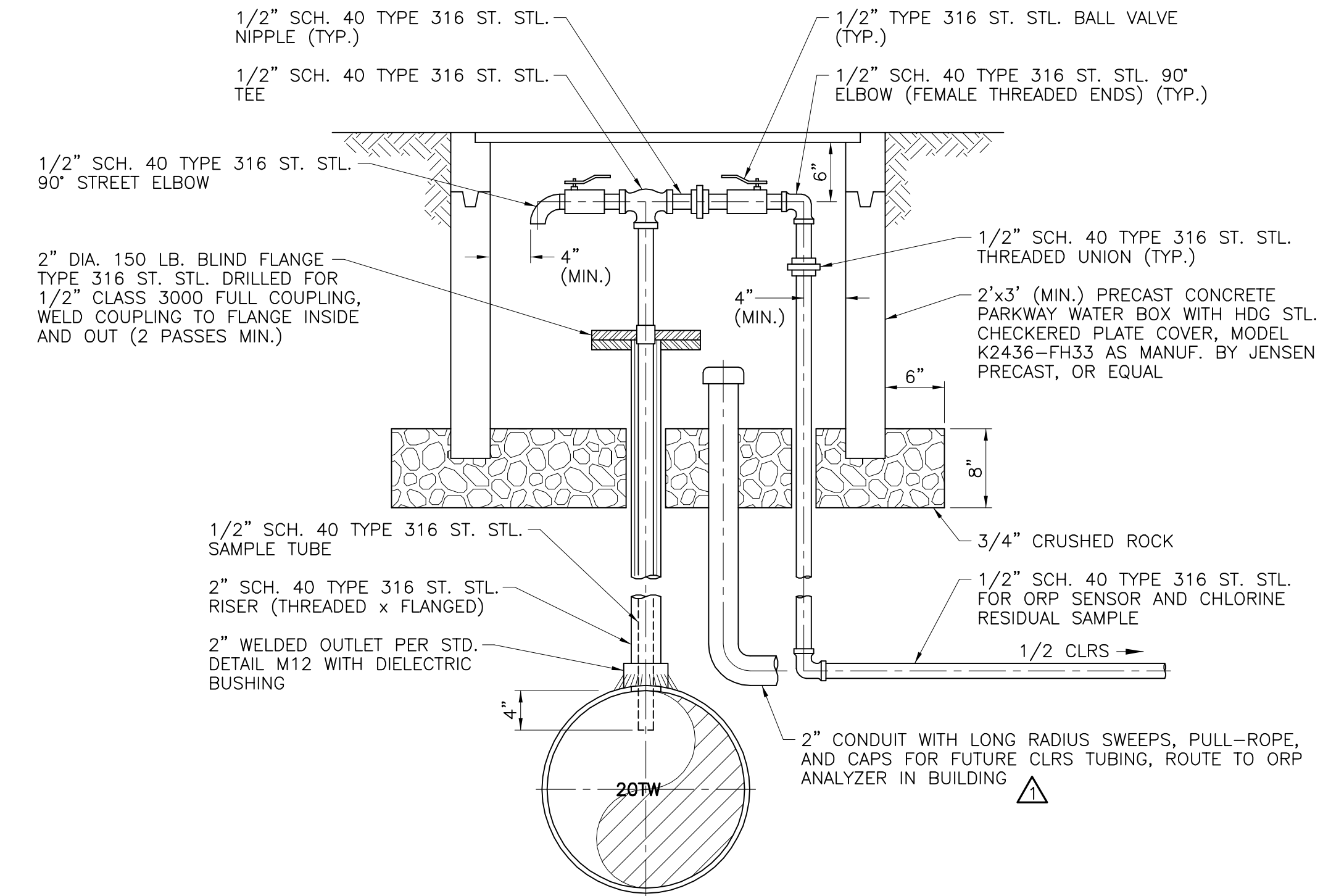


- NOTES:**
- CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UNDERGROUND FACILITIES PRIOR TO COMMENCING WORK. PER "UNDERGROUND FACILITIES AND EXISTING IMPROVEMENTS" CONSTRUCTION NOTES ON DRAWING G-2.
  - CONTRACTOR SHALL BACKFILL WITH CONTROL DENSITY FILL (CDF), ALL MAINLINE UTILITY CROSSINGS, WITH 1' OR LESS OF SEPARATION BETWEEN PROPOSED PIPELINE AND SAID CROSSINGS AND AT LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS. THE CONTROL DENSITY FILL SHALL EXTEND THREE FEET ON EACH SIDE OF THE EXISTING FACILITY AND EXTEND FROM THE BOTTOM OF THE PROPOSED PIPELINE TRENCH TO THE SPRING LINE OF THE EXISTING FACILITY TO BE SUPPORTED.

**CONTROL DENSITY FILL DETAIL 2**  
N.T.S.

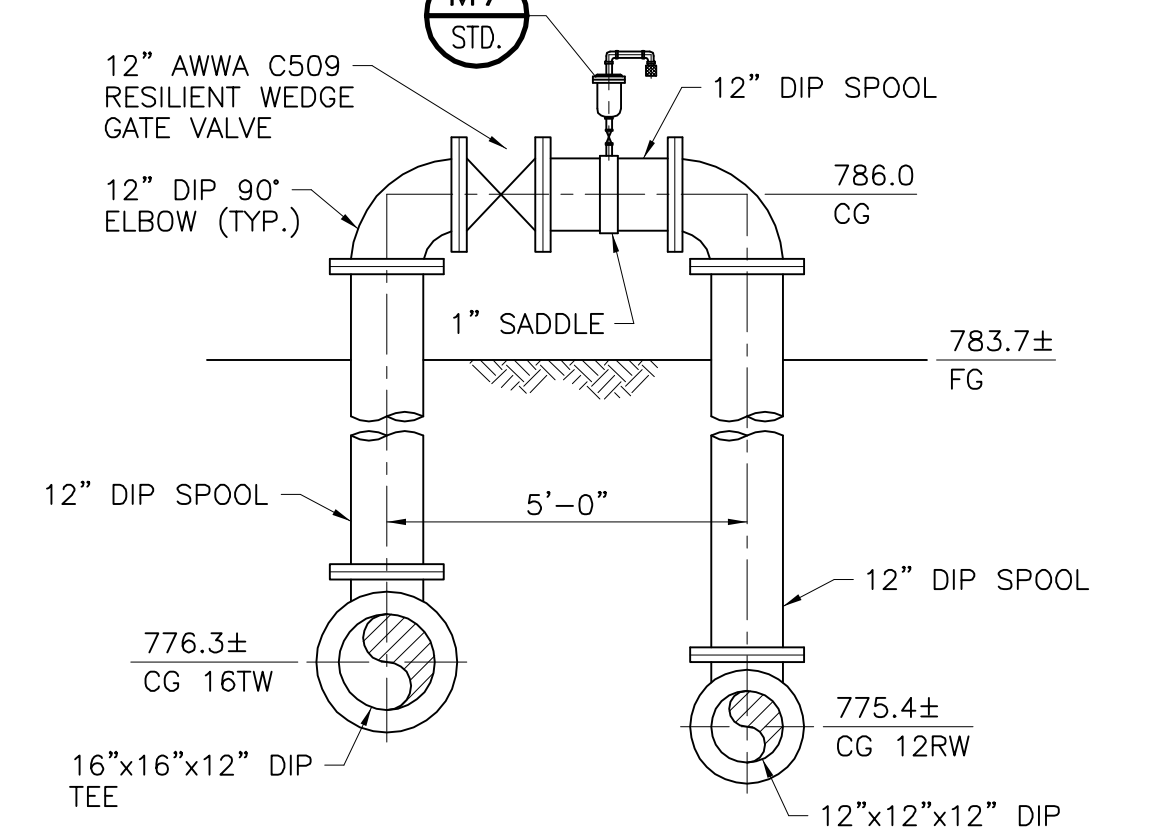


**SECTION A-A**  
**DETAIL 3**  
SCALE: 1/2"=1'-0"



**ORP/CHLORINE RESIDUAL SAMPLE POINT DETAIL 4**  
N.T.S.

- ④ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING C-9:**
- CONTRACTOR SHALL FILL PIPE TRENCH WITH CONTROL DENSITY FILL UNDER EXISTING UTILITIES PER CONTROL DENSITY FILL DETAIL HEREON.
  - 12" GATE VALVE WITH CAN AND RISER.
  - 16" GATE VALVE PER AWWA C515, RESILIENT WEDGE, WITH MIN. WORKING PRESSURE OF 200 PSI, AS MANUFACTURED BY CLOW, AMERICAN FLOW CONTROL, MUELLER, OR EQUAL, WITH CAN AND RISER.
  - 12" CML&C STD. WT. PIPE/FITTINGS.
  - 16" CML&C STD. WT. PIPE/FITTINGS.
  - 12" DIA. LONG BARREL SLEEVE COUPLING WITH FUSION BONDED EPOXY COATING AND STAINLESS STEEL HARDWARE. COUPLED LENGTH SHALL BE 12" MINIMUM. PROVIDE STYLE 501 SLEEVE COUPLING BY ROMAC IND. OR APPROVED EQUAL.
  - PIPE RESTRAINING SYSTEM WITH THE FOLLOWING COMPONENTS: ASTM GRADE 65-45-12 DI CASTINGS WITH; HIGH STRENGTH LOW ALLOY STEEL CLAMPING BOLTS, RODS, T-BOLTS AND ROD NUTS (PER AWWA C111); AND ANSI B18.2.2 CLAMP NUTS WITH FUSION BONDED EPOXY COATING. PROVIDE STYLE 611 PIPE RESTRAINING SYSTEM BY ROMAC IND. OR APPROVED EQUAL.
  - 12" PLAIN END DI PIPE SPOOL.
  - 12" TEE, DI (MJ x MJ x FLG). MJ SHALL BE RESTRAINED.
  - 16" DIA. RESTRAINED SLEEVE COUPLING WITH FUSION BONDED EPOXY COATING. COUPLED LENGTH SHALL BE 10" MINIMUM. COUPLING AND INTEGRAL COUPLING RESTRAINT SYSTEM SHALL BE RATED FOR 250 PSI WORKING PRESSURE. PROVIDE MODEL 400RG RESTRAINED SLEEVE COUPLING BY ROMAC IND. OR APPROVED EQUAL.
  - 16" PIPE SPOOL, DI (PE x PE).
  - 16" TEE, DI (MJ x MJ x FLG). MJ SHALL BE RESTRAINED.
  - EXISTING 12" CLASS 200 C900 PVC RAW WATER PIPELINE.
  - EXISTING 16" CML AND ASPHALT COATED DI CLASS 250 POTABLE WATER PIPELINE.
  - 4" PIPE SPOOL, DI (MJ x PE).
  - 4" ELBOW, DI (FLG x MJ).
  - 4" PIPE SPOOL, DI (FLG x GROOVED END).
  - 8" DIA. SCH. 40 PVC PIPE SPOOL.
  - 4" DIP PIPE SPOOL (FLG x FLG).
  - 36" I.D. PRECAST CONCRETE MANHOLE WITH HEAVY DUTY HDG STEEL GRATING AND HDG STEEL ANGLE FRAME EMBEDDED IN MANHOLE.
  - 4" PIPE SPOOL, DI (FLG x PE).
  - 12" (MIN.) THICK CLASS 2 BASE MATERIAL COMPACTED TO 95% RELATIVE COMPACTION.
  - 4" 45° ELBOW, DI (MJ x MJ).
  - 3/8" ALUMINUM CHECKERED PLATE BOLTED TO MANHOLE SHAFT WITH 4- 3/8" 316 STAINLESS STEEL EXPANSION ANCHORS (3" EMBEDMENT).
  - 2"x2"x1/4" 316 STAINLESS STEEL ANGLE SUPPORT WITH 4"x6"x1/4" 316 STAINLESS STEEL END PLATES. MOUNT WITH 2- 3/8" STAINLESS STEEL EXPANSION ANCHORS AT EACH PLATE INTO MANHOLE SHAFT (3" EMBEDMENT). PROVIDE 1" THICK NON-SHRINK GROUT BETWEEN MANHOLE SHAFT AND SUPPORT PLATE.
  - 4" GROOVED 90° ELBOW, DI.
  - NOTCH CHECKERED PLATE FOR 8" PVC PIPE.
  - LEVEL FLOATS FOR WARN AND HIGH LEVELS.
  - JUNCTION BOX AND 1" CONDUIT WITH 3' EXTRA LENGTH FOR EACH FLOAT CABLE. CORE 1" CONDUIT THROUGH MANHOLE SHAFT FOR FLOAT CABLES.
  - TYPE 316 STAINLESS STEEL U-BOLT FOR 8" PIPE.
  - VICTAULIC GROOVED COUPLING (STYLE 31).
  - 4" FLANGED MAGMETER WITH METER MOUNTED SIGNAL CONVERTER WITH INDICATOR AND TOTALIZER. PROVIDE GROUNDING PER 3E-1, NOTE 10, AND DETAIL E5 STANDARD.
  - 4" ECCENTRIC PLUG VALVE WITH WORM GEAR OPERATOR.
  - 4" 90° ELBOW, DI (FLG x FLG).



**TEMPORARY BYPASS OF TW TO RW FOR PLANT START UP 5**  
SCALE: 3/8"=1'-0"

**RECORD DRAWING**  
BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV

**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

REGISTERED PROFESSIONAL ENGINEER  
WILLIAM GEORGE HOFFMAN  
No. 70939 Exp. 6-30-11  
CIVIL  
STATE OF CALIFORNIA

APPROVED BY: *William George Hoffman*  
REGISTERED ENGINEER No. 70939 DATE 2/15/11

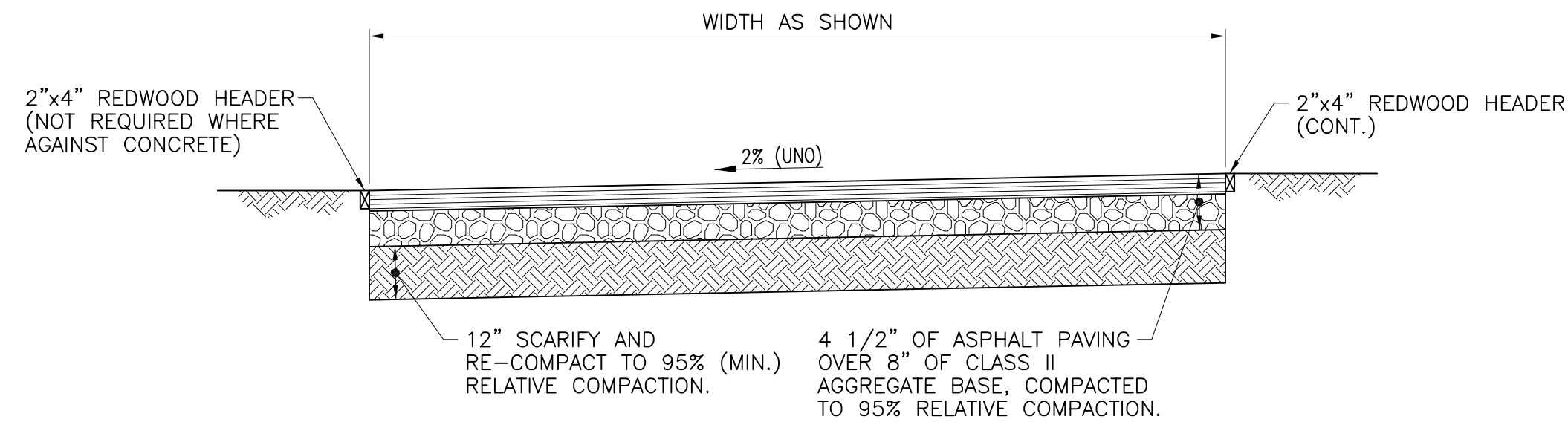
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	MRN
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**SITE PIPING DETAILS**

**DRAWING C-9**  
16 OF 69 SHEETS  
11726  
R.C.S.D. PLAN NO.

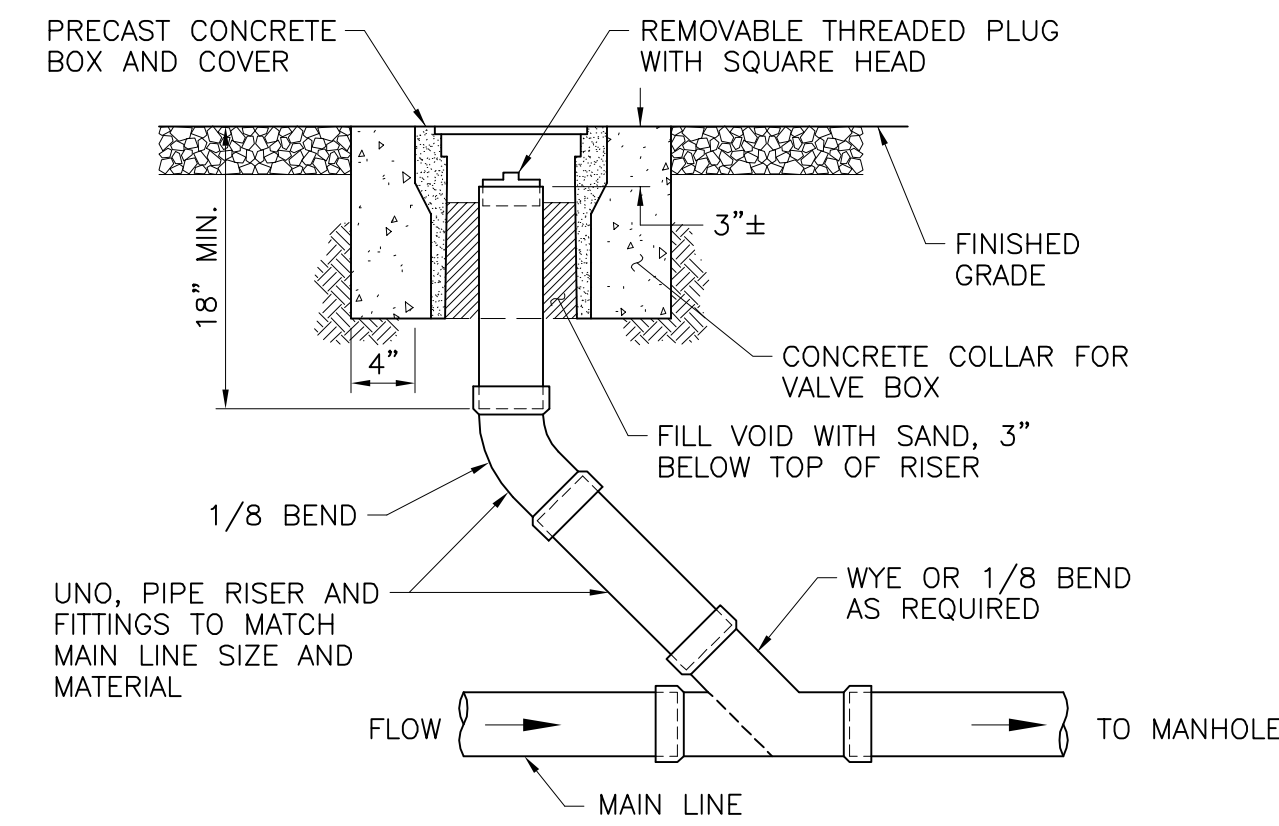
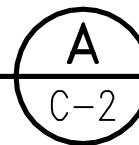




NOTE:  
 REDWOOD HEADER SHALL BE "TRUE HEART" REDWOOD. HEADER SHALL BE INSTALLED WITH 1 1/2"W x 12"L x 1/4" THK. HDG STEEL STAKES AT 4' O.C. SET TOP OF STAKES AT 1/4" BELOW TOP OF HEADER. PROVIDE 1/4" DIA. HDG LAG SCREWS FOR CONNECTING HEADER TO METAL STAKES.

**ROADWAY CROSS SECTION**

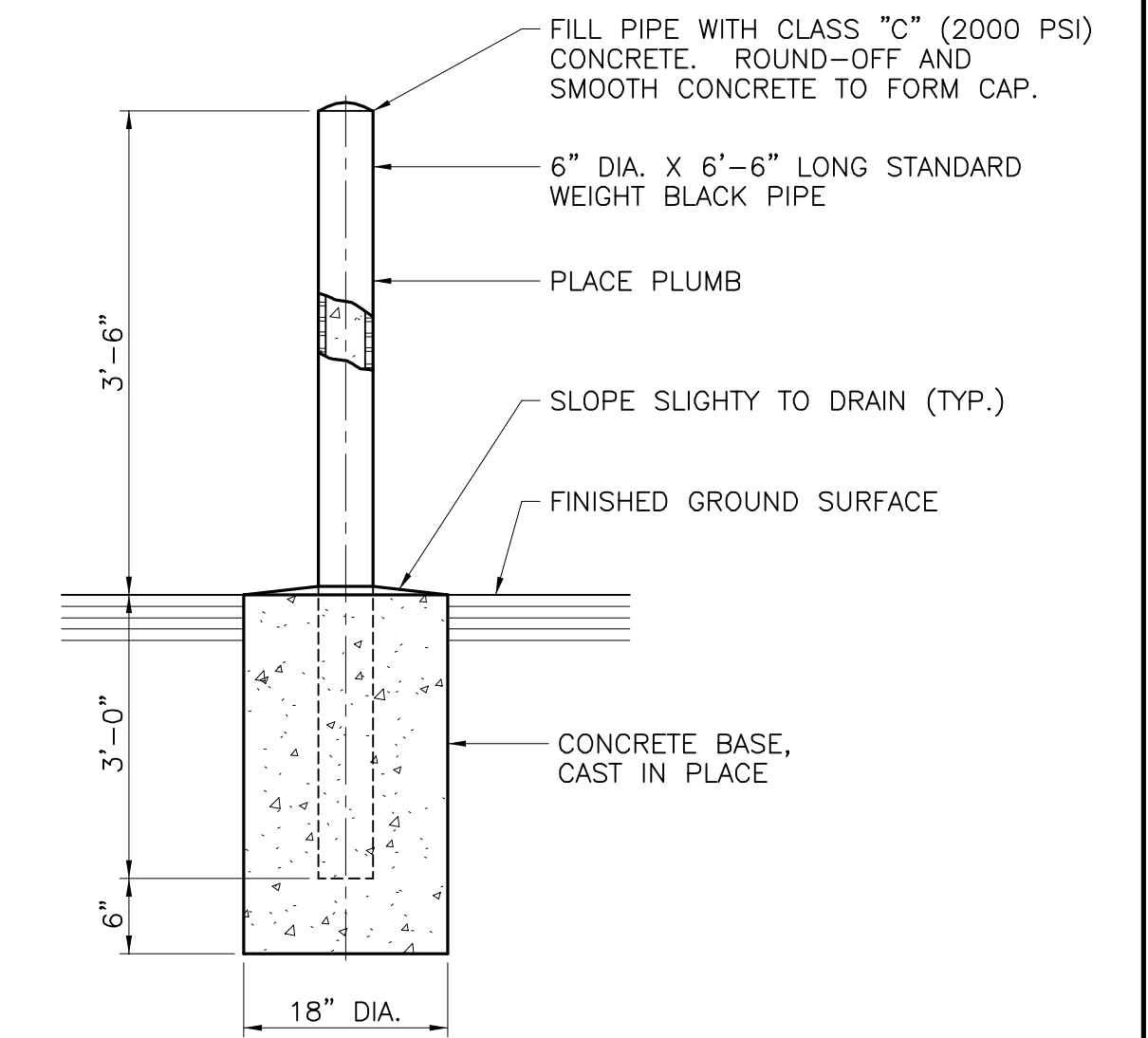
SCALE: 3/8"=1'-0"



NOTES:  
 1. FOR 4" OR SMALLER CLEAN-OUT PIPING, PROVIDE TRAFFIC VALVE BOX AND COVER, BROOKS PRODUCTS 3-RT OR EQUAL, WITH COVER MARKED "SEWER".  
 2. FOR 6" OR LARGER CLEAN-OUT PIPING, PROVIDE METER BOX AND COVER, BROOKS PRODUCTS 11MB OR EQUAL, WITH TRAFFIC RATED HDG FLUSH STEEL DIAMOND PLATE COVER MARKED "SEWER".

**CLEAN-OUT TO GRADE (C.O.T.G.) DETAIL**

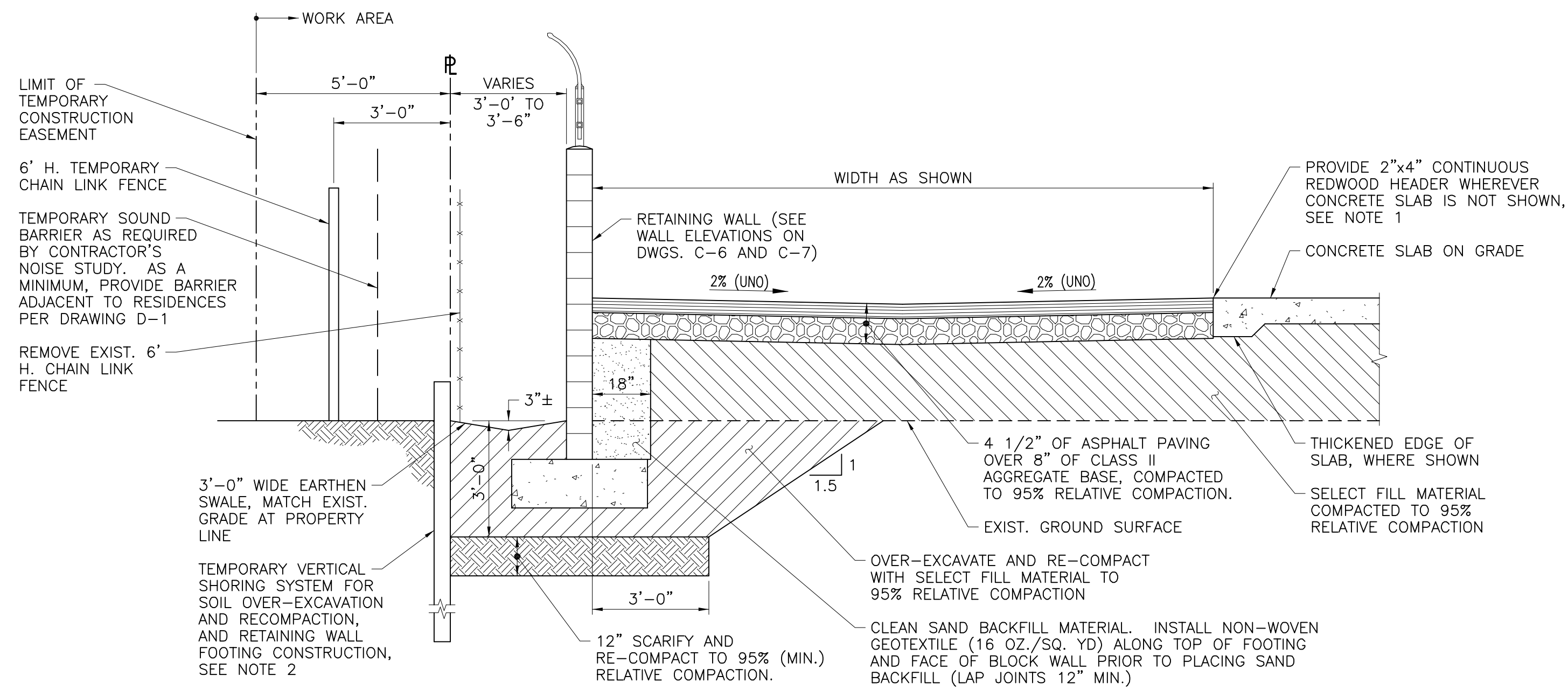
N.T.S.



NOTES:  
 1. ALL GUARD POSTS SHALL BE SET AS SPECIFIED.  
 2. GUARD POSTS SHALL BE COATED PER SERVICE CONDITION A, SPECIFICATION 09900. FINISH COLOR SHALL BE SAFETY YELLOW.

**GUARD POST DETAIL**

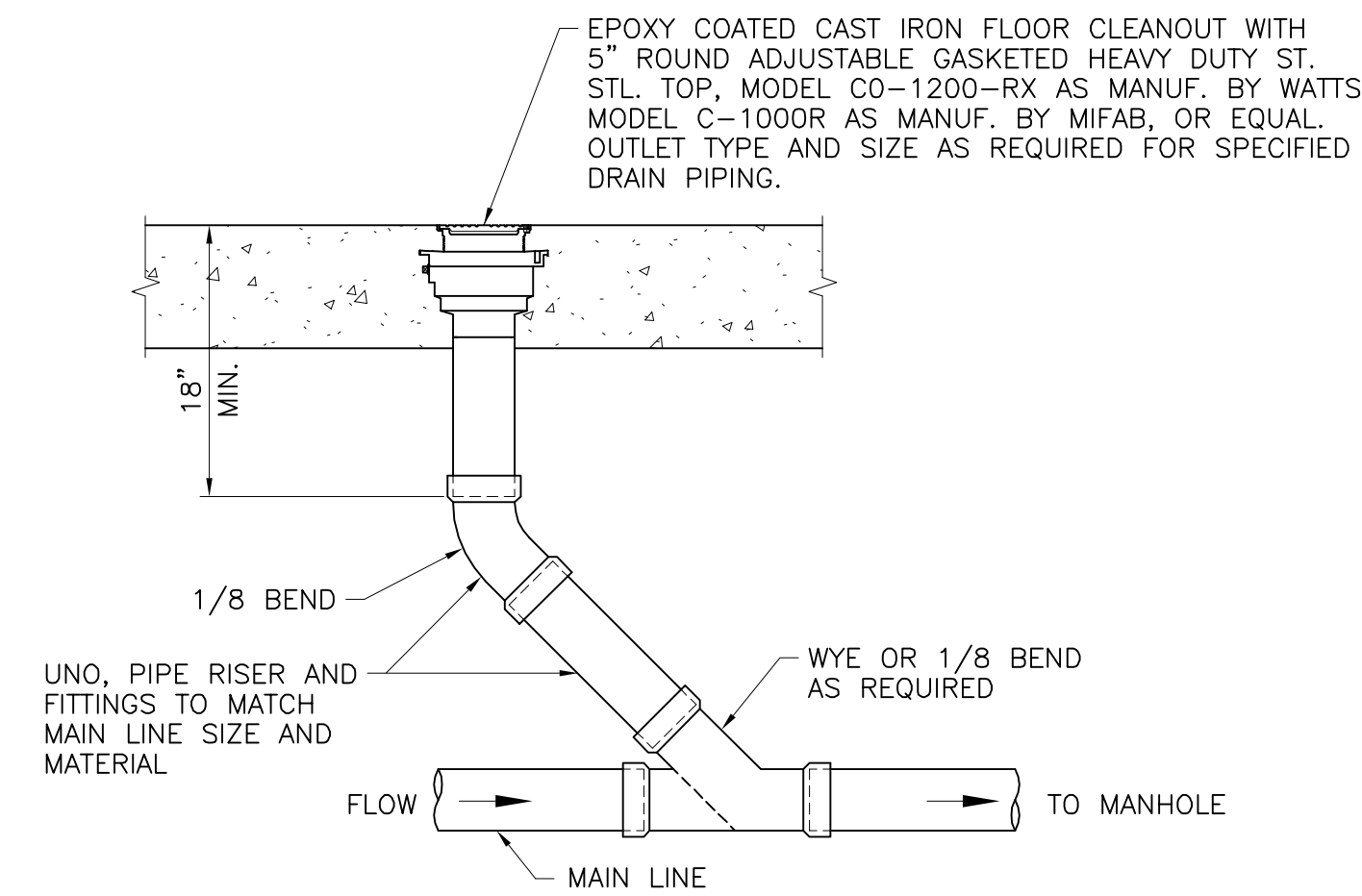
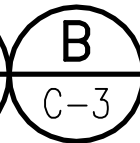
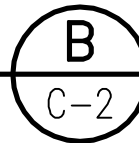
N.T.S.



NOTES:  
 1. REDWOOD HEADER SHALL BE "TRUE HEART" REDWOOD. HEADER SHALL BE INSTALLED WITH 1 1/2"W x 12"L x 1/4" THK. HDG STEEL STAKES AT 4' O.C. SET TOP OF STAKES AT 1/4" BELOW TOP OF HEADER. PROVIDE 1/4" DIA. HDG LAG SCREWS FOR CONNECTING HEADER TO METAL STAKES.  
 2. SHORING IS REQUIRED AROUND THE ENTIRE PROPERTY TO CONSTRUCT THE RETAINING WALL, INCLUDING THE SPECIFIED OVER-EXCAVATION BENEATH THE FOOTING.

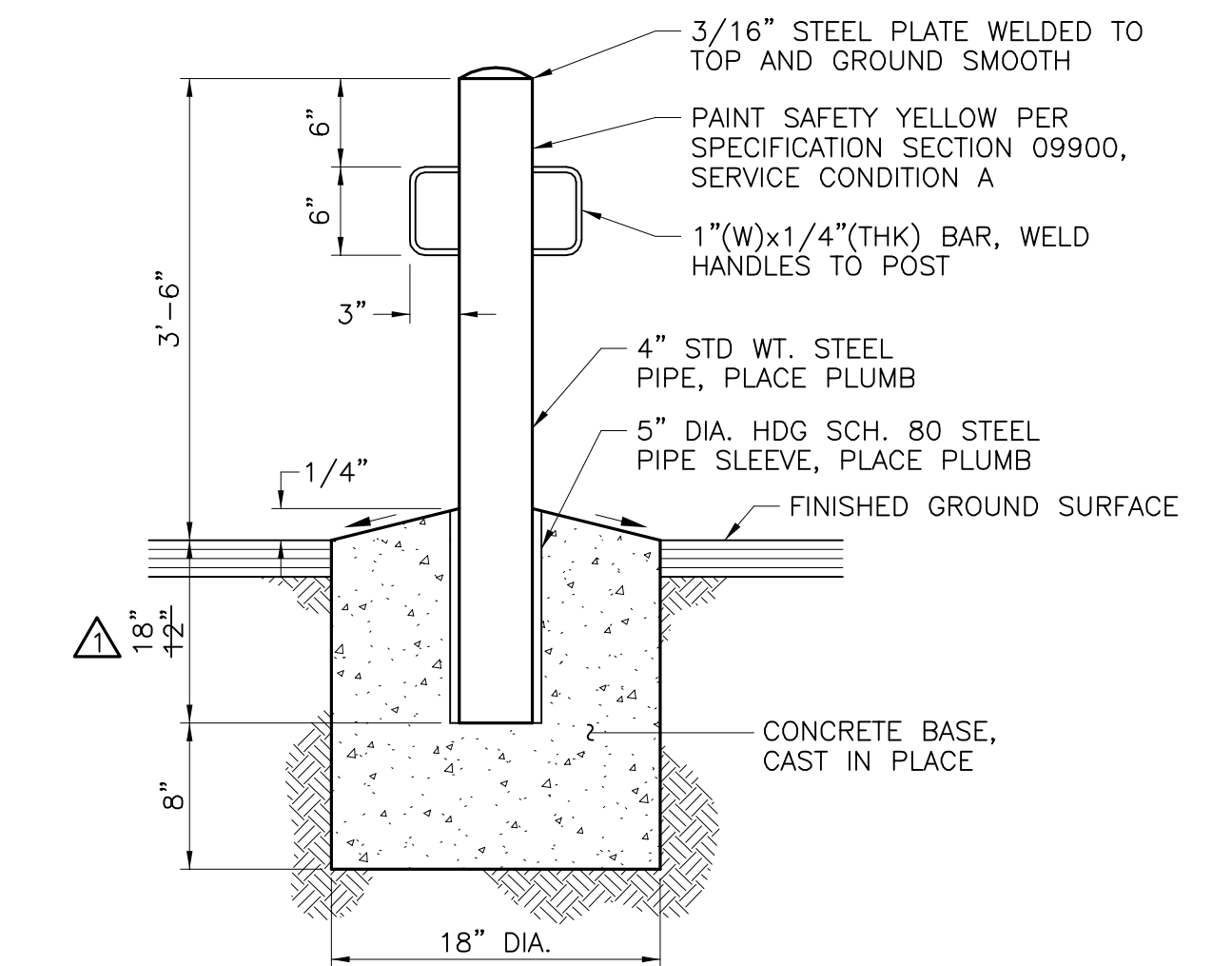
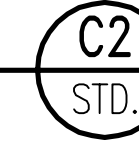
**RETAINING WALL AND ROADWAY CROSS SECTION**

SCALE: 3/8"=1'-0"



**FLUSH FLOOR CLEAN-OUT (F.F.C.O.) DETAIL**

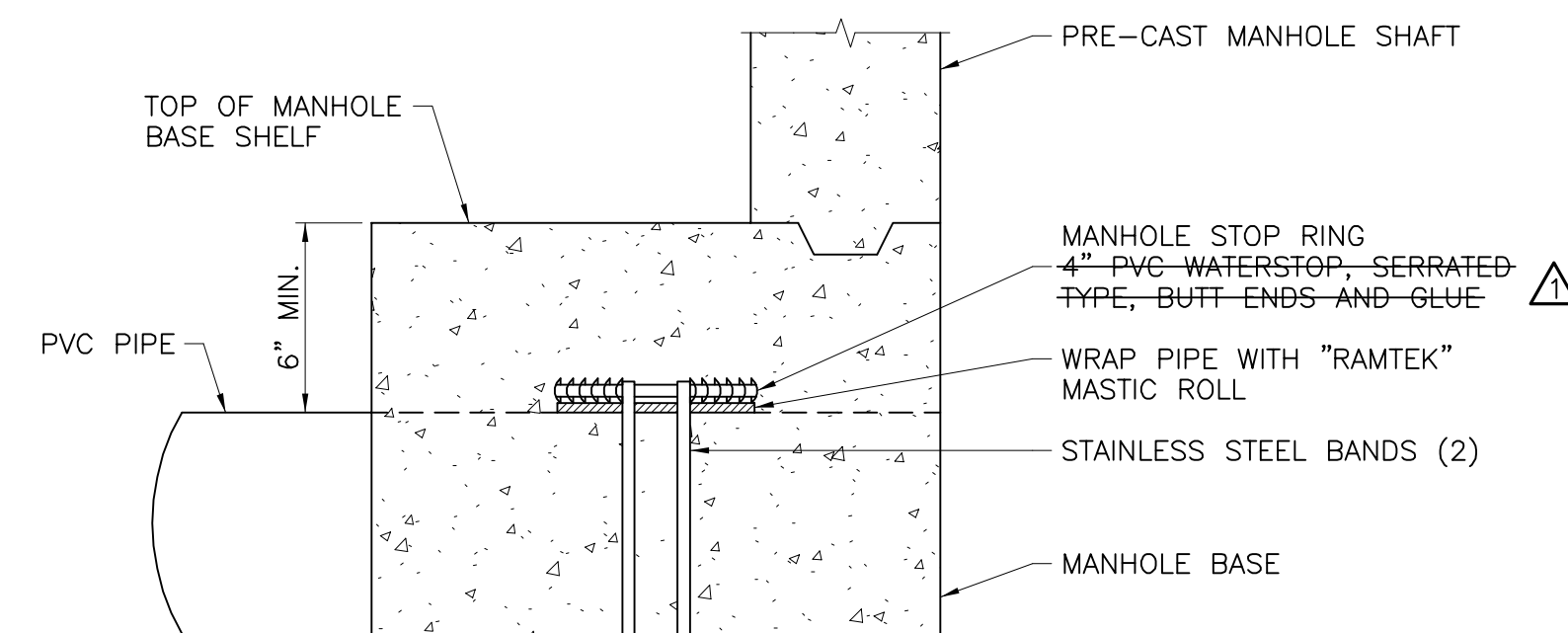
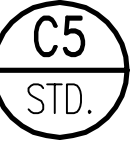
N.T.S.



NOTES:  
 1. ALL GUARD POSTS SHALL BE SET AS SPECIFIED.

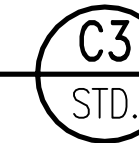
**REMOVABLE GUARD POST DETAIL**

N.T.S.



**PVC PIPE INTO MANHOLE SEAL DETAIL**

N.T.S.



**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
 1-800-227-2600  
 CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Philip L. Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**MISCELLANEOUS SECTIONS AND DETAILS**

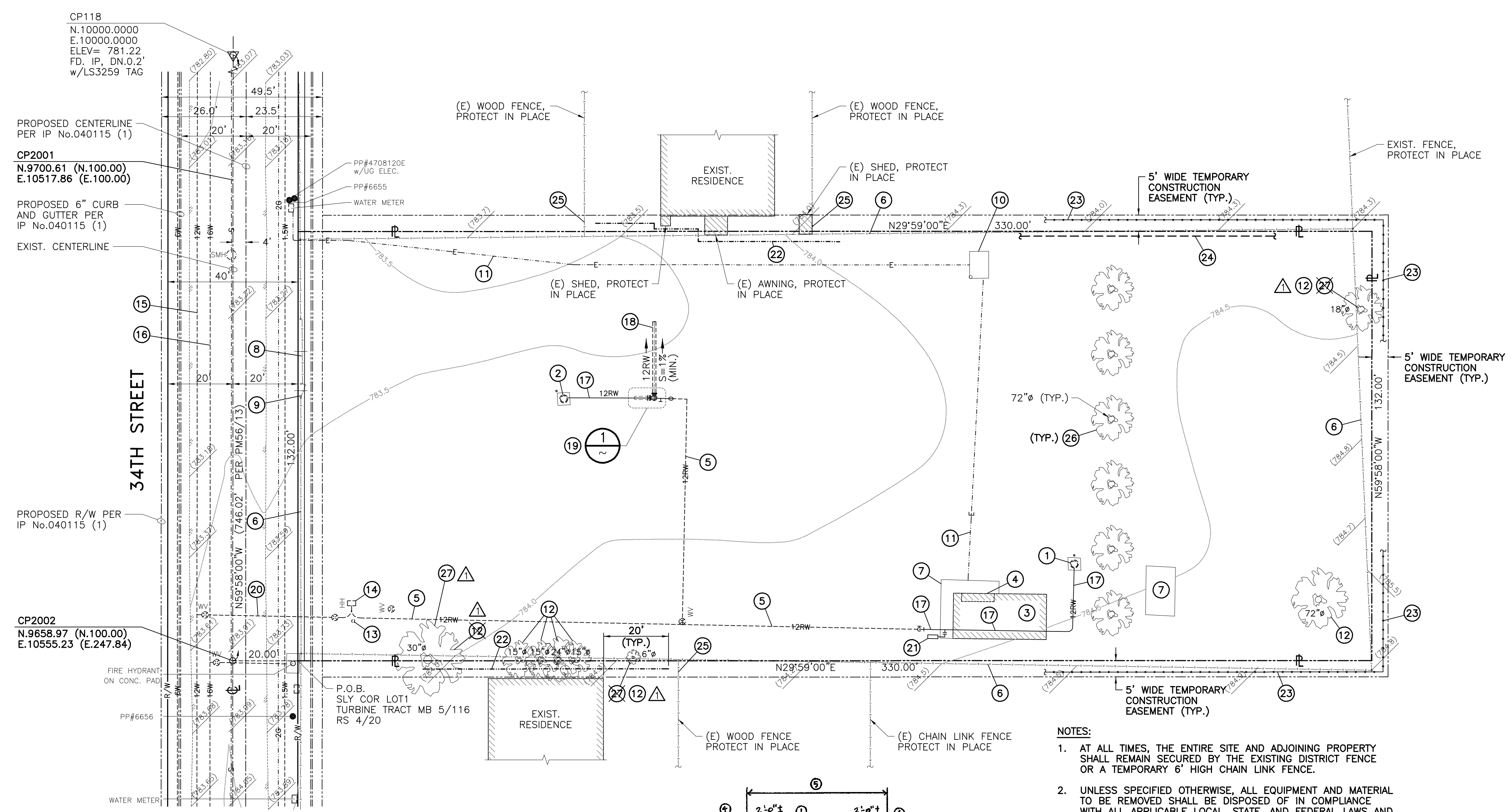
DRAWING  
**C-10**  
 17 OF 69 SHEETS  
 11727  
 R.C.S.D. PLAN No.

DWG. NO.: RC-90-18-54-10 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 3:16PM PLOT SCALE: 1=1



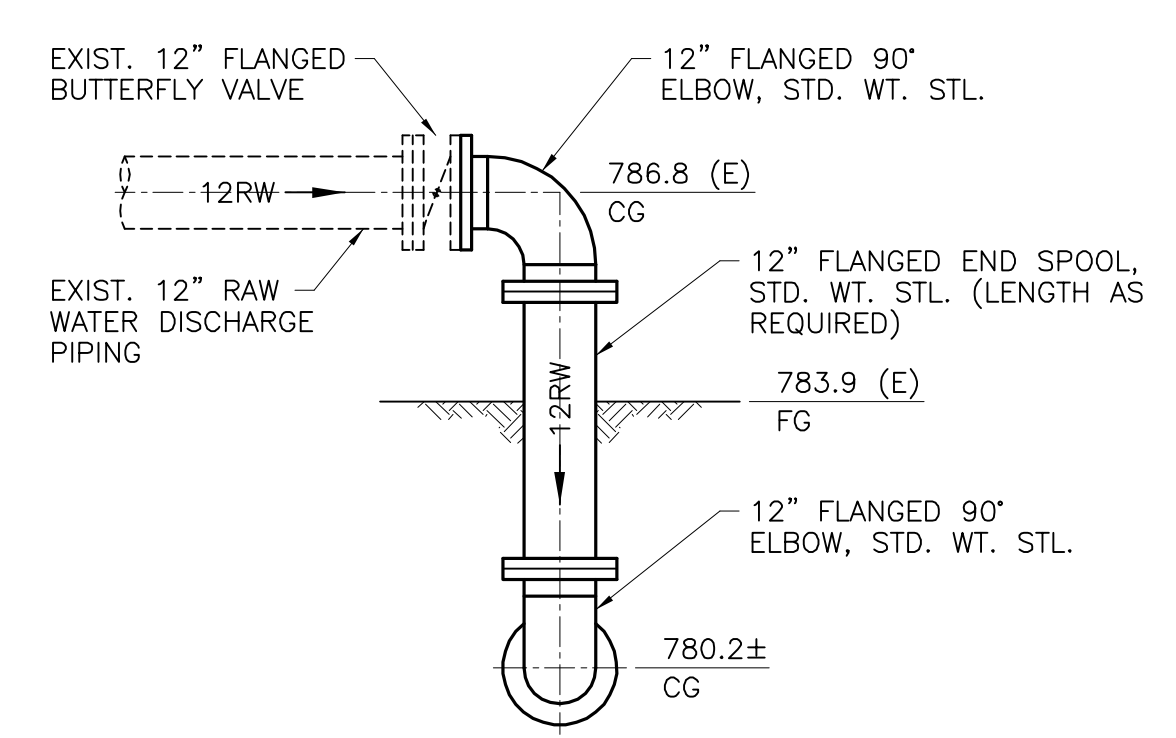


DWG. NO.: re-98-19-34-01 FILE NO.: 587-19-54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 3:23PM PLOT SCALE: 1"=1'



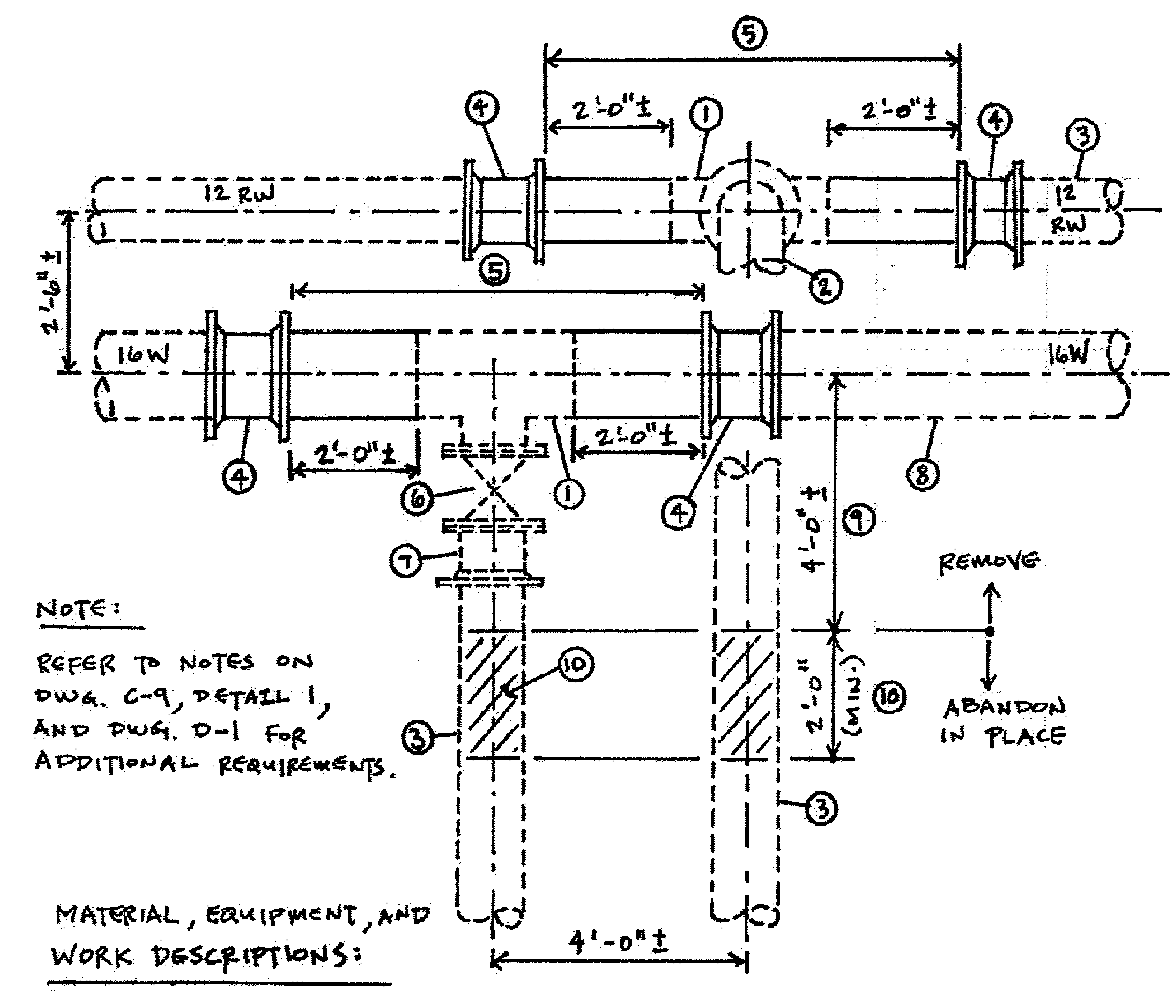
- ④ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING D-1:**
- EXISTING WELL No.17 PUMPING UNIT AND FOUNDATION TO BE MODIFIED.
  - EXISTING WELL No.18 PUMPING UNIT AND FOUNDATION TO BE MODIFIED.
  - EXISTING CONCRETE MASONRY BLOCK BUILDING TO BE DEMOLISHED, INCLUDING: WOOD ROOF, SOLID GROUTED REINFORCED MASONRY WALLS, REINFORCED CONCRETE FOUNDATION AND SLAB, AND APPURTENANCES.
  - EXISTING OUTDOOR ELECTRICAL PANEL WITH SERVICE, SWITCHGEAR, AND MCC FOR WELLS No.17 AND No.18 TO BE RELOCATED FOR TEMPORARY OPERATION OF WELL No.18, AND SALVAGED UPON PROJECT COMPLETION. DISCONNECT ALL EXISTING CONDUCTORS AND REMOVE TO PERMIT RELOCATION OF PANEL.
  - EXISTING BELOW GRADE DISCHARGE PIPING TO BE REMOVED.
  - EXISTING 6' HIGH CHAIN LINK FENCE WITH REDWOOD SLATS TO BE REMOVED.
  - EXISTING 8" THICK REINFORCED CONCRETE SLAB ON GRADE TO BE REMOVED.
  - EXISTING 20' WIDE SITE ACCESS GATE TO BE REMOVED.
  - EXISTING 4' WIDE SITE ACCESS GATE TO BE REMOVED.
  - EXISTING SCE PAD MOUNTED TRANSFORMER TO BE REMOVED BY SCE. CONTRACTOR SHALL REMOVE AND DISPOSE OF CONCRETE PAD, PULL BOX, CONDUIT, AND GROUND RODS.
  - EXISTING UNDERGROUND ELECTRICAL SERVICE. CONDUCTORS TO BE REMOVED BY SCE. UPON COMPLETION OF NEW ELECTRICAL SERVICE, CONTRACTOR SHALL REMOVE AND DISPOSE OF CONDUIT.
  - EXISTING TREE STUMP AND ROOTS TO BE REMOVED. DIMENSION SHOWN HEREON REPRESENTS TREE TRUNK DIAMETER.
  - EXISTING WATER SAMPLING STATION TO REMAIN.
  - EXISTING ELECTRICAL HAND HOLE FOR DIRECT BURIAL TELEMETRY CABLE TO REMAIN.
  - EXISTING 12" RAW WATER TRANSMISSION PIPELINE FROM WELL 8 TO REMAIN.
  - EXISTING 16" POTABLE WATER TRANSMISSION PIPELINE TO REMAIN.
  - EXISTING ABOVE GRADE WELL DISCHARGE PIPING TO BE REMOVED. VALVES, FLOW METER, AND INSTRUMENTATION SHALL BE SALVAGED.
  - TEMPORARY WELL No.18 RAW WATER DISCHARGE PIPING. SEE SITE PIPING PLAN FOR CONTINUATION. TEMPORARY PIPING SHALL BE REMOVED AND DISPOSED OF UPON COMPLETION OF PERMANENT RAW WATER PIPING. SEE SITE PIPING PLAN FOR CONTINUATION.
  - CONNECT TO EXISTING ABOVE GRADE 12" FLANGED BUTTERFLY VALVE WITH A 12" FLANGED 90° ELBOW. PROVIDE 12" FLANGED END SPOOL RISER, STD. WT. STL., AND 12" FLANGED 90° ELBOW BELOW GRADE (REFER TO DETAIL 1 HEREON). ALL TEMPORARY PIPING AND FITTINGS SHALL BE REMOVED AND DISPOSED OF UPON COMPLETION OF PERMANENT RAW WATER PIPING.
  - EXISTING BELOW GRADE PIPING TO REMAIN.
  - EXISTING REDUCED PRESSURE BACKFLOW DEVICE TO BE REMOVED AND SALVAGED.
  - CONSTRUCT SOUND BARRIER A MINIMUM OF 20' BEYOND EXISTING RESIDENCES. PROVIDE ADDITIONAL SOUND BARRIERS AS REQUIRED PER CONTRACTORS NOISE STUDY. SEE DRAWING C-10, SECTION B.
  - CONSTRUCT TEMPORARY 6' HIGH CHAIN LINK FENCING AROUND ENTIRE SITE TO MAINTAIN SECURITY. SEE DRAWING C-10, SECTION B.
  - CONSTRUCT TEMPORARY VERTICAL SHORING ALL AROUND SITE FOR RETAINING WALL CONSTRUCTION, INCLUDING OVER-EXCAVATION AND RECOMPACTION BENEATH FOOTING. SEE DRAWING C-10, SECTION B.
  - REMOVE PORTION OF EXISTING FENCE AS NECESSARY AND CONNECT TO TEMPORARY CHAIN LINK FENCE.
  - EXISTING TREE STUMP AND ROOTS TO BE REMOVED. APPROXIMATE LOCATION OF 100' TALL EUCALYPTUS TREES. TREES WERE PREVIOUSLY REMOVED AND REMAINING STUMPS ARE BELOW GRADE AND NOT VISIBLE.
  - EXISTING TREE TO BE REMOVED BY CONTRACTOR. NOT USED.

- NOTES:**
- AT ALL TIMES, THE ENTIRE SITE AND ADJOINING PROPERTY SHALL REMAIN SECURED BY THE EXISTING DISTRICT FENCE OR A TEMPORARY 6' HIGH CHAIN LINK FENCE.
  - UNLESS SPECIFIED OTHERWISE, ALL EQUIPMENT AND MATERIAL TO BE REMOVED SHALL BE DISPOSED OF IN COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS, ALL AT THE CONTRACTOR'S EXPENSE.
  - ALL SALVAGED EQUIPMENT AND MATERIAL SHALL BE DELIVERED AND UNLOADED BY THE CONTRACTOR AT THE DISTRICT'S STORAGE YARD.
  - REFER TO SPECIFICATION SPECIAL REQUIREMENTS, SECTION 02050, AND APPENDIX D FOR ADDITIONAL DEMOLITION, RELOCATION, AND SALVAGE REQUIREMENTS.



**TEMPORARY WELL No.18 RAW WATER DISCHARGE PIPING CONNECTION DETAIL**

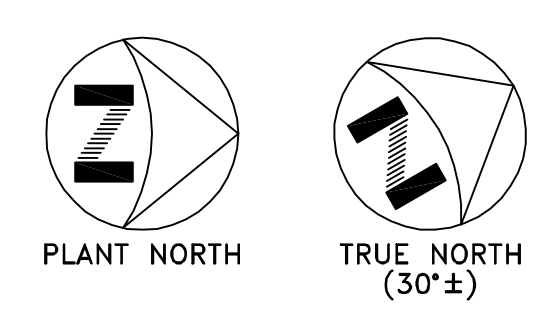
SCALE: 3/8"=1'-0"



**ABANDON EXISTING CONNECTIONS DETAIL**

N.T.S.

- NOTE:**  
REFER TO NOTES ON DWA. C-1, DETAIL 1, AND DWA. D-1 FOR ADDITIONAL REQUIREMENTS.
- MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS:**
- EXISTING TAPPING SADDLE WITH 12" FLG'D BRANCH TO BE REMOVED & SALVAGED.
  - EXISTING 12" FLG. x MJ 90° ELBOW, DS, TO BE REMOVED.
  - EXISTING 12" CLASS 200 C905 PVC RAW WATER PIPELINE.
  - MECHANICAL JOINT SOLID SLEEVE (LONG), DS, WITH RESTRAINED JOINTS.
  - PLAIN END PIPE SPOOL, DS, CLASS 250 (MIN.), LENGTH AS REQUIRED.
  - EXISTING 12" FLANGED GATE VALVE TO BE REMOVED & SALVAGED.
  - EXISTING 12" FLG. x MJ ADAPTER, DS, TO BE REMOVED.
  - EXISTING 16" CML & ASPHALT COATED DS CLASS 250 POTABLE WATER PIPELINE.
  - REMOVE AND DISPOSE OF EXISTING PIPE.
  - PLUG END OF PIPE WITH CONCRETE (ABANDON IN PLACE).



**RECORD DRAWING**  
BY: *B. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



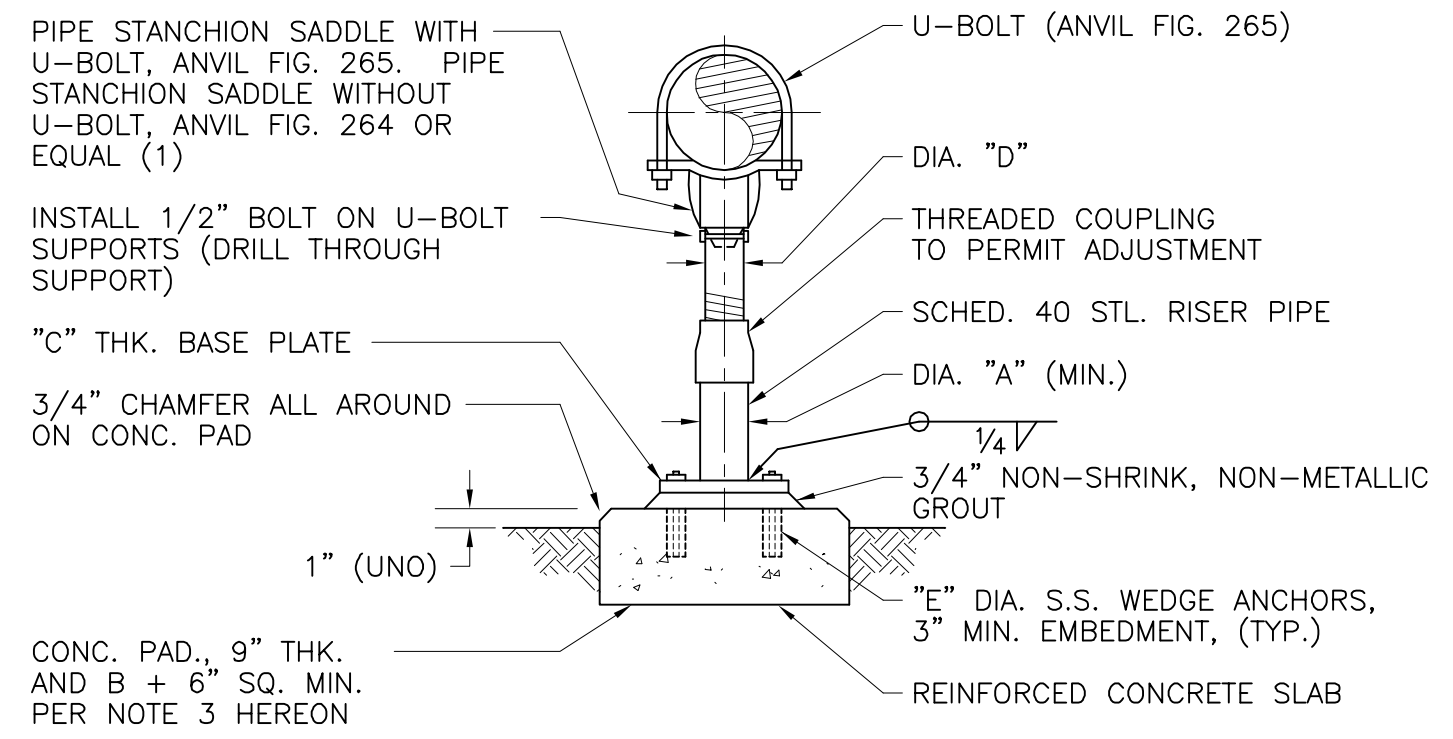
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Steen*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	1"=20'
FLD. BK.	NA
DESIGN	BCV/PES
DRAWN	MRN
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**DEMOLITION AND TEMPORARY FACILITIES PLAN AND DETAIL**

DRAWING  
**D-1**  
19 OF 69 SHEETS  
11729  
R.C.S.D. PLAN No.

DWG. NO.: RE-987-19.54-11 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:02PM PLOT SCALE: 1=1



**TYPE PS1 - WITH U-BOLT**

PIPE SIZE	A	B	C	D	E
4", 6"	4"	10"	3/8"	3"	3/8"
8", 10", 12"	4"	10"	1/2"	3"	1/2"
14", 16"	4"	12"	5/8"	3"	1/2"
18", 20"	6"	14"	3/4"	3 1/2"	1/2"
24", 30", 36"	6"	14"	3/4"	4"	1/2"

**TYPE PS2 - WITHOUT U-BOLT**

PIPE SIZE	A	B	C	D	E
2 1/2", 3", 3 1/2"	2 1/2"	9"	3/8"	1 1/2"	3/8"
4", 6"	3"	10"	3/8"	2 1/2"	3/8"
8", 10", 12"	3"	10"	1/2"	2 1/2"	1/2"
14", 16"	4"	12"	5/8"	3"	1/2"
18", 20"	6"	14"	3/4"	3 1/2"	1/2"
24", 30", 36"	6"	14"	3/4"	4"	1/2"

- NOTES:**
- WHERE LOCATED UNDER FLANGE OR VALVE USE PS2 SUPPORT WITH SADDLE RADIUS TO MATCH FLANGE OR VALVE BODY. SADDLE SHALL BE CAST IRON OR FABRICATED STEEL.
  - UNO, PIPE STANCHIONS AND ACCESSORIES SHALL BE HOT DIP GALVANIZED (HDG).
  - PROVIDE INDIVIDUAL CONCRETE SUPPORT PAD WITH #4 AT 12" O.C. TOP AND BOTTOM, EACH WAY, FOR PIPE STANCHIONS NOT LOCATED ON CONCRETE SLABS OF 6" MIN. THICKNESS.

**PS1 - PIPE STANCHION WITH U-BOLT**  
**PS2 - PIPE STANCHION WITHOUT U-BOLT**

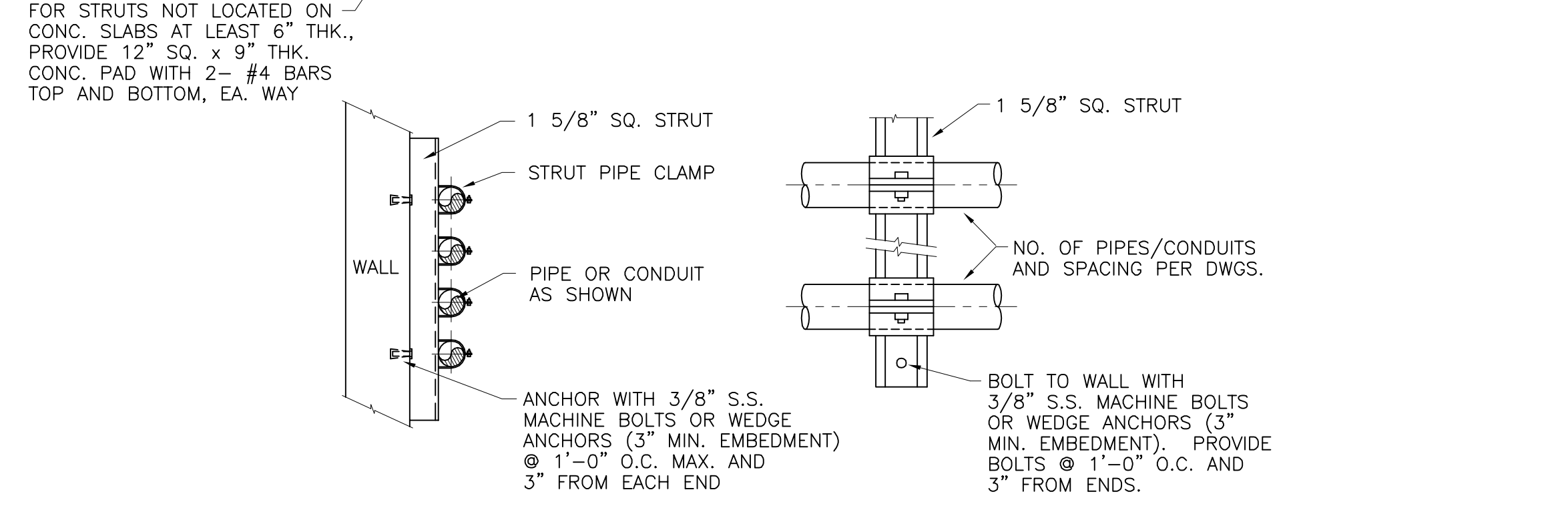
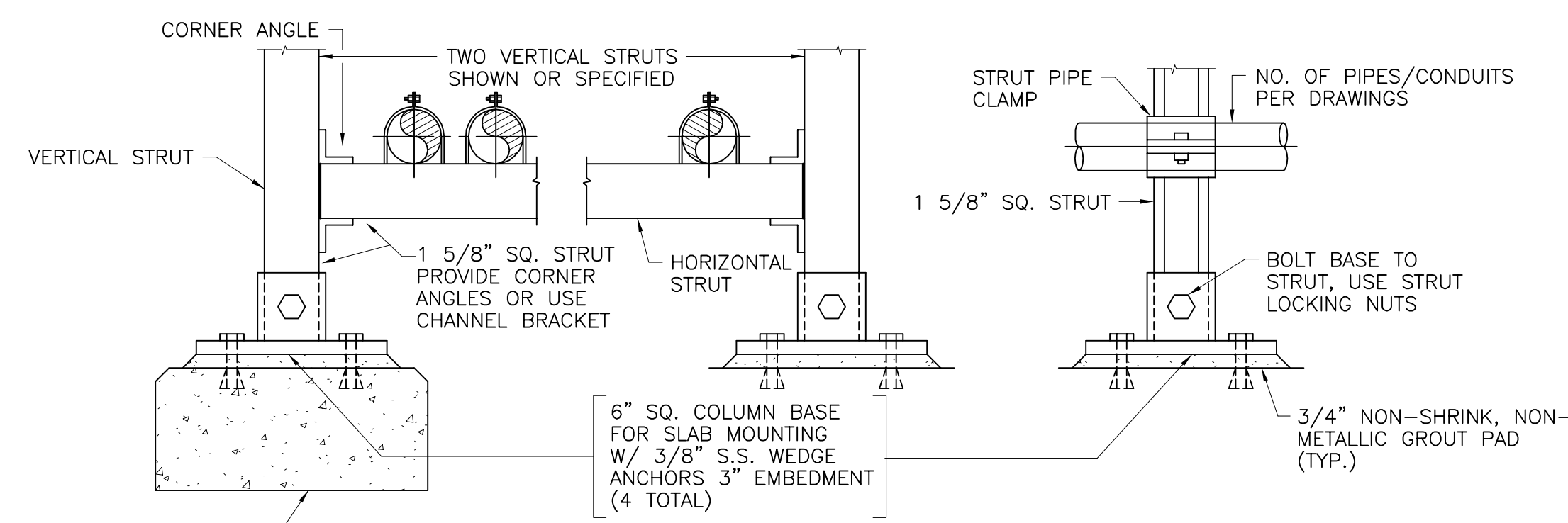
N.T.S.

**NOTES:**

- UNLESS SHOWN OTHERWISE ON THE DRAWINGS, PIPE AND CONDUIT SUPPORT SPACING SHALL BE AS FOLLOWS:

NOMINAL PIPE SIZE (INCHES)	MAXIMUM SPACING (FEET)
2 AND SMALLER	6
3 TO 5	10
6 AND LARGER	12

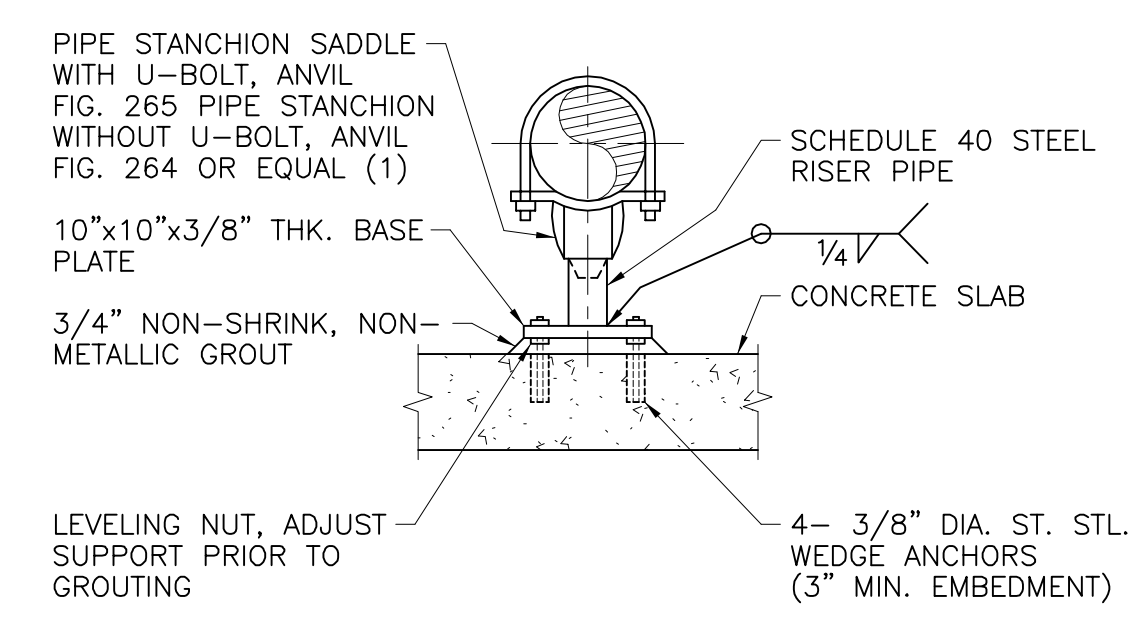
- SUPPORTS SHALL BE PROVIDED WITHIN 18" OF PIPE FITTINGS, AT EACH CHANGE IN DIRECTION.
- PIPE SUPPORTS SHALL BE SPACED NOT OVER 5 FEET APART AT VALVES.



- NOTES:**
- UNLESS NOTED OTHERWISE, FOR INDOOR AND OUTDOOR LOCATIONS ALL MATERIAL SHALL BE STAINLESS STEEL. STRUT CHANNEL SHALL BE 12 GAUGE 1 5/8"x1 5/8" TYPE 304 ST. STL. PROVIDE NECESSARY STRUT ACCESSORIES TO ACCOMMODATE SUPPORT CONFIGURATION, INCLUDING CONNECTION FITTINGS AND POST BASES. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, THREADED RODS, AND PIPE/CONDUIT STRAPS SHALL BE 304 ST. STL. ALL ANCHOR BOLTS SHALL BE TYPE 316 ST. STL.
  - STRUT SYSTEM, INCLUDING ALL COMPONENTS, SHALL BE AS MANUFACTURED BY UNISTRUT, B-LINE, OR EQUAL.
  - PROVIDE DOUBLE STRUT WHERE REQUIRED FOR LOAD OR CONFIGURATION, OR WHERE NOTED AS PS3-D ON DRAWINGS.
  - ALL CUT ENDS OF STRUT SHALL BE GROUND SMOOTH.
  - WHERE NOTED AS PS3-CORROSION RESISTANT OR PS3-CR ON DRAWING. STRUT CHANNEL SHALL BE HEAVY DUTY 1 5/8"x1 5/8"x1/4" NON-METALLIC (VINYLESTER) AS MANUFACTURED BY AICKINSTRUT, B-LINE, OR EQUAL. PROVIDE NECESSARY STRUT ACCESSORIES TO ACCOMMODATE SUPPORT CONFIGURATION, INCLUDING CONNECTION FITTINGS AND POST BASES. UNLESS OTHERWISE NOTED, ALL NUTS, BOLTS, THREADED RODS, AND PIPE/CONDUIT STRAPS SHALL BE POLYURETHANE. ALL CONCRETE ANCHOR BOLTS SHALL BE 316 ST. STL. EPOXY ANCHORS.

**PS3 - PIPING/CONDUIT STAINLESS STEEL AND NON-METALLIC STRUT SUPPORTS**

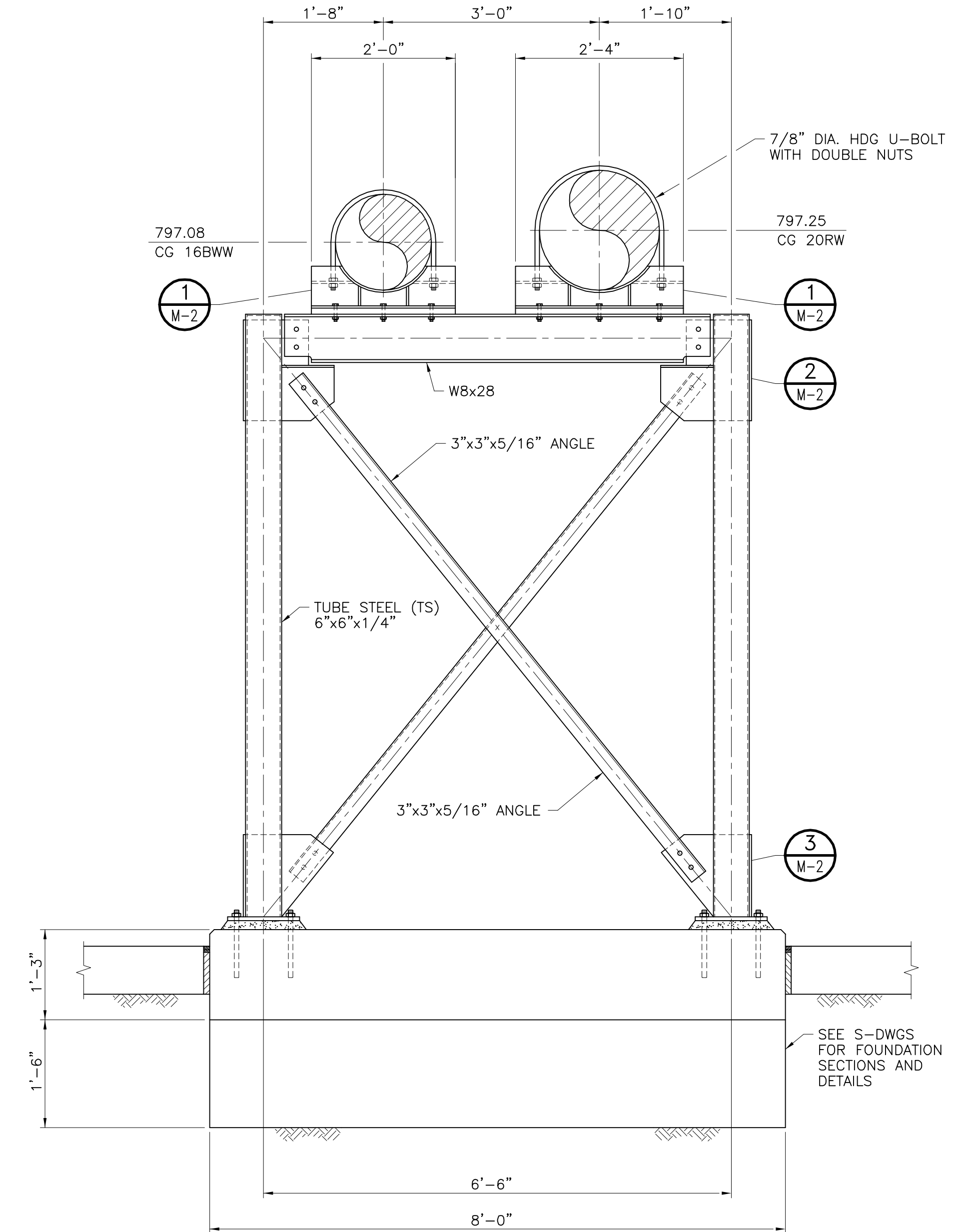
N.T.S.



- NOTES:**
- WHERE LOCATED UNDER FLANGE OR VALVE USE PS6 SUPPORT WITH SADDLE RADIUS TO MATCH FLANGE OR VALVE BODY. SADDLE SHALL BE CAST IRON OR FABRICATED STEEL.
  - UNO, PIPE SUPPORT AND ACCESSORIES SHALL BE HOT DIP GALVANIZED (HDG).
  - PROVIDE INDIVIDUAL CONCRETE SUPPORT PAD (16" SQ. x 9" THK.) WITH #4 AT 12" O.C. TOP AND BOTTOM FOR PIPE STANCHIONS NOT LOCATED ON CONCRETE SLABS OF 6" MIN. THICKNESS.

**PS5 - SHORT PIPE SUPPORT WITH U-BOLT**  
**PS6 - SHORT PIPE SUPPORT WITHOUT U-BOLT**

N.T.S.



- NOTES:**
- UNO, ALL MATERIAL SHALL BE CARBON STEEL PER NOTES ON DRAWING G-3.
  - HOT DIP GALVANIZE ALL PIPE SUPPORT POSTS, BRACES, BEAMS, AND SADDLES AFTER FABRICATION.

**PS4 - PIPE SUPPORT FRAME**

N.T.S.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
 1-800-227-2600  
 CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



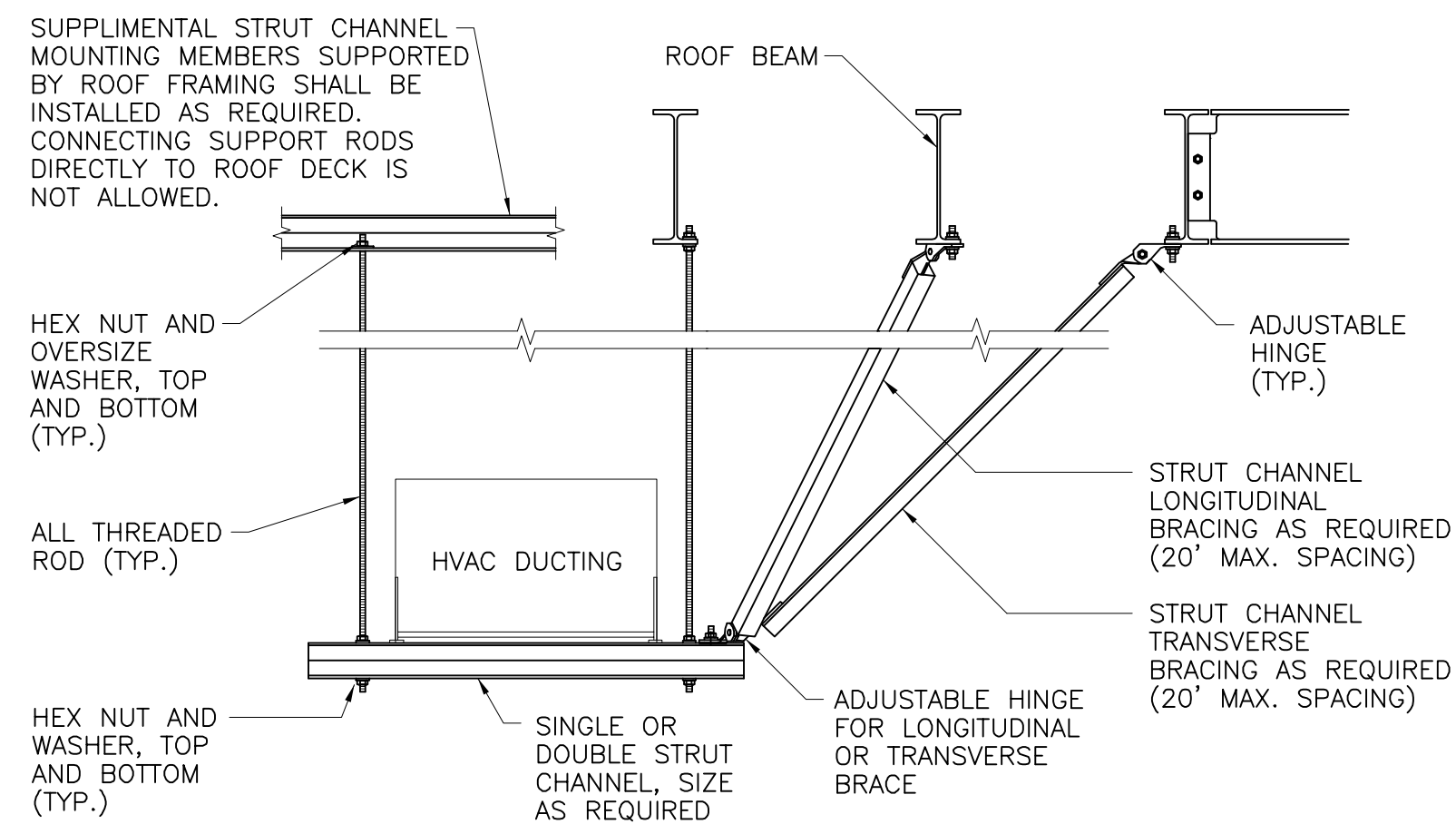
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Phillip Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD PIPE/CONDUIT SUPPORT DETAILS**

DRAWING  
**M-1**  
 20 OF 69 SHEETS  
 11730  
 R.C.S.D. PLAN No.

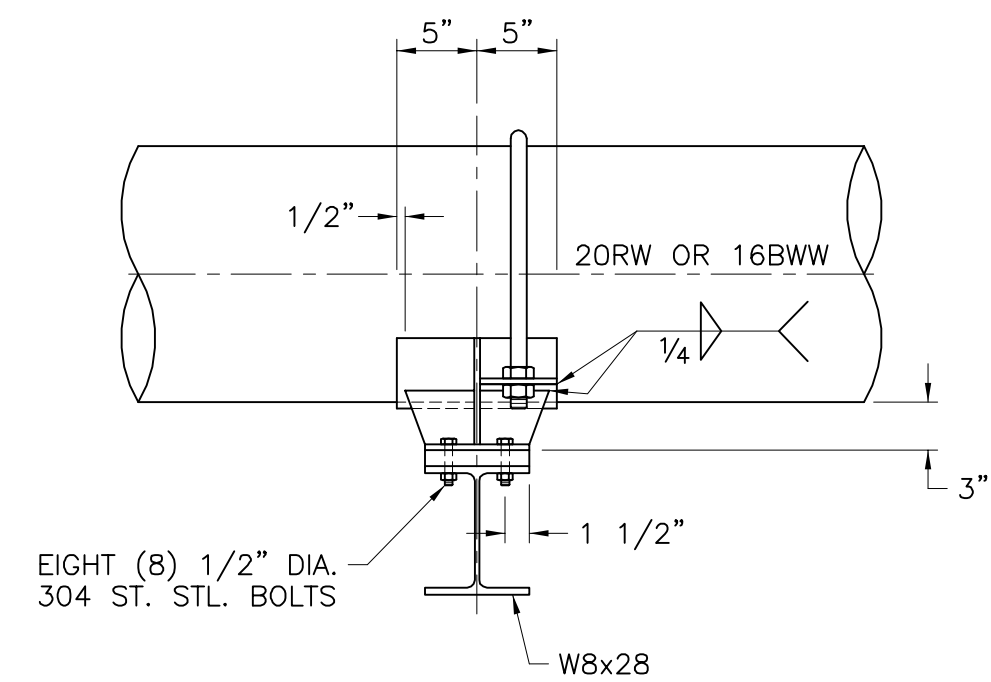
DWG. NO.: RE-90-18-54-M2 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:03PM PLOT SCALE: 1"=1'



- NOTES:**
- SUPPORT VERTICAL DUCTING AT MAXIMUM INTERVALS OF 6'-0" (U.N.O.).
  - SUPPORT HORIZONTAL DUCTS WITHIN 24" OF EACH ELBOW AND WITHIN 36" OF EACH BRANCH INTERSECTION.
  - TRANSVERSE BRACES AND LONGITUDINAL BRACES NEED NOT BE INSTALLED ON THE SAME TRAPEZE SUPPORT.
  - LONGITUDINAL BRACES, WHEN NEEDED, SHALL BE INSTALLED AT BOTH ENDS OF TRAPEZE.
  - THE EQUIPMENT SHOWN ON SUPPORT IS GENERIC IN NATURE. DUCTWORK TO BE SUPPORTED SHALL BE AS SHOWN ON THE DRAWINGS. CONTRACTOR SHALL SIZE SUPPORT MEMBERS AND ATTACHMENTS AND DETERMINE SUPPORT SPACING REQUIRED.
  - WHERE SUPPORT LOCATIONS DO NOT ALIGN WITH BUILDING STRUCTURAL STEEL FRAMING, CONTRACTOR SHALL PROVIDE ADDITIONAL STRUCTURAL STEEL FRAMING MEMBERS AS REQUIRED FOR SUPPORT ATTACHMENT. MAXIMUM END REACTION AT CONNECTION TO STRUCTURAL STEEL FRAMING SHALL NOT EXCEED 1,000 LBS.

**DS1- HVAC DUCT SUPPORT**

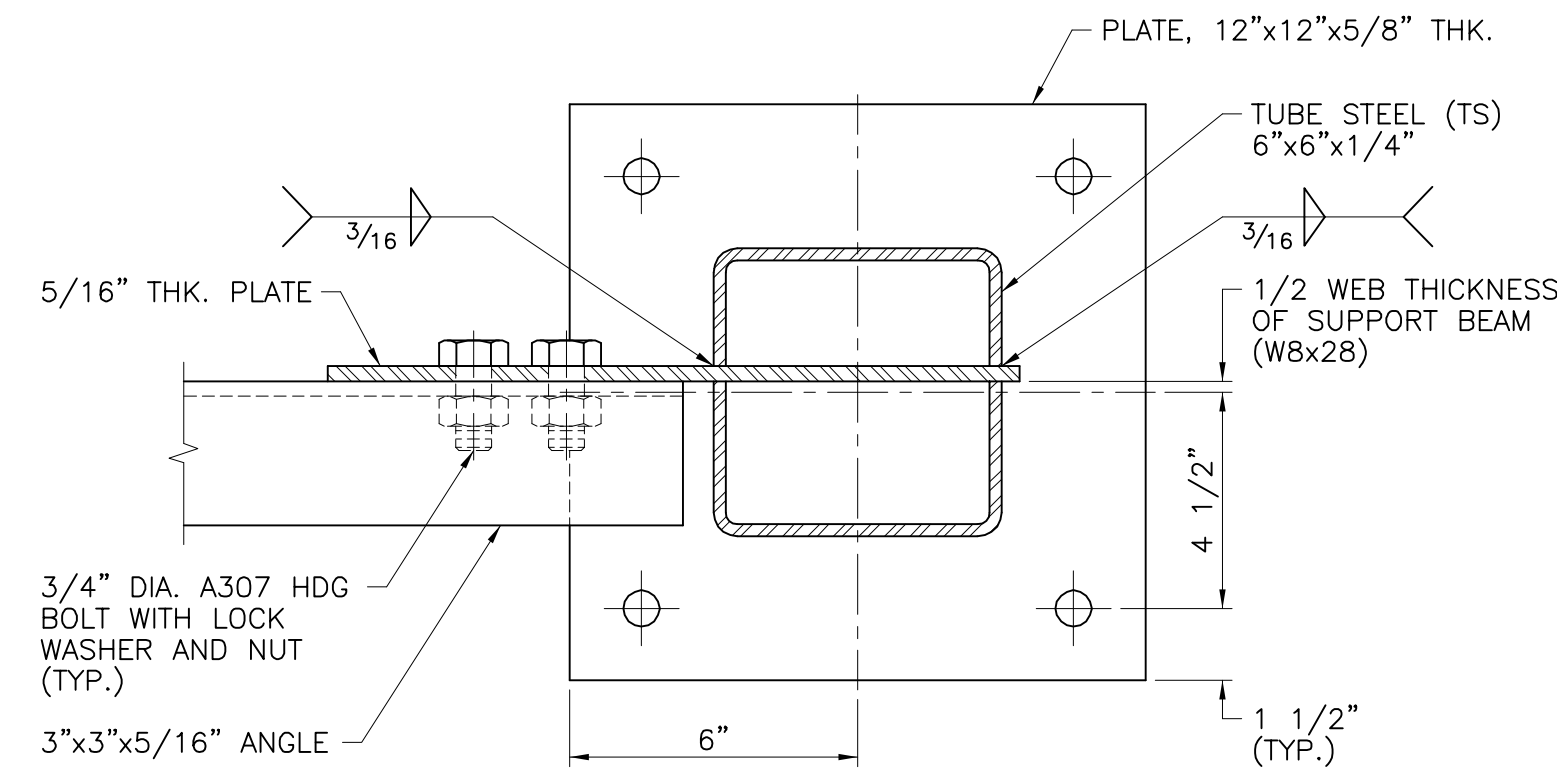
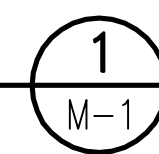
N.T.S.



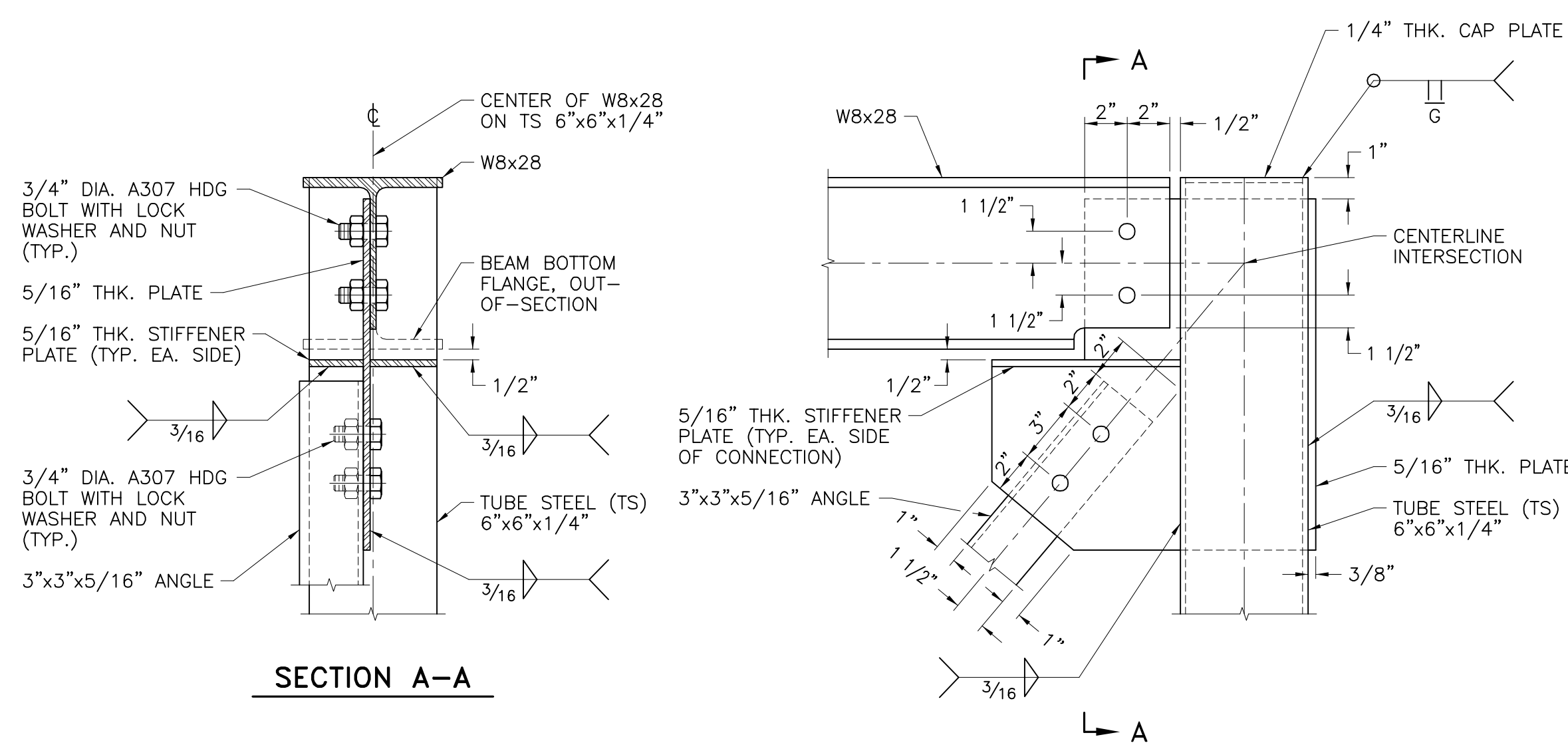
- NOTES:**
- UNO, ALL MATERIAL SHALL BE A36 STEEL, HOT DIP GALVANIZE AFTER FABRICATION.
  - UNO, ALL STEEL PLATES SHALL BE 1/2" THICK.

**PIPE SADDLE DETAIL**

N.T.S.



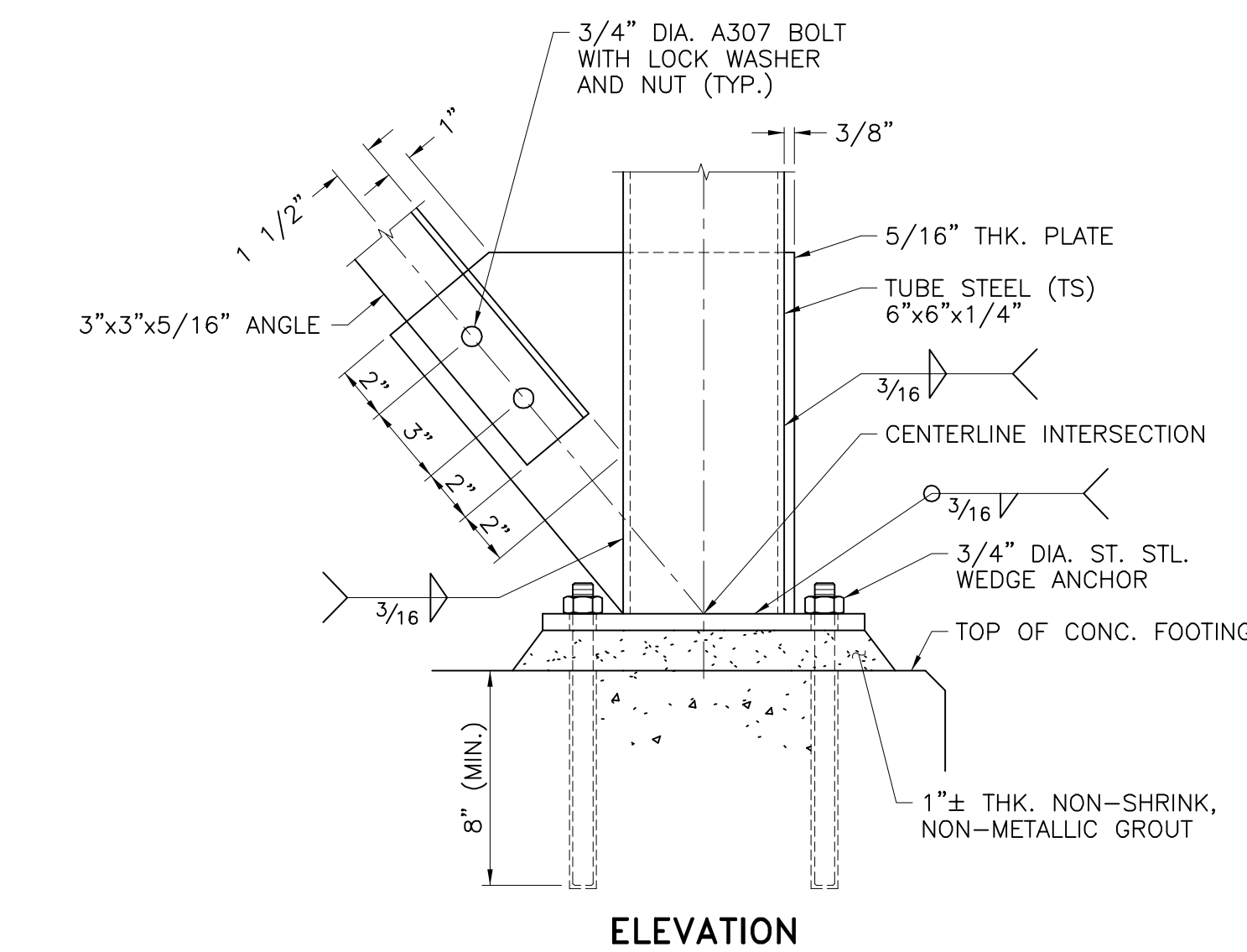
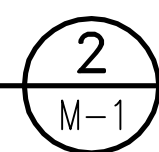
**PLAN**



- NOTE:**
- UNO, ALL MATERIAL SHALL BE CARBON STEEL PER NOTES ON DRAWING G-3.

**BEAM TO POST CONNECTION**

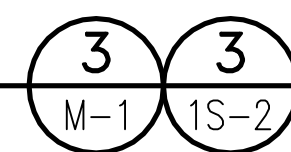
SCALE: 1"=1'-0"



- NOTE:**
- UNO, ALL MATERIAL SHALL BE CARBON STEEL PER NOTES ON DRAWING G-3.

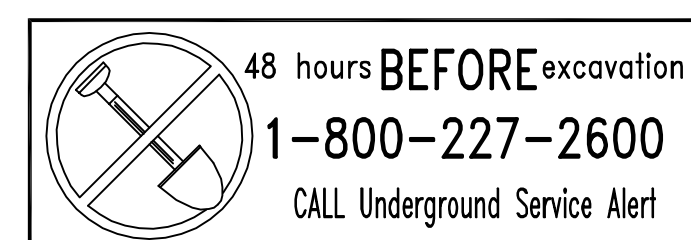
**POST BASE DETAIL**

N.T.S.



**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Phillip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMM
CHECKED	JCR

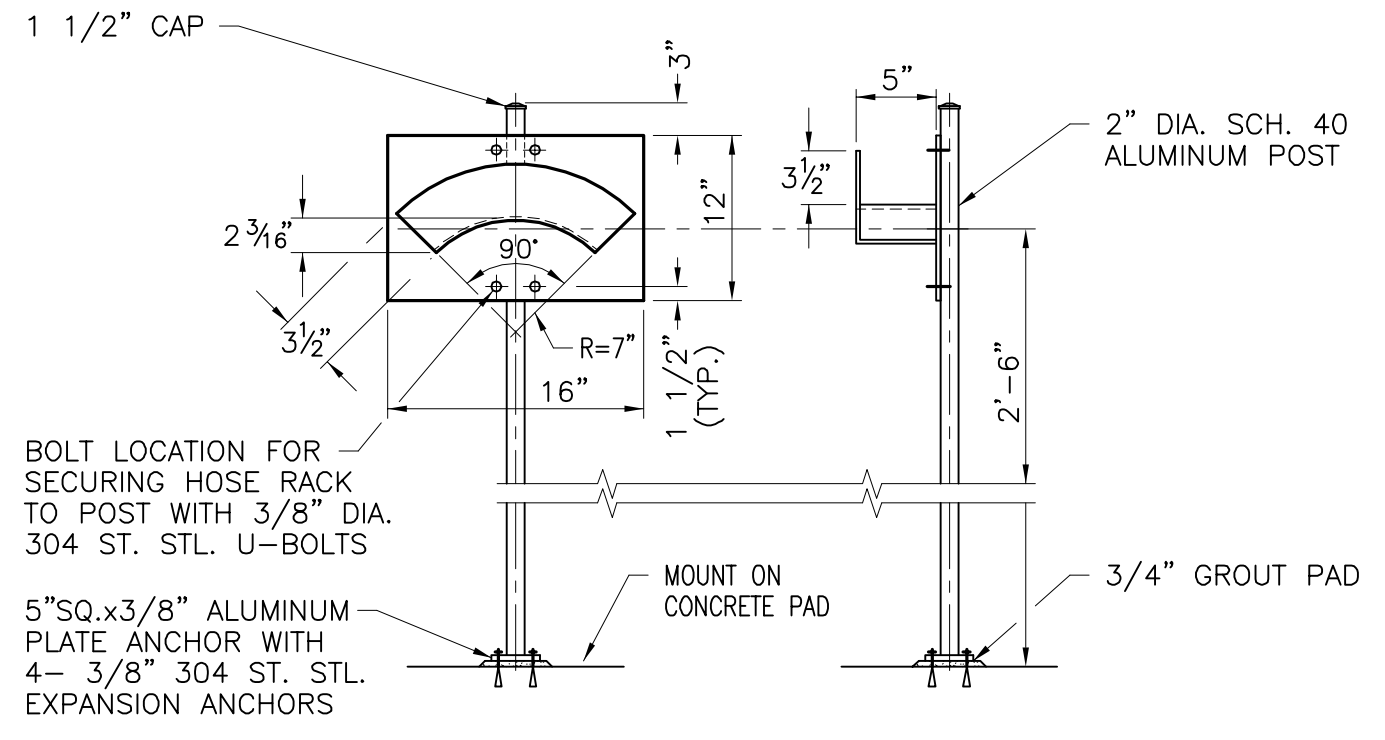
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD PIPE/CONDUIT/DUCT SUPPORT DETAILS**

DRAWING  
**M-2**  
21 OF 69 SHEETS  
11731  
R.C.S.D. PLAN No.

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



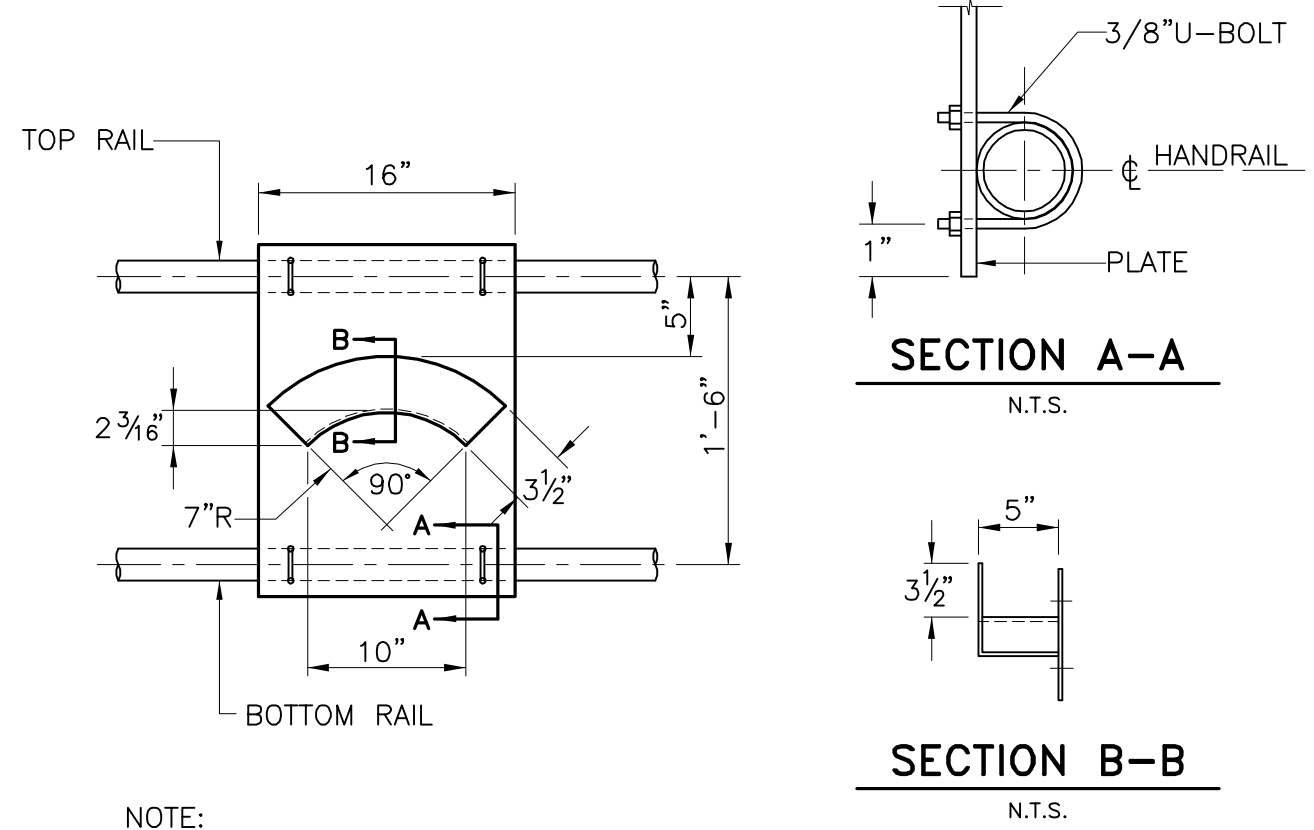
DWG. NO.: REC-90-18-54-M3 FILE NO.: 587-19-54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:04PM PLOT SCALE: 1"=1'



**NOTE:**  
HOSE RACK MATERIAL SHALL BE 1/4" THK. ALUMINUM PLATE. ALL PLATES SHALL BE CONTINUOUSLY WELDED. ENTIRE HOSE RACK/POST ASSEMBLY SHALL BE CLEAR ANODIZED AFTER FABRICATION.

**TYPE 1 HOSE RACK, POST MOUNTED**

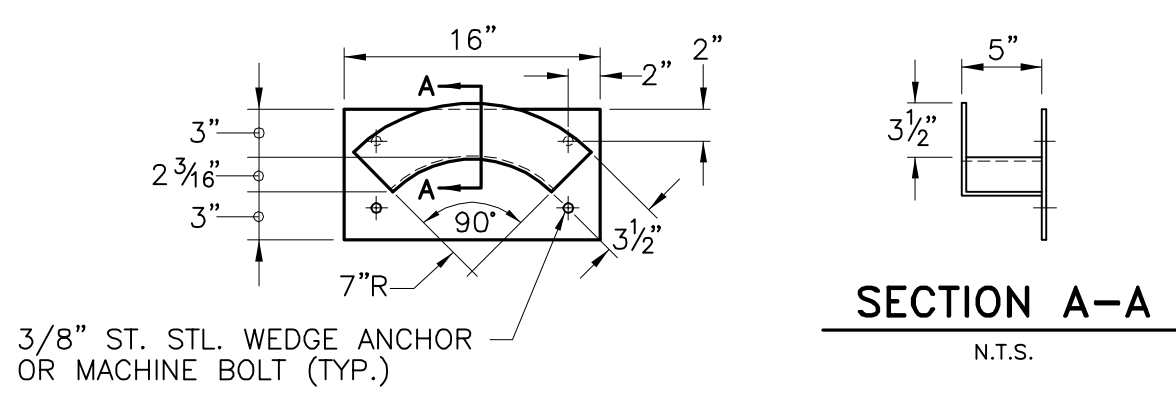
SCALE: 1"=1'-0"



**NOTE:**  
HOSE RACK MATERIAL SHALL BE 1/4" THK. ALUMINUM PLATE. ALL PLATES SHALL BE CONTINUOUSLY WELDED. ENTIRE HOSE RACK ASSEMBLY SHALL BE CLEAR ANODIZED AFTER FABRICATION.

**TYPE 2 HOSE RACK, HAND RAIL MOUNTED**

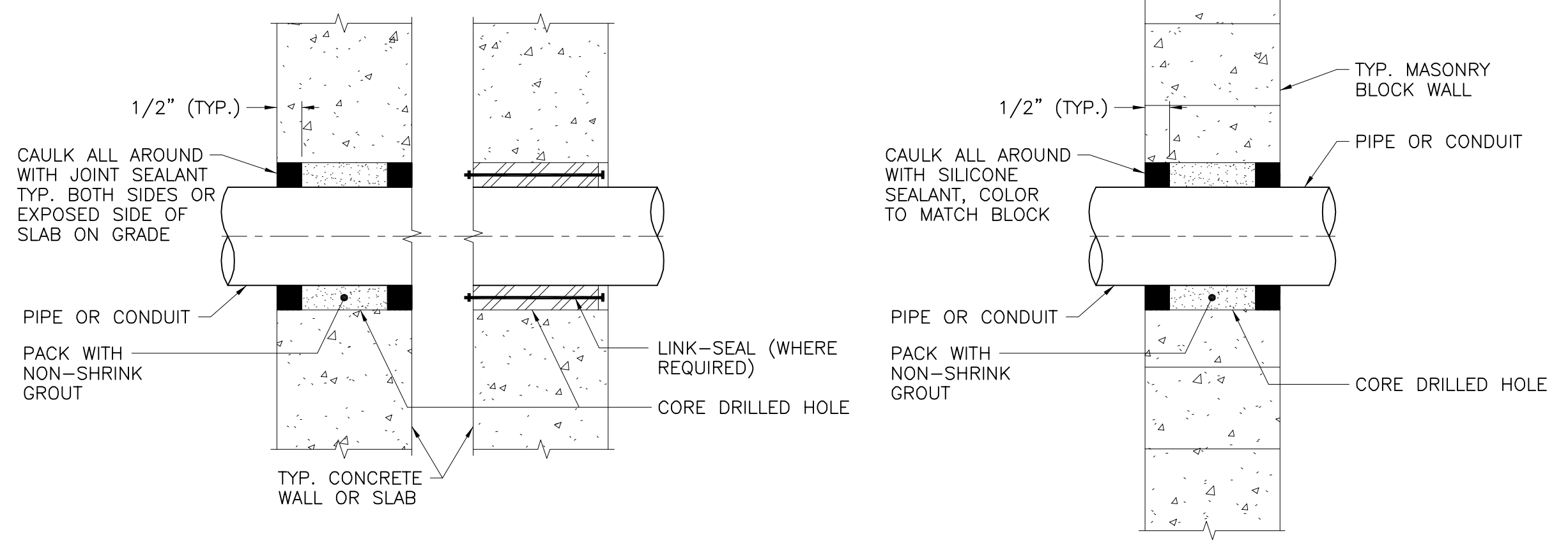
SCALE: 1"=1'-0"



**NOTE:**  
HOSE RACK MATERIAL SHALL BE 1/4" THK. ALUMINUM PLATE. ALL PLATES SHALL BE CONTINUOUSLY WELDED. ENTIRE HOSE RACK ASSEMBLY SHALL BE CLEAR ANODIZED AFTER FABRICATION.

**TYPE 3 HOSE RACK, WALL MOUNTED**

SCALE: 1"=1'-0"

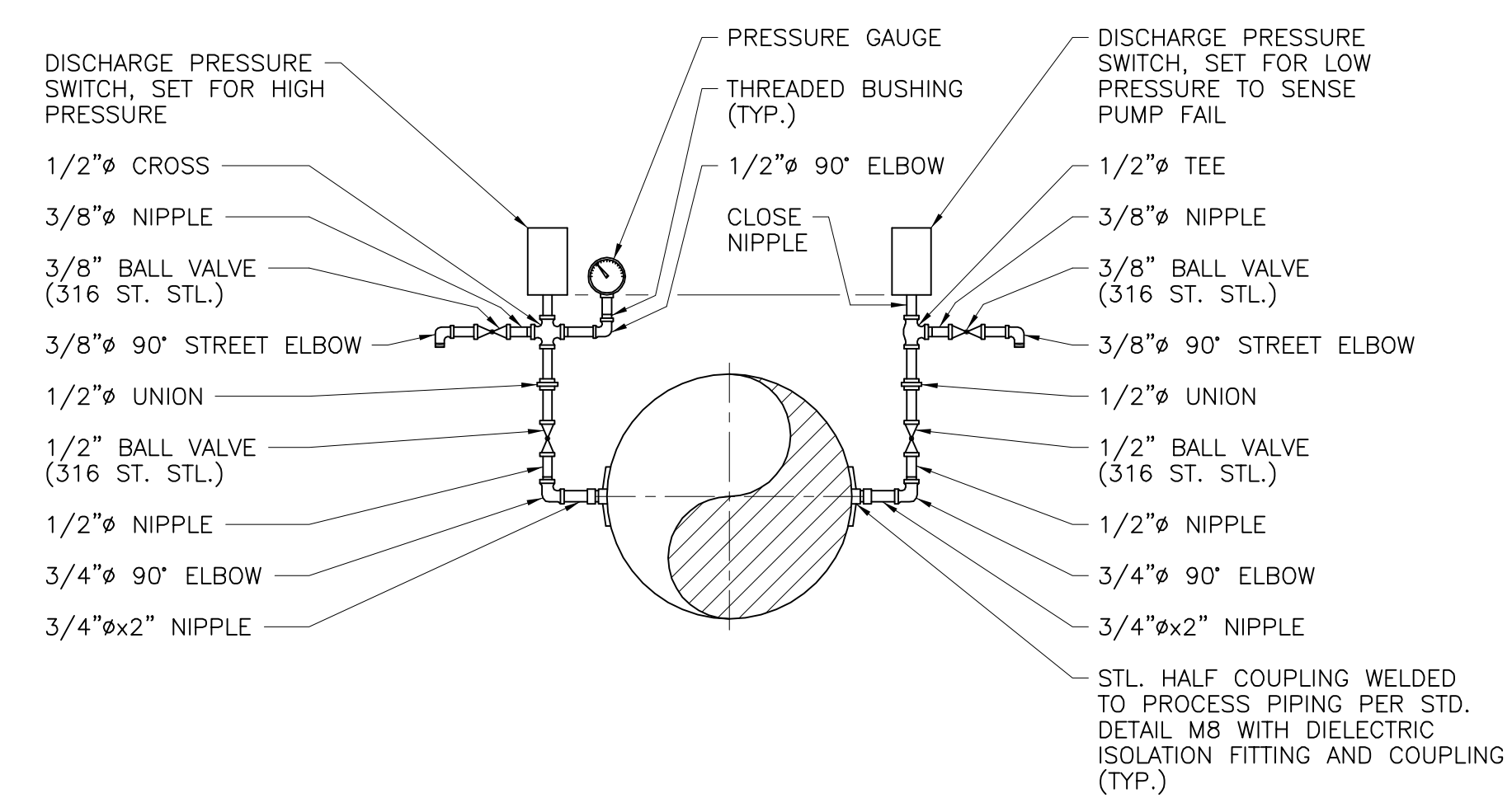


- NOTES:**
1. PROVIDE ONLY WHERE PENETRATION IS SPECIFIED AS CORE DRILLED HOLE. NOT FOR WATER HOLDING STRUCTURES UNLESS SPECIFICALLY SPECIFIED.
  2. JOINT SEALANT SHALL BE TWO COMPONENT RESERVOIR GRADE, POLYURETHANE ELASTOMERIC SEALANT, AS MANUFACTURED BY SIKKA, SELECT PRODUCTS, OR EQUAL. PROVIDE BACKER ROD OR TAPE AT BACK OF JOINT SEALANT.
  3. WHERE REQUIRED, LINK-SEAL SHALL BE LOCATED ON SIDE OF WALL/SLAB THAT WILL BE PERMANENTLY ACCESSIBLE. LINK-SEAL SHALL BE FOR CORROSIVE SERVICE WITH EPDM RUBBER AND STAINLESS STEEL BOLTS AND NUTS, AS MANUFACTURED BY THUNDERLINE CORP., OR EQUAL. CORE DRILL DIAMETER SHALL BE PER MANUFACTURER'S RECOMMENDATION.

**PIPE PENETRATION DETAIL**

N.T.S.

**M1**  
STD.

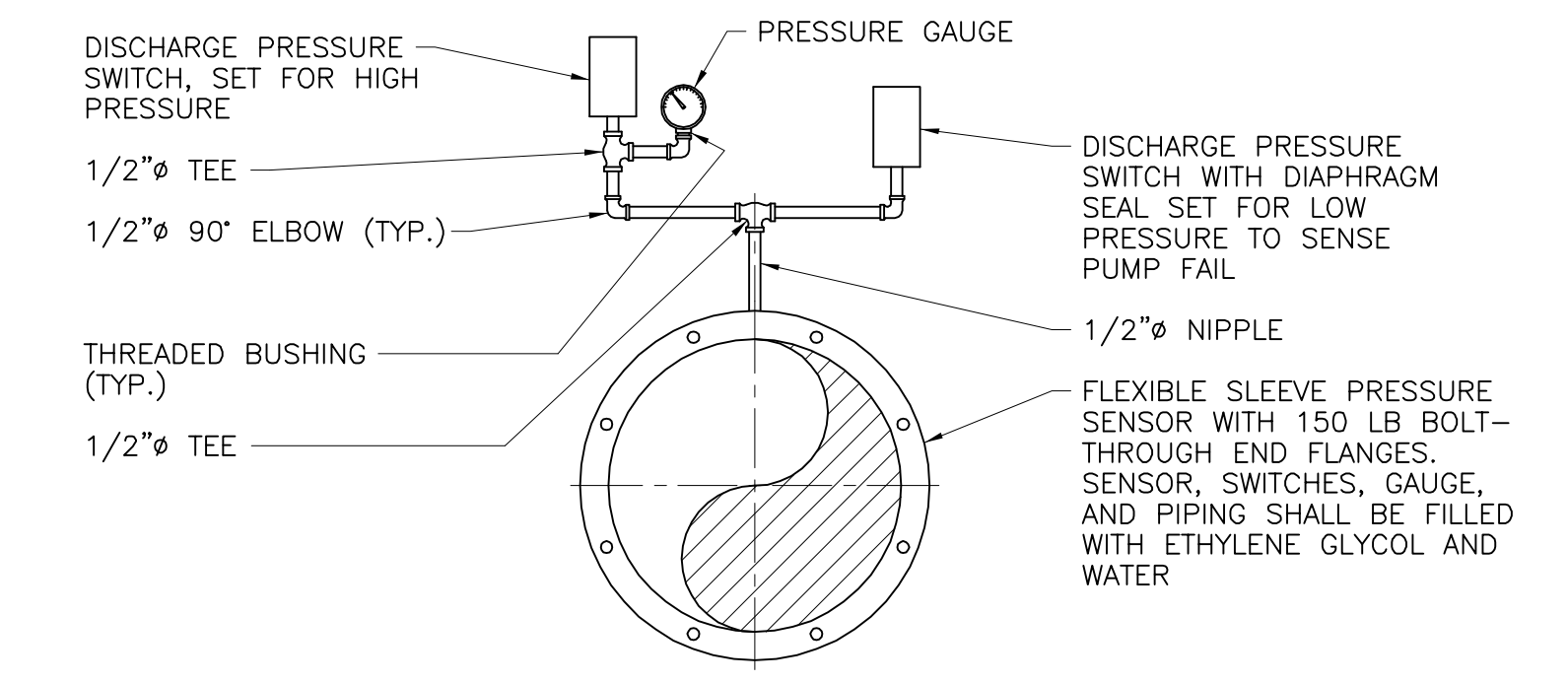


- NOTES:**
1. UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, TYPE 316 STAINLESS STEEL.
  2. SEE ELECTRICAL CONTROL DIAGRAMS FOR PRESSURE SWITCH INITIAL SETTINGS.
  3. ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.). PRESSURE GAUGE RANGE SHALL BE SELECTED FOR 150% OF SYSTEM WORKING PRESSURE.
  4. ALL PRESSURE SWITCHES, GAUGES, PIPING, VALVES, AND APPURTENANCES SHALL BE INSULATED PER SPECIFICATION SECTIONS 15070 AND 15100.

**DUAL PRESSURE SWITCH DETAIL**

N.T.S.

**M2**  
STD.

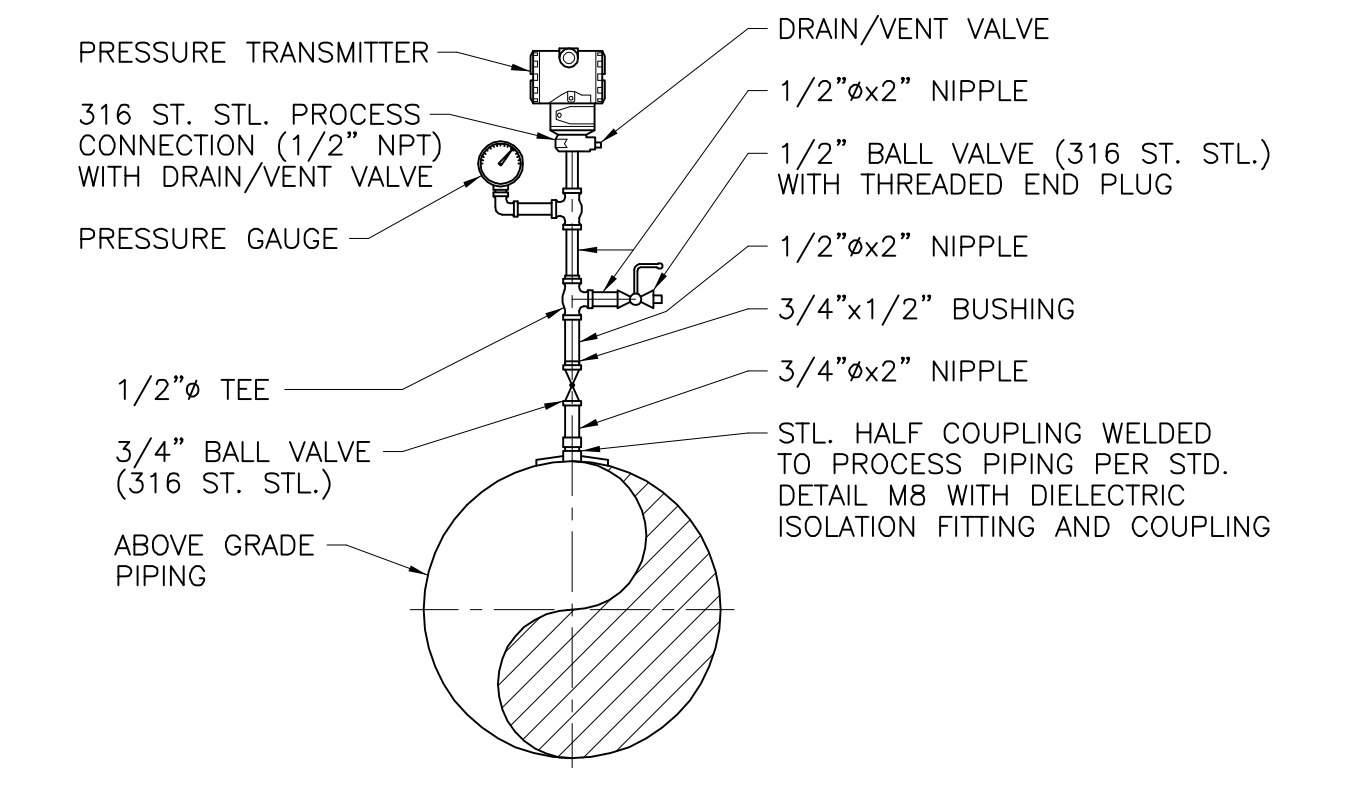


- NOTES:**
1. UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, TYPE 316 STAINLESS STEEL.
  2. SEE ELECTRICAL CONTROL DIAGRAMS FOR PRESSURE SWITCH INITIAL SETTINGS.
  3. ALL VALVES, FITTINGS, AND FLEXIBLE PRESSURE SENSOR SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.). PRESSURE GAUGE RANGE SHALL BE SELECTED FOR 150% OF SYSTEM WORKING PRESSURE.
  4. ALL PRESSURE SWITCHES, GAUGES, PIPING, VALVES, AND APPURTENANCES SHALL BE INSULATED PER SPECIFICATION SECTIONS 15070 AND 15100.

**DUAL PRESSURE SWITCH DETAIL**

N.T.S.

**M3**  
STD.

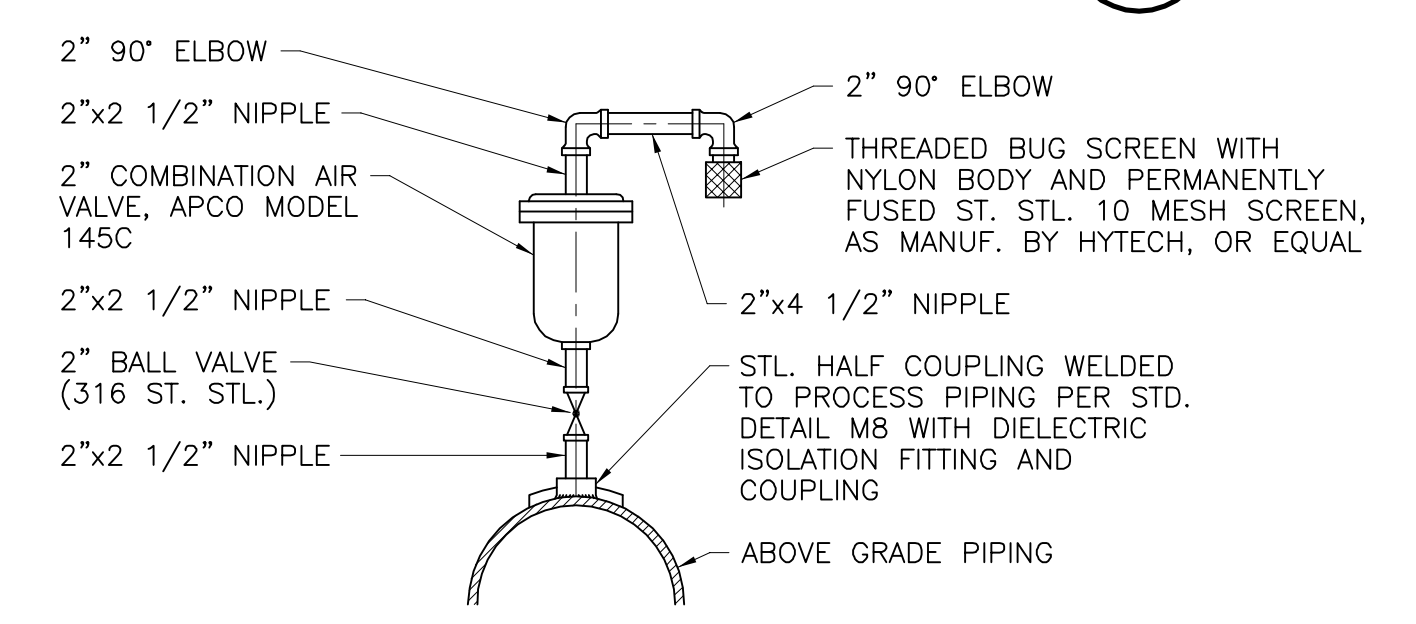


- NOTES:**
1. UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, TYPE 316 STAINLESS STEEL.
  2. ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).
  3. ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).
  4. ALL PRESSURE TRANSMITTERS, GAUGES, PIPING, VALVES, AND APPURTENANCES SHALL BE INSULATED PER SPECIFICATION SECTIONS 15070 AND 15100.

**SINGLE PRESSURE TRANSMITTER DETAIL**

N.T.S.

**M4**  
STD.



- NOTES:**
1. UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, RED BRASS PAINTED.
  2. AIR VALVE SEAT AND NEEDLE DUROMETER HARDNESS TO BE SELECTED FOR SYSTEM OPERATING PRESSURE.
  3. ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).
  4. AIR VALVE INTERIOR SHALL BE EPOXY LINED (8 TO 12 MILS) IN ACCORDANCE WITH AWWA-C550.
  5. AIR VALVES, PIPING, AND APPURTENANCES SHALL BE INSULATED PER SPECIFICATION SECTIONS 15070 AND 15100.

**2" COMBINATION AIR VALVE DETAIL**

N.T.S.

**M5**  
STD.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

RECORD DRAWING	05/21/13	BCV
SYMBOL	REVISIONS	DATE BY



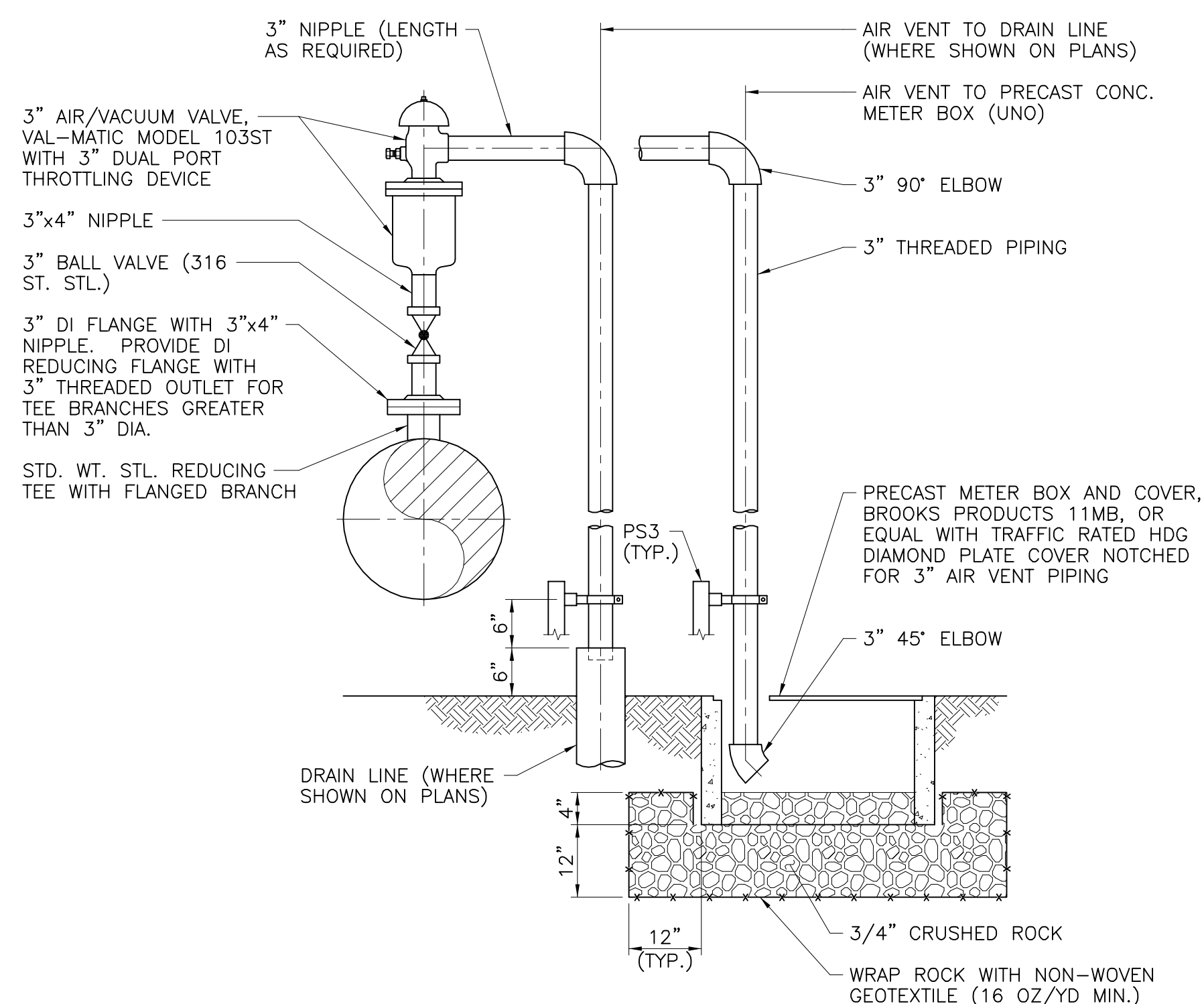
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD MECHANICAL DETAILS**

DRAWING  
**M-3**  
22 OF 69 SHEETS  
11732  
R.C.S.D. PLAN No.

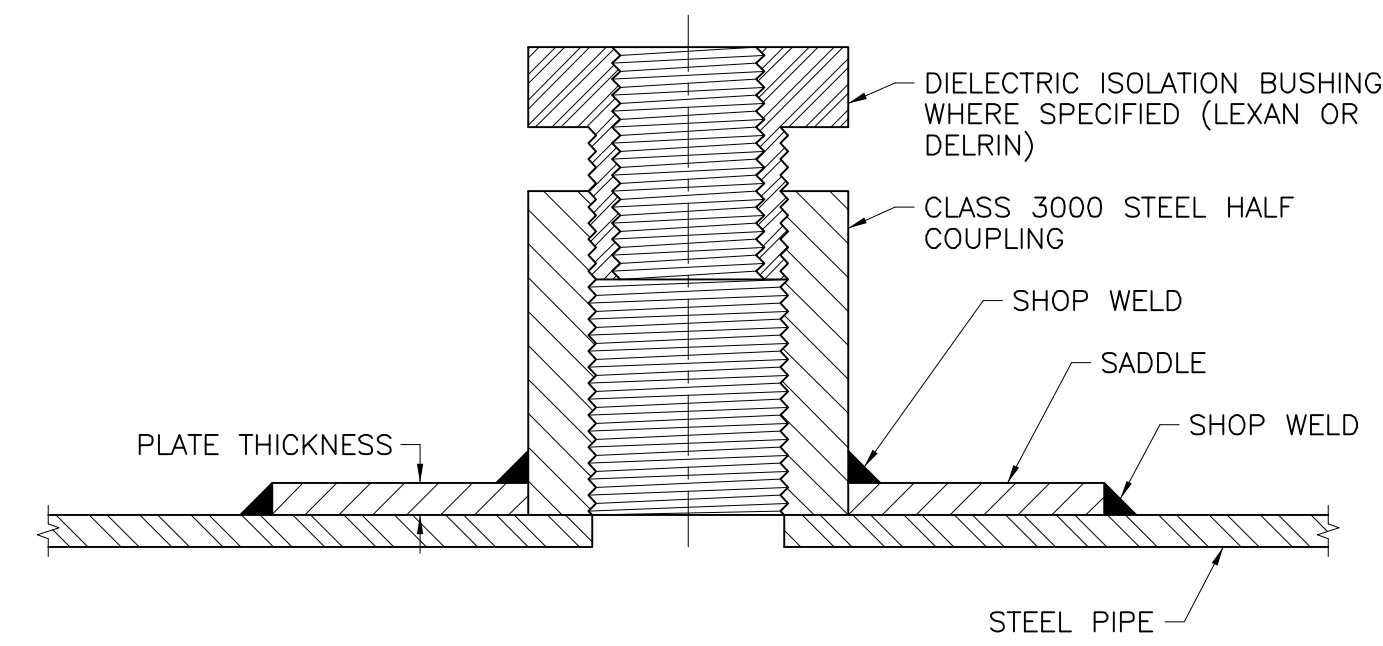
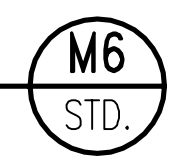
DWG. NO.: REC-90-18-54-01 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:05PM PLOT SCALE: 1"=1'



- NOTES:**
- UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, RED BRASS PAINTED.
  - AIR VALVE SEAT DUROMETER HARDNESS TO BE SELECTED FOR SYSTEM OPERATING PRESSURE.
  - ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).
  - AIR VALVE INTERIOR SHALL BE EPOXY LINED (8 TO 12 MILS) IN ACCORDANCE WITH AWWA-C550.

**3" DEEP WELL AIR/VACUUM VALVE DETAIL**

N.T.S.

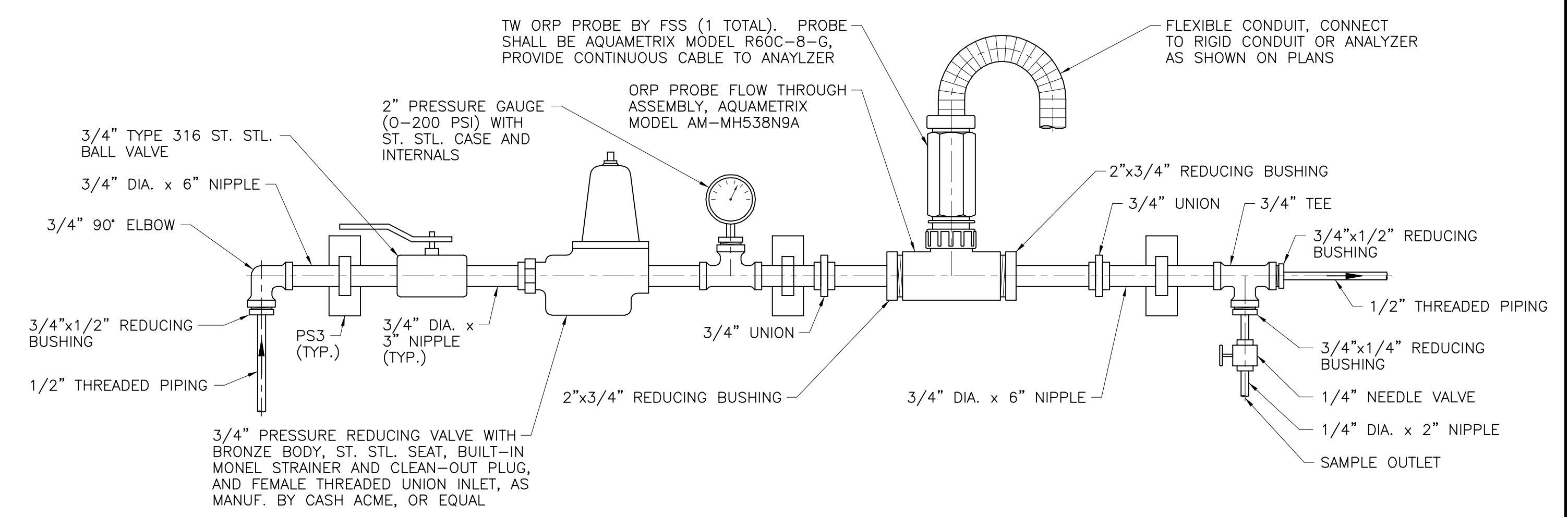
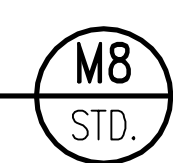


- NOTES:**
- SADDLE CURVATURE TO BE SHOP FORMED TO MATCH OUTSIDE DIAMETER OF STEEL PIPE.
  - AFTER SHOP WELDING OF HALF COUPLING TO CURVED SADDLE, SHOP GRIND HALF COUPLING TO MATCH DIAMETER OF PIPE.
  - PIPE COATING AND LINING NOT SHOWN FOR CLARITY.

SERVICE SADDLE OUTLETS			
OUTLET SIZE	HALF COUPLING SIZE	SADDLE OUTSIDE DIA.	SADDLE PLATE THICKNESS
3/4"	1 1/4"	4 1/2"	3/16"
1"	1 1/4"	4 1/2"	3/16"
1 1/2"	2 1/2"	6 1/2"	1/4"
2"	2 1/2"	6 1/2"	1/4"

**WELDED OUTLET DETAIL**

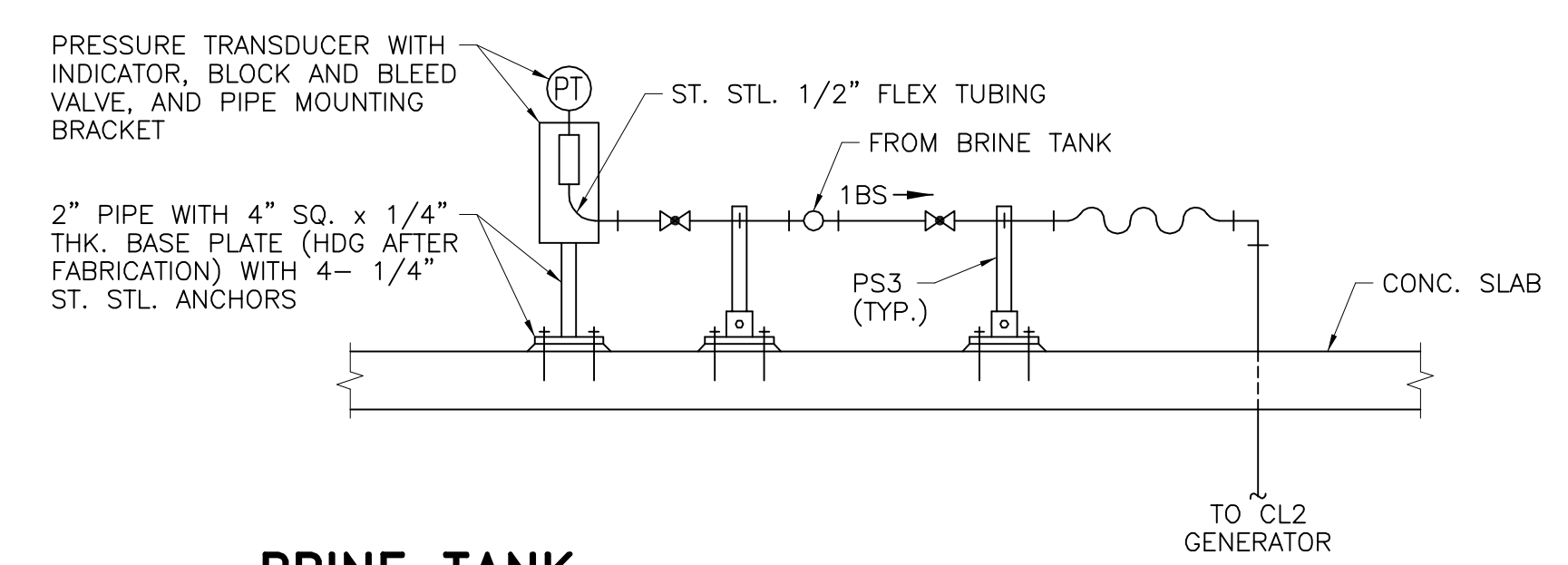
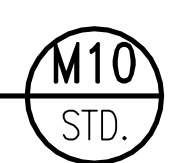
N.T.S.



- NOTES:**
- UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, TYPE 316 STAINLESS STEEL.
  - ALL VALVES, FITTINGS, APPURTENANCES SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).

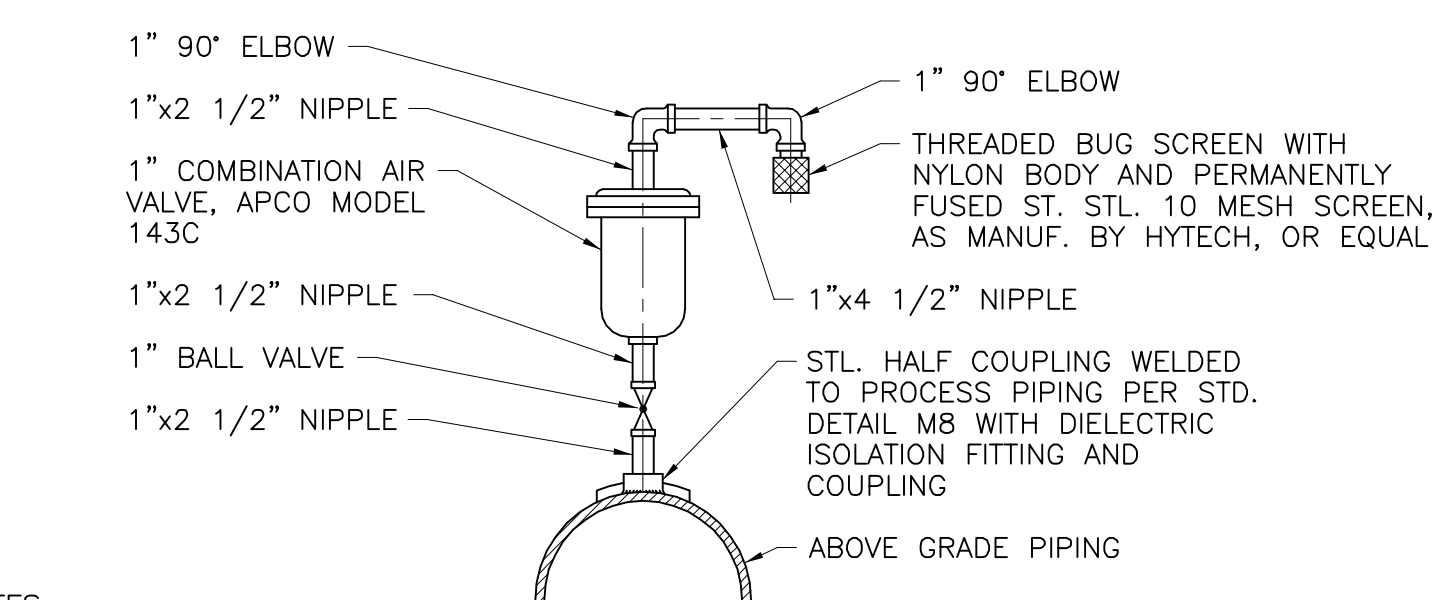
**ORP PROBE ASSEMBLY DETAIL**

SCALE: N.T.S.



**BRINE TANK PRESSURE TRANSDUCER DETAIL**

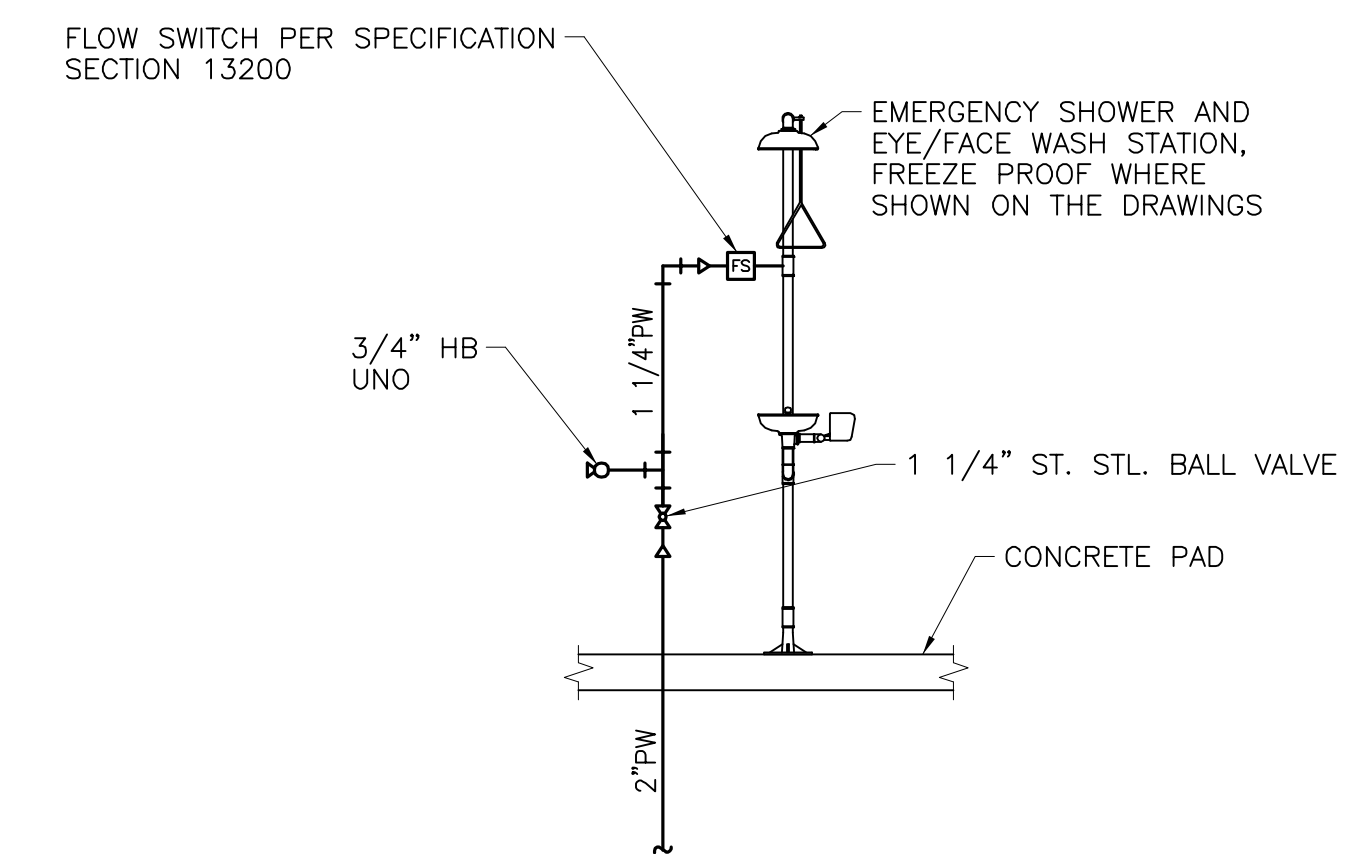
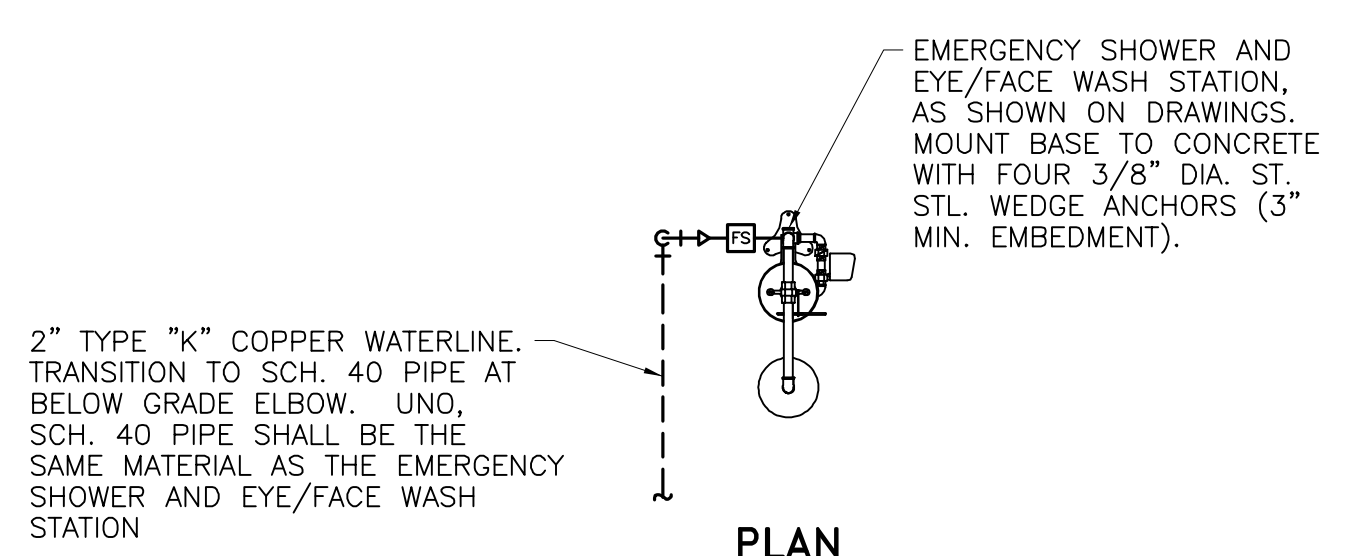
SCALE: N.T.S.



- NOTES:**
- UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40, RED BRASS, PAINTED.
  - AIR VALVE SEAT AND NEEDLE DUROMETER HARDNESS TO BE SELECTED FOR SYSTEM OPERATING PRESSURE.
  - ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 200 PSI (MIN.).
  - AIR VALVE, PIPING, AND APPURTENANCES SHALL BE INSULATED PER SPECIFICATION SECTIONS 15070 AND 15100.

**1" COMBINATION AIR VALVE DETAIL**

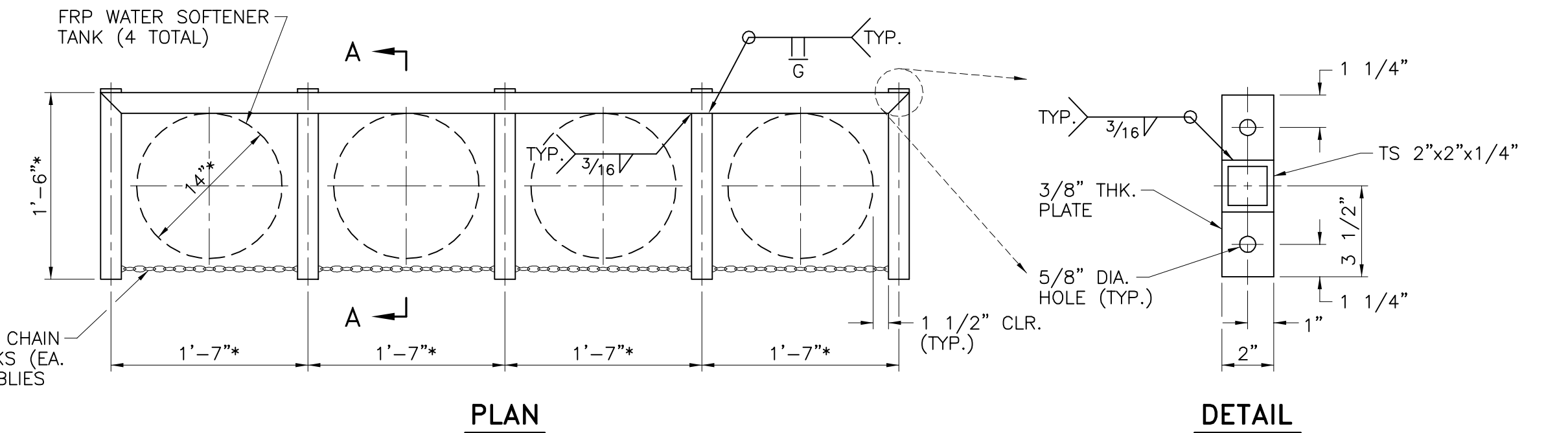
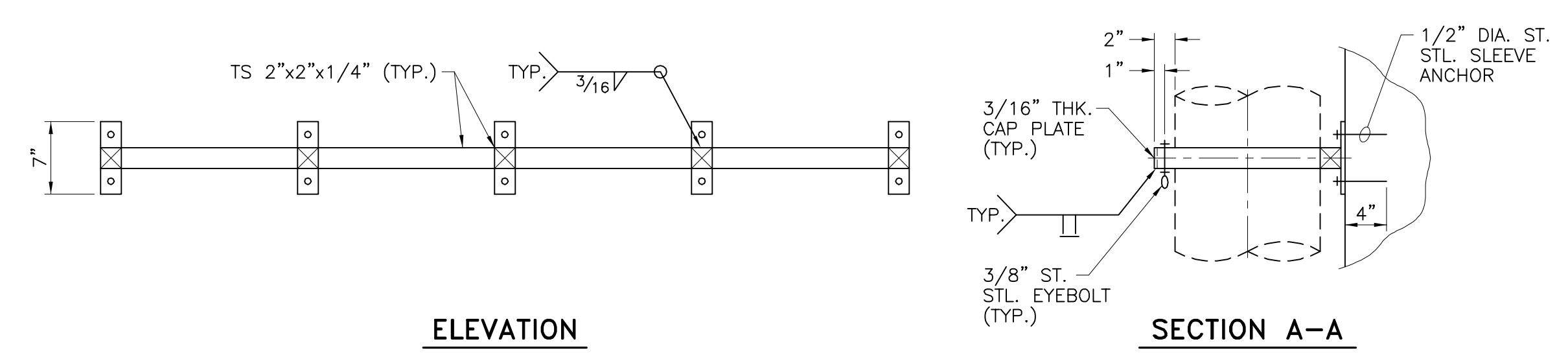
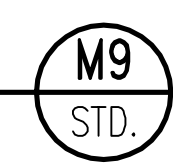
N.T.S.



- NOTE:**  
PROVIDE EMERGENCY SHOWER AND EYE/FACE WASH STATION IN ACCORDANCE WITH SPECIFICATION SECTION 13200.

**EMERGENCY SHOWER AND EYE/FACE WASH STATION DETAIL**

N.T.S.



**WATER SOFTENER TANK SUPPORT RACK DETAIL**

N.T.S.



- NOTE:**  
UNLESS SPECIFIED OTHERWISE, ALL MATERIAL SHALL BE CARBON STEEL. HOT DIP GALVANIZE AFTER FABRICATION.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

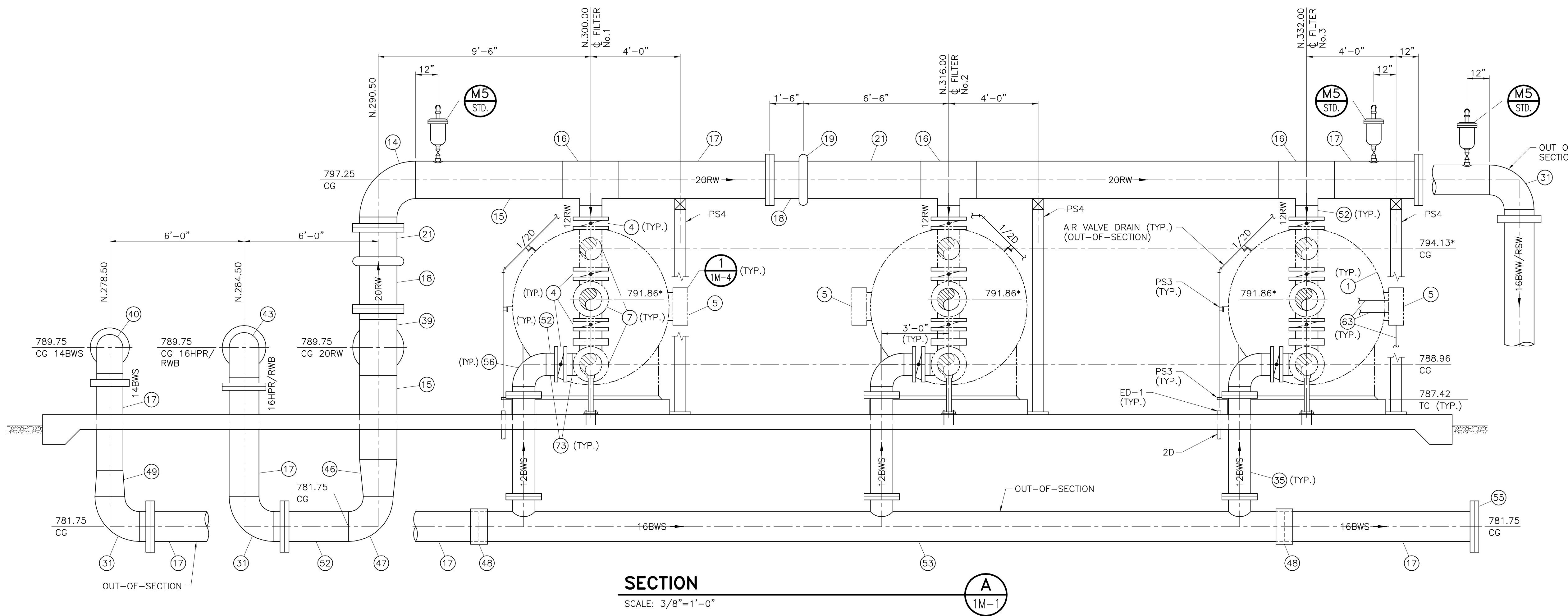
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD MECHANICAL DETAILS**

DRAWING  
**M-4**  
23 OF 69 SHEETS  
11733  
R.C.S.D. PLAN No.



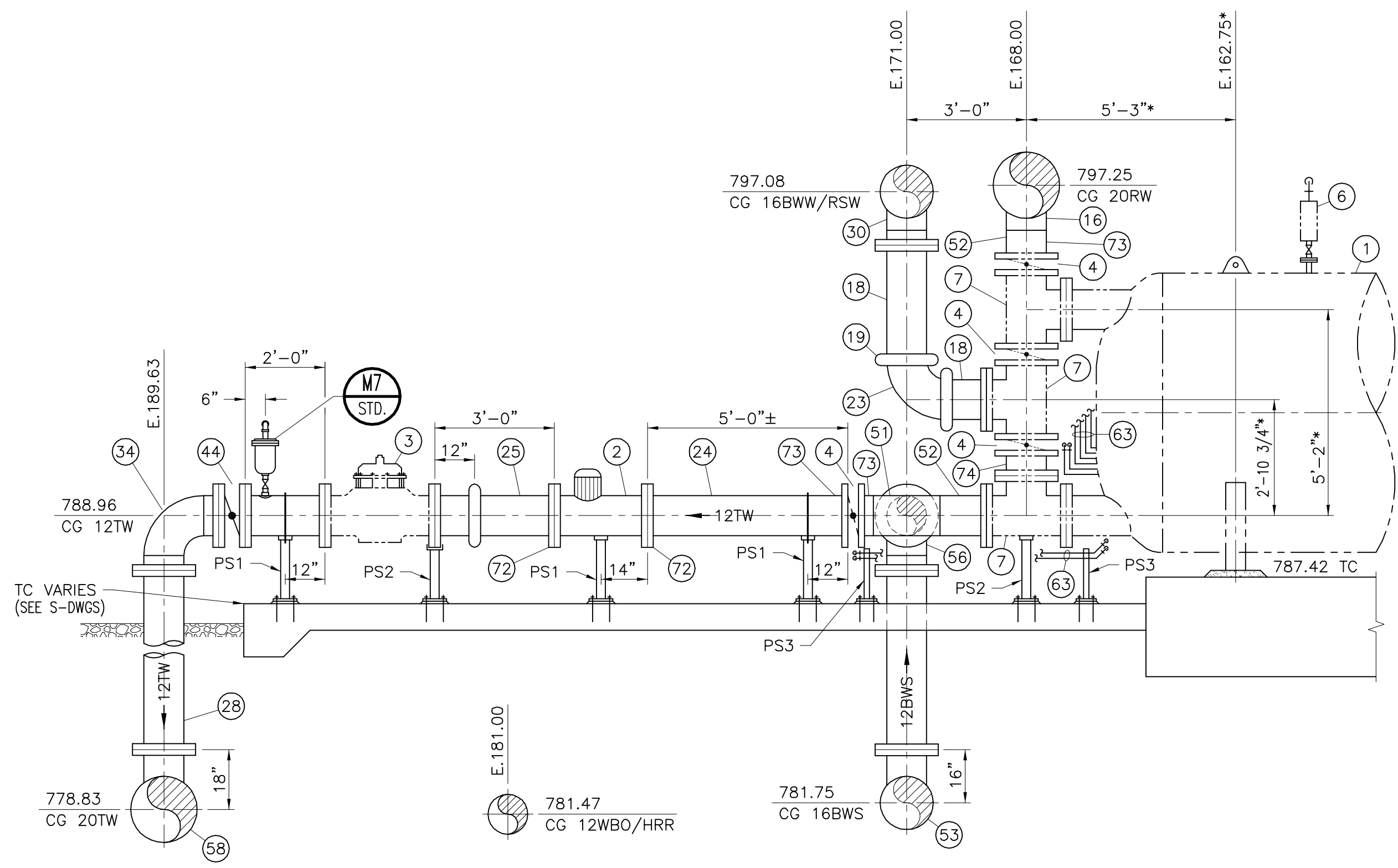


DWG. NO.: REC-80-18-54-102 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:07PM PLOT SCALE: 1"=1'

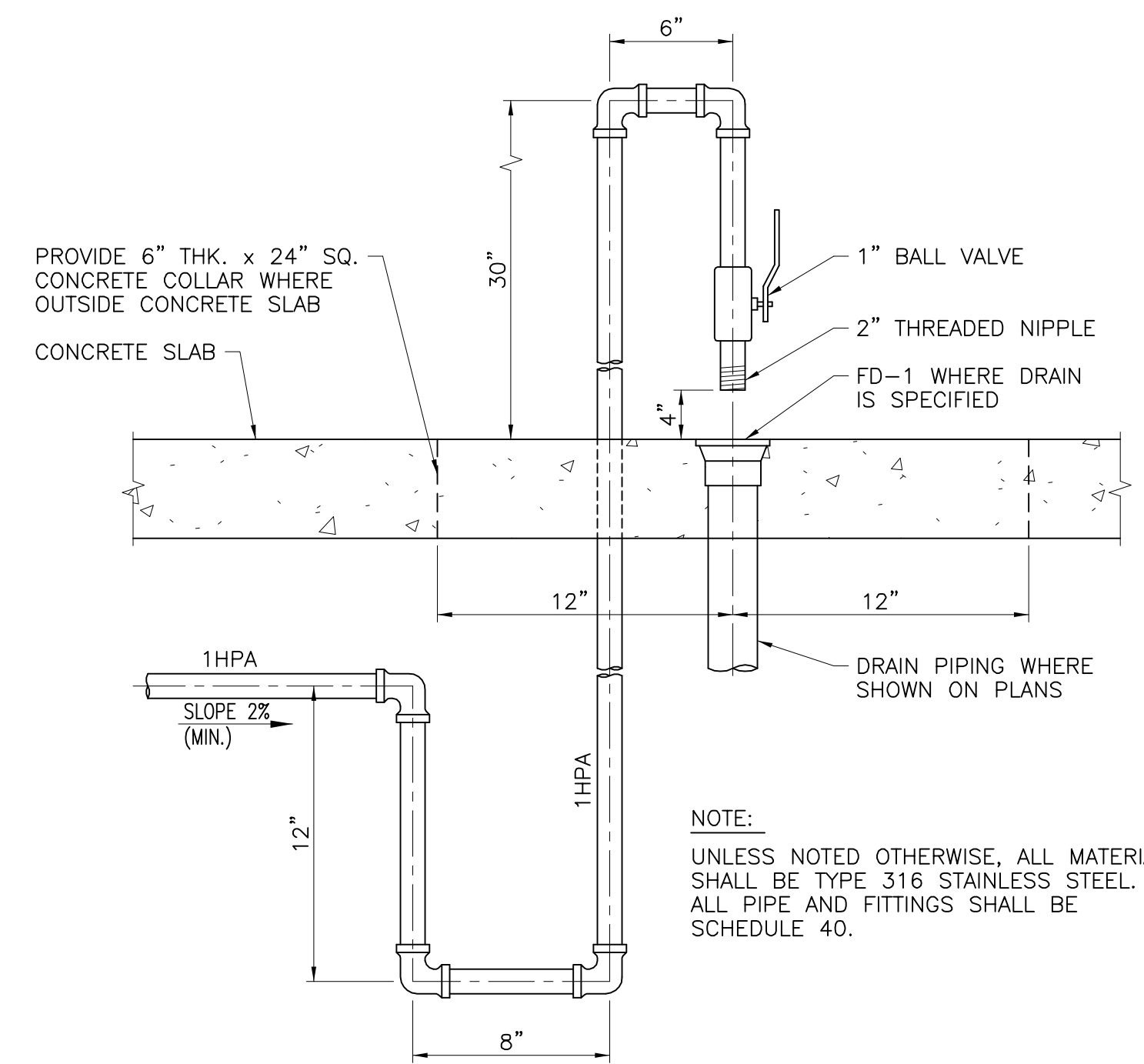


**SECTION A**  
SCALE: 3/8"=1'-0"

- MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 1M-1 THROUGH 1M-3 (CONT.):**
43. 16" FLANGED 90° ELBOW.
  44. FLANGED BUTTERFLY VALVE WITH WORM GEAR OPERATOR AND HANDWHEEL. CLASS 125 FLANGES. RATED FOR 250 PSI.
  45. 20" SWING CHECK VALVE, SPRING AND LEVER OPERATED WITH DI BODY AND DISC WITH STAINLESS STEEL FACING AND CLASS 250 FLANGES, APCO OR EQUAL.
  46. 20"x16" PLAIN END x PLAIN END CONCENTRIC REDUCER.
  47. 16" PLAIN END 90° ELBOW.
  48. BUTT STRAP WITH HAND HOLES PER RCSD STD. DWG. W1220.
  49. 16"x14" PLAIN END x PLAIN END CONCENTRIC REDUCER.
  50. 16" PRESSURE RELIEF VALVE (PRV-3), AS MANUFACTURED BY CLA-VAL (NO SUBSTITUTES) SET TO OPEN AT 165 PSI WITH SOLENOID OVER-RIDE FOR VALVE OPEN. PROVIDE VALVE IN ACCORDANCE WITH SPECIFICATION REQUIREMENTS. CLASS 125 FLANGES. RATED FOR 250 PSI.
  51. 12"x12"x12" TEE, (PE x PE x FLG).
  52. FLANGED BY PLAIN END SPOOL, LENGTH AS REQUIRED PLUS 6" CUT-TO-FIT. SHIP FLANGE LOOSE AND FIELD WELD TO REQUIRED LENGTH.
  53. 16" PLAIN END SPOOL WITH 12" FLANGED SIDE OUTLETS, STD. WT. STL. SIDE OUTLETS SHALL BE PROVIDED WITH REINFORCING WRAPPERS, 3/16" MIN. THK.
  54. 6" 90° ELBOW, DI (FLG x MJ).
  55. 16" BLIND FLANGE.
  56. 12" FLANGED x PLAIN END SHORT RADIUS 90° ELBOW.
  57. 6" PLAIN END SHORT RADIUS 90° ELBOW.
  58. 20" FLANGED x PLAIN END SPOOL WITH 12" FLANGED SIDE OUTLETS, STD. WT. STL. SIDE OUTLETS SHALL BE PROVIDED WITH REINFORCING WRAPPERS, 1/4" MIN. THK.
  59. 6" DI PIPE SPOOL (FLG x FLG), LENGTH AS REQUIRED.
  60. 6" 90° ELBOW, DI (FLG x FLG).
  61. 6"x4" CONCENTRIC REDUCER (PE x FLG).
  62. 1" CHEMICAL FEED SYSTEMS DISCHARGE BALL VALVE PER SPECIFICATIONS.
  63. 316 STAINLESS STEEL AIR TUBING AND FITTINGS FROM REMOTE SOLENOID PANEL TO PNEUMATIC ACTUATORS FOR AUTOMATIC BUTTERFLY VALVES. TUBING AND FITTINGS SHALL BE RATED FOR A MINIMUM WORKING PRESSURE OF 200 PSI. TUBING AND COMPRESSION FITTINGS SHALL BE AS MANUFACTURED BY SWAGELOK, OR EQUAL. TWO (2) AIR TUBING LINES PER ACTUATOR (10 PER FILTER). SEE FSS SHOP DRAWINGS.
  64. 1" CHEMICAL FEED SYSTEMS DISCHARGE CHECK VALVE PER SPECIFICATIONS.
  65. 1" CPVC PRESSURE SUSTAINING (BACK PRESSURE) VALVE.
  66. 2" PVC SCH. 40 CONDUIT ONLY. PROVIDE LONG RADIUS SWEEPS FOR ALL BENDS. PROVIDE PULL ROPE AND CAPS AT EACH END.
  67. 20"x12" CONCENTRIC REDUCER, (PE x PE).
  68. 20"x20"x12" REDUCING TEE, (FLG x PE x FLG).
  69. 20"x12" CONCENTRIC REDUCER, (PE x FLG).
  70. 12"x12"x12" TEE, (FLG x PE x FLG).
  71. 20" 45° ELBOW, (FLG x PE).
  72. CLASS 300 FLANGE.
  73. TAPER CML TO ACCOMMODATE WAFER BUTTERFLY VALVE.
  74. 12" FLANGED SPOOL BY FSS (1 PER FILTER), EPOXY LINED.
  75. 20" REDUCING FLANGE (20" CLASS 150 BLIND FLANGE WITH 3" OUTLET) AND 3" SCH. 80 STEEL FLG x PE PIPE (12" LONG) FULLY WELDED TO REDUCING FLANGE (2 PASSES MIN.). 20" REDUCING FLANGE WITH 3" STEEL PIPE AND FLANGE SHALL BE FUSION BONDED EPOXY LINED AFTER FABRICATION PER SPEC. SECTION 09915.



**SECTION B**  
SCALE: 3/8"=1'-0"



**AIR BLOW-OFF DETAIL**  
N.T.S.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



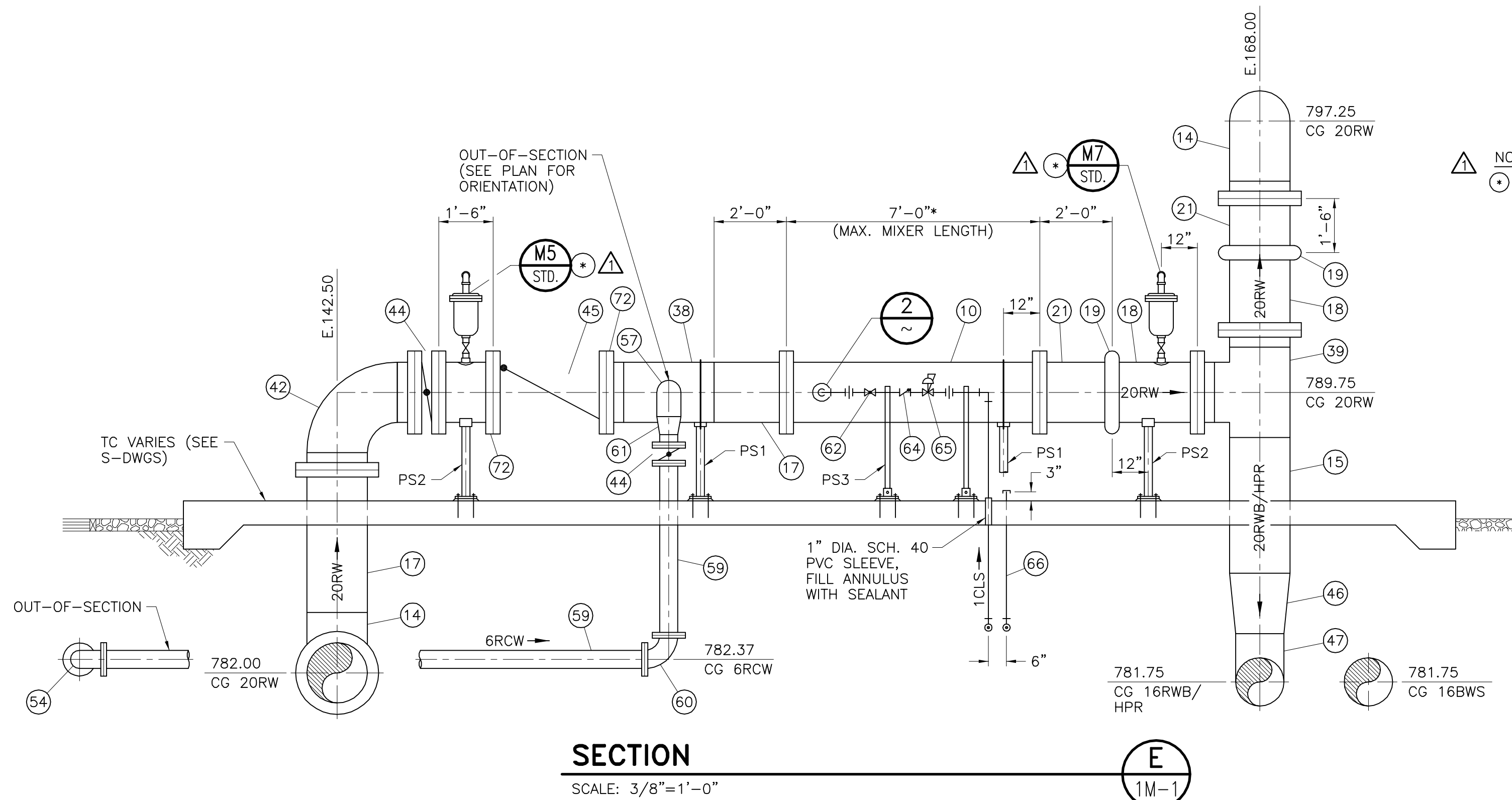
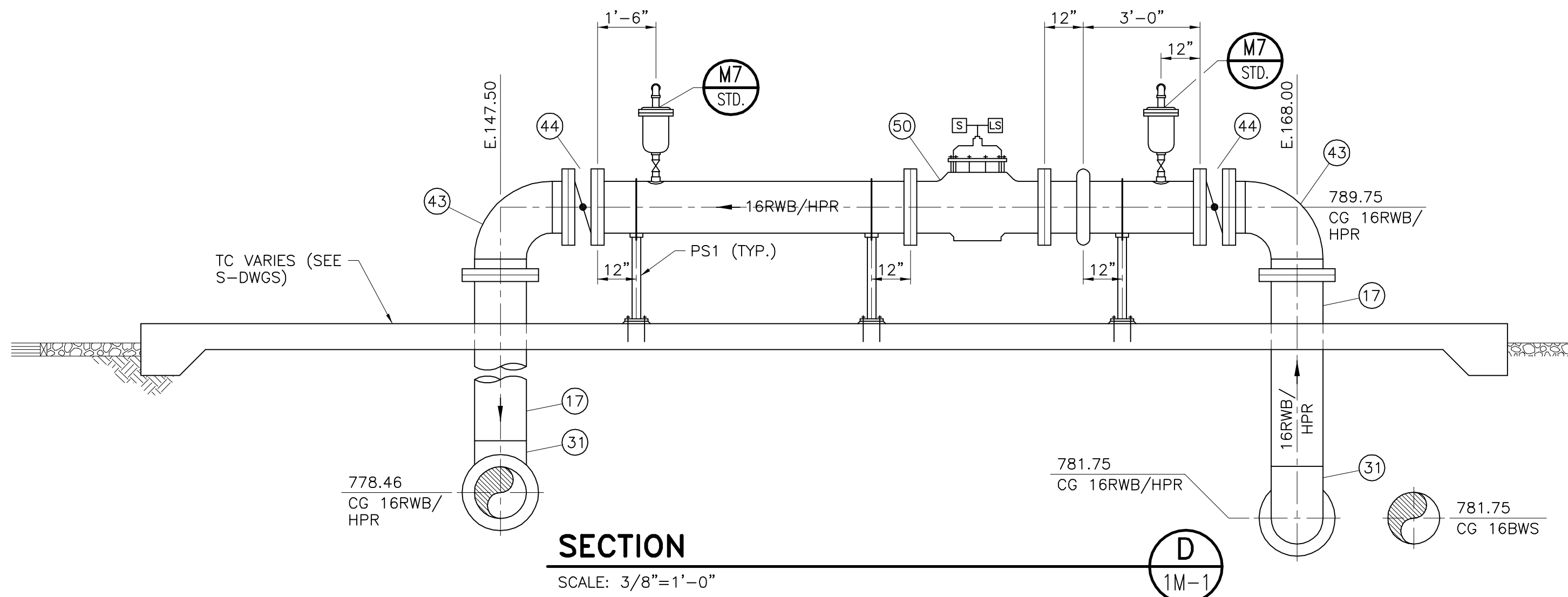
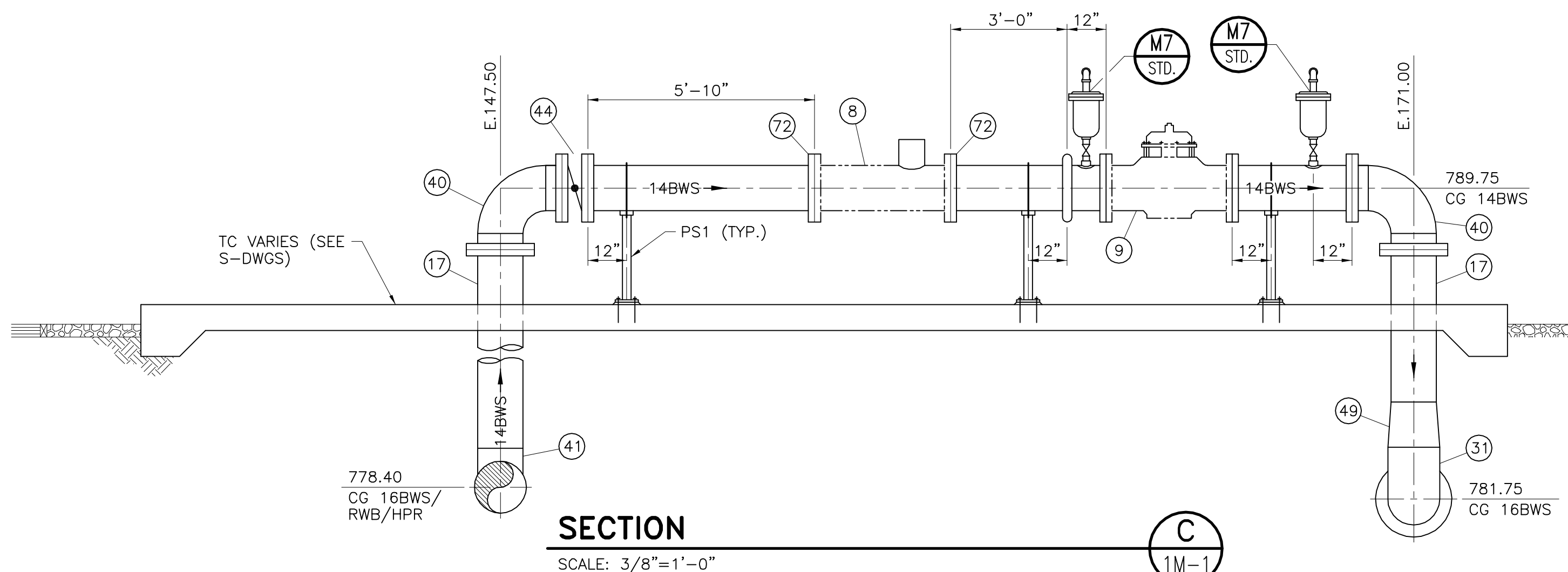
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	3/8"=1'-0"
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

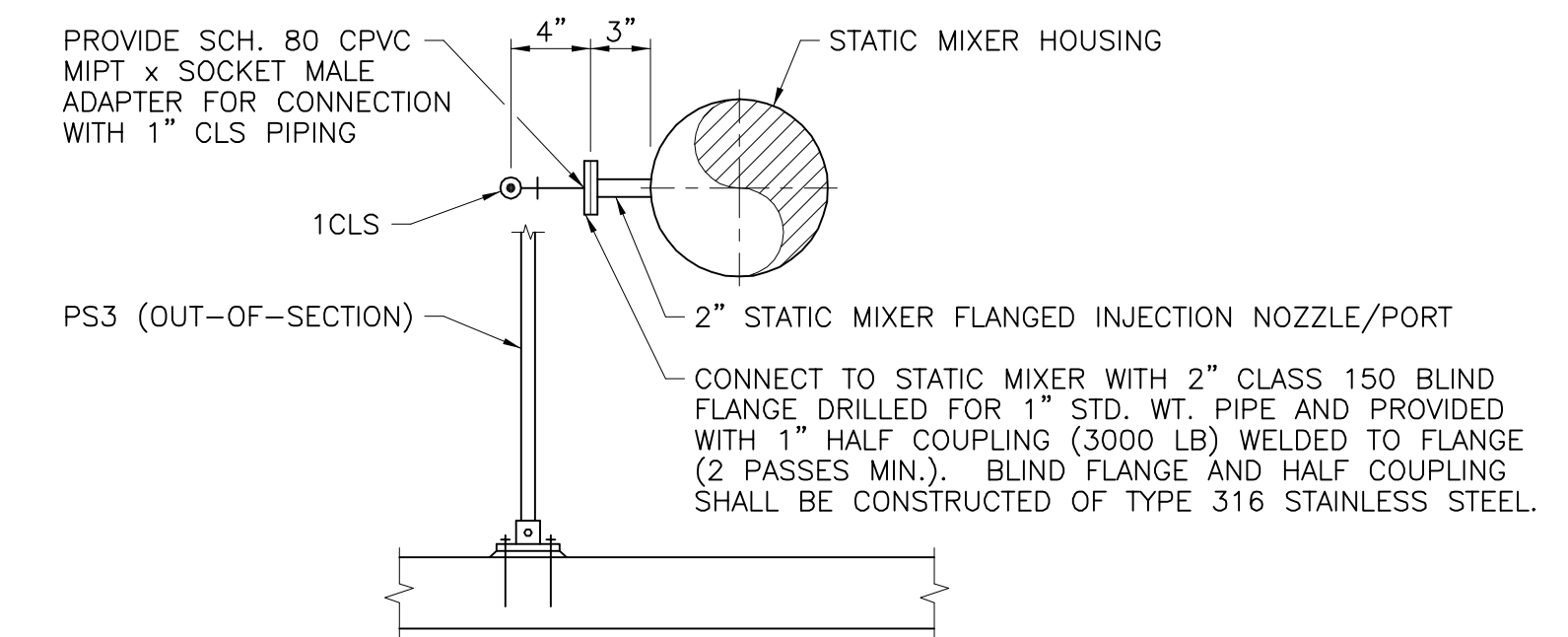
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**FILTER SECTIONS**

DRAWING  
**1M-2**  
25 OF 69 SHEETS  
11735  
R.C.S.D. PLAN No.

DWG. NO.: REC-80-19.54-103 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/20/13 PLOT TIME: 4:08PM PLOT SCALE: 1=1



NOTE:  
 ADD TEE AND 1/2" CORP STOP VALVE FOR SAMPLING TO AIR VALVE PIPING BELOW BALL VALVE.



STATIC MIXER CONNECTION DETAIL 2/2  
 N.T.S.

**RECORD DRAWING**

BY: *R. C. V. V.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
 1-800-227-2600  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



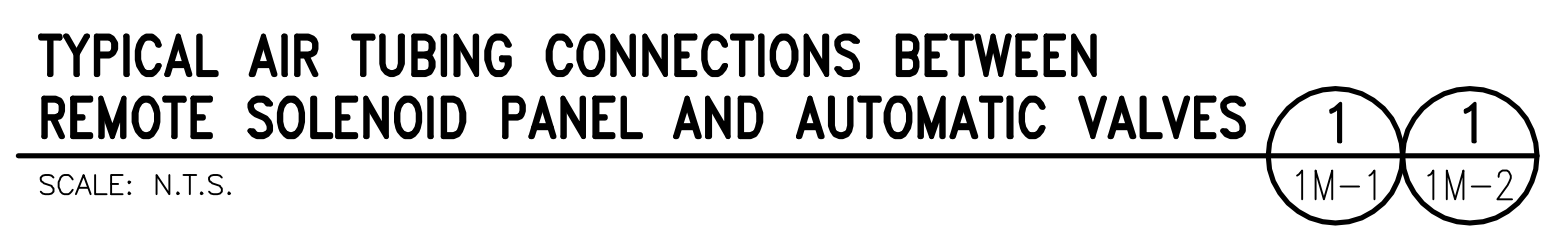
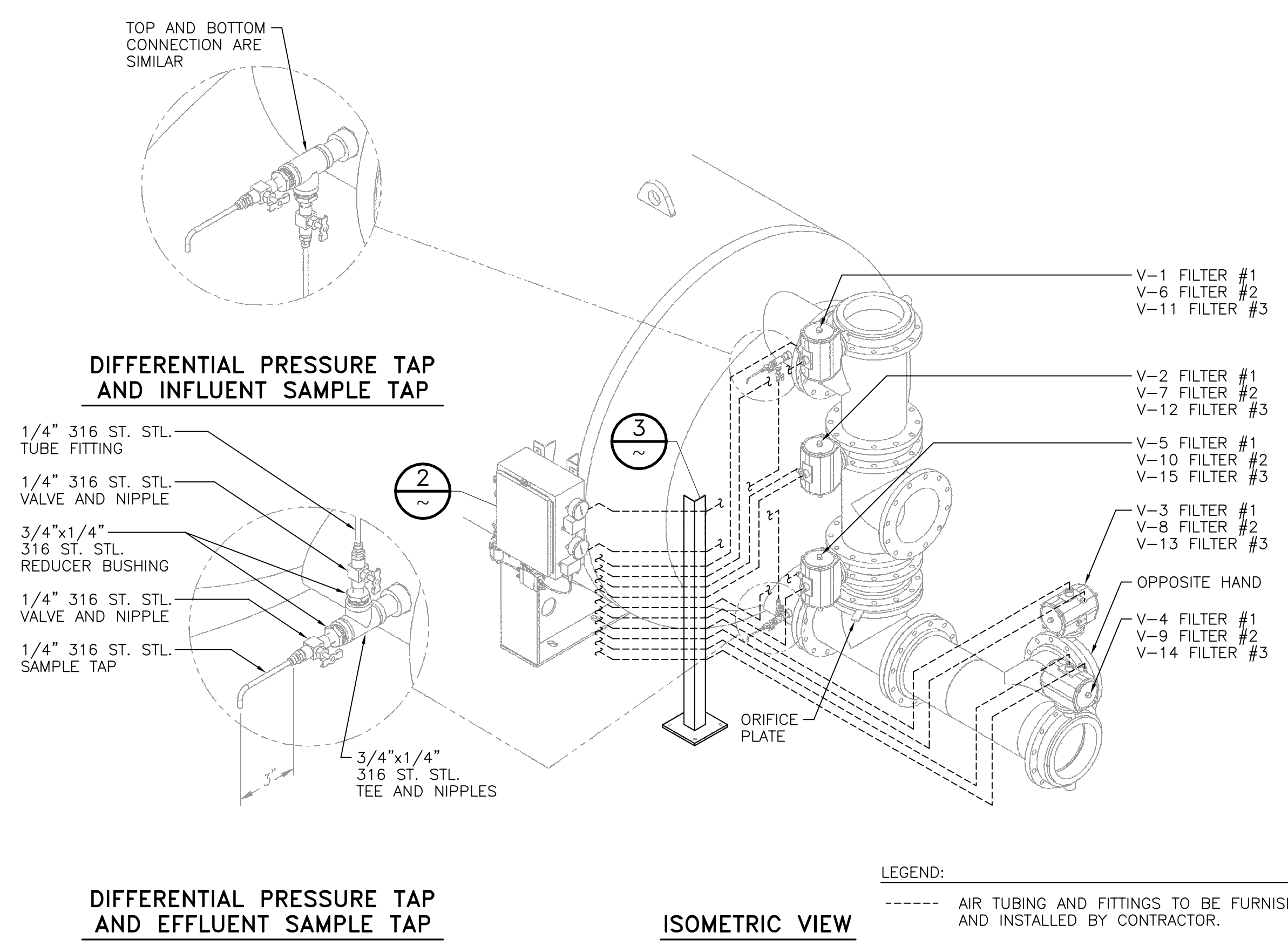
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Phillip Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	3/8"=1'-0"
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
 FILTER SECTIONS

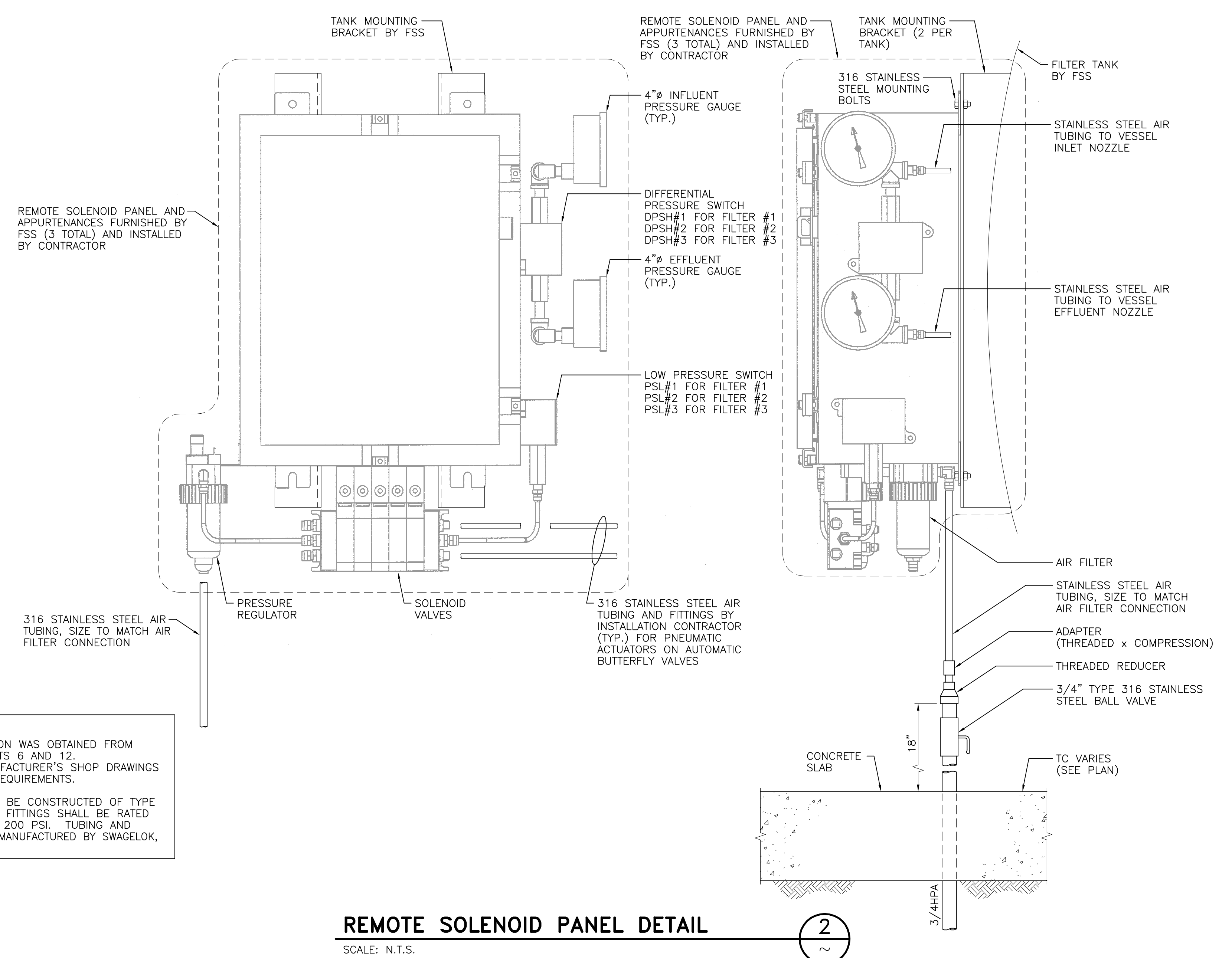
DRAWING  
**1M-3**  
 26 OF 69 SHEETS  
 11736  
 R.C.S.D. PLAN No.

DWG. NO.: 05-20-13-18-54-INT. FILE NO.: 587-19.54. UPDATE BY: TMM. PROJ. ENG.: PES. PLOT DATE: 05/20/13. PLOT TIME: 4:09PM. PLOT SCALE: 1=1

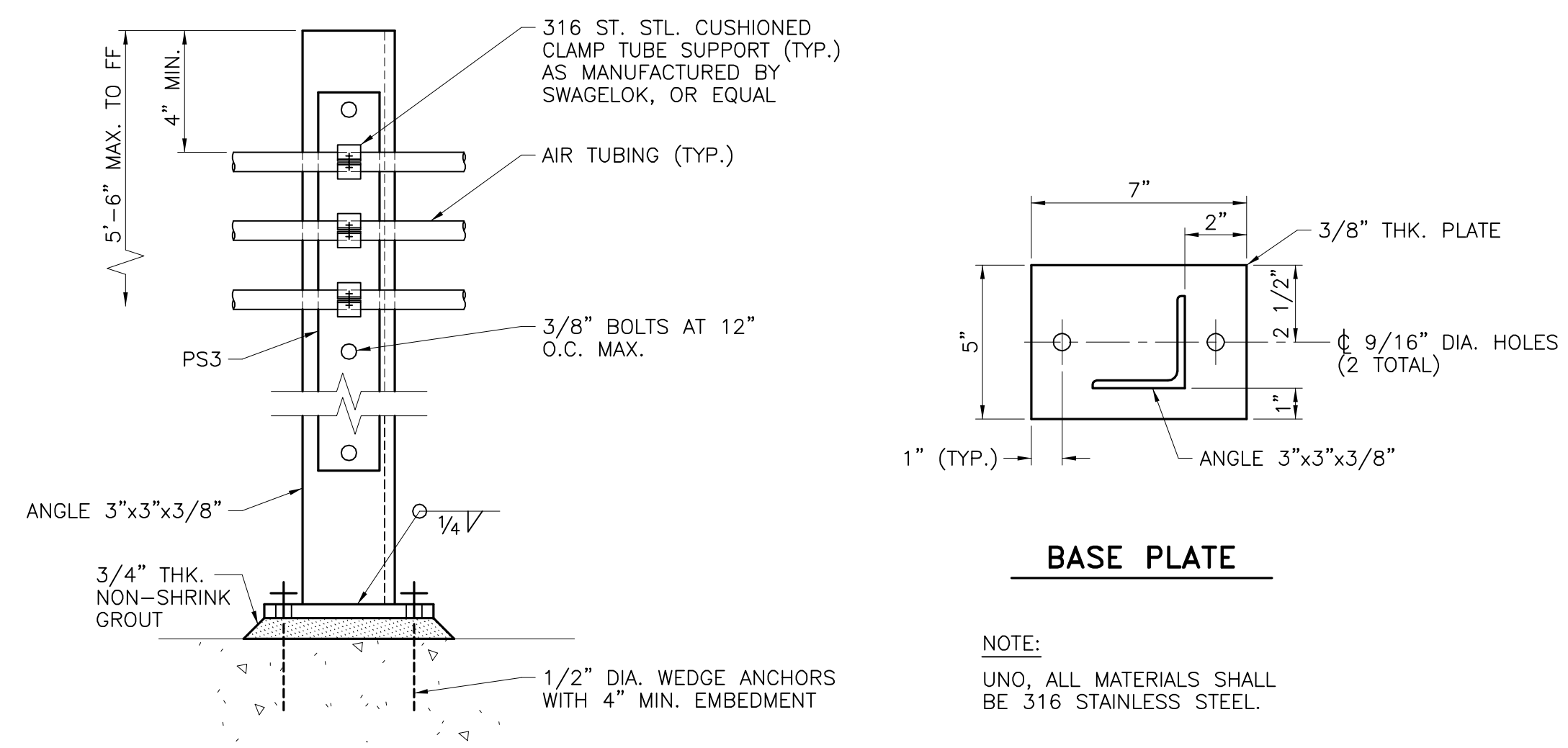


**NOTES:**

- DRAWING INFORMATION SHOWN HEREON WAS OBTAINED FROM FILTRONICS, DRAWING CP7771, SHEETS 6 AND 12. CONTRACTOR SHALL REFER TO MANUFACTURER'S SHOP DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
- ALL AIR TUBING AND FITTINGS SHALL BE CONSTRUCTED OF TYPE 316 STAINLESS STEEL. TUBING AND FITTINGS SHALL BE RATED FOR A MIN. WORKING PRESSURE OF 200 PSI. TUBING AND COMPRESSION FITTINGS SHALL BE AS MANUFACTURED BY SWAGELOK, OR EQUAL.



**REMOTE SOLENOID PANEL DETAIL**  
SCALE: N.T.S.



**AIR TUBING SUPPORT STANCHION**  
SCALE: N.T.S.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Alfred L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

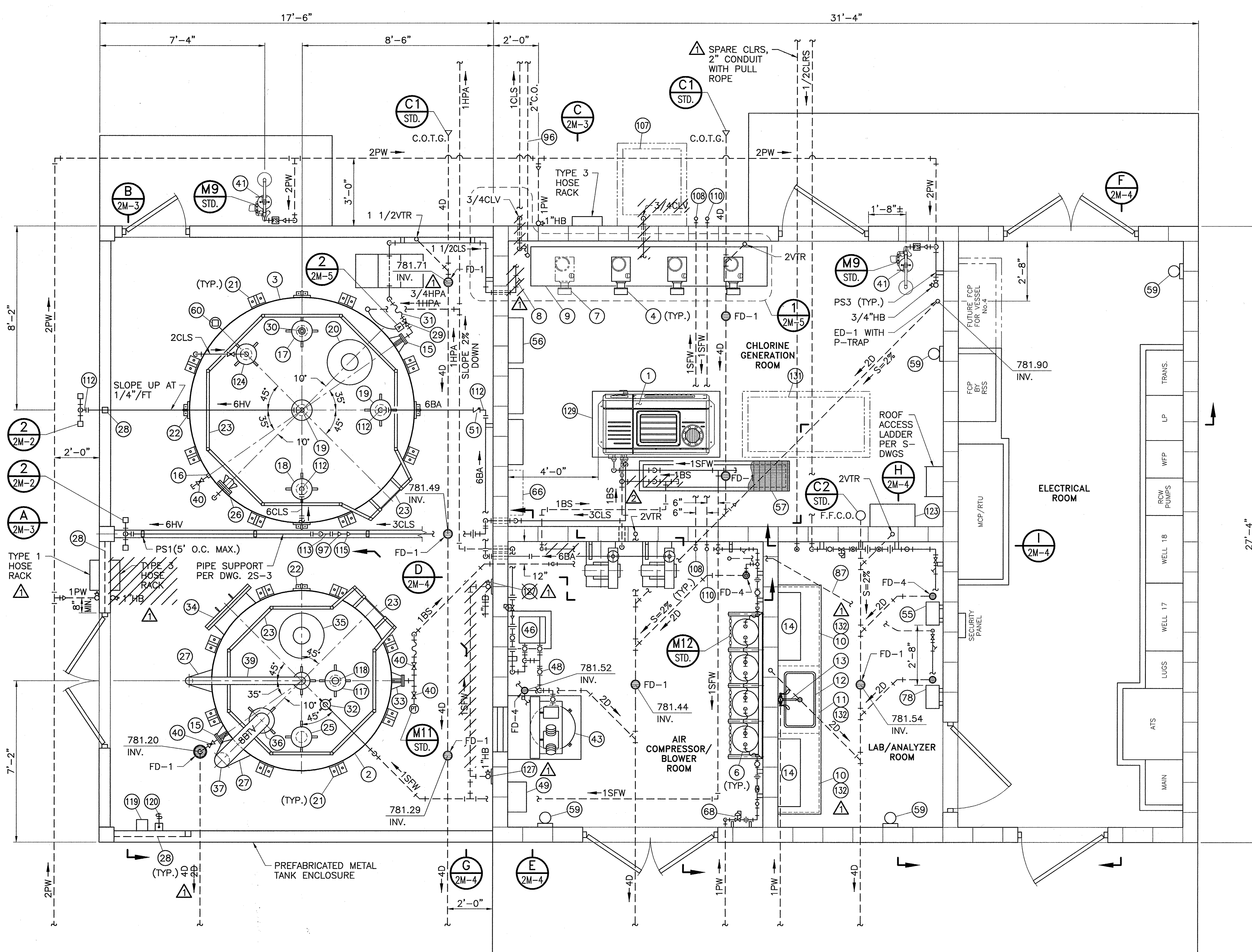
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	SPK
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**FILTER DETAILS**

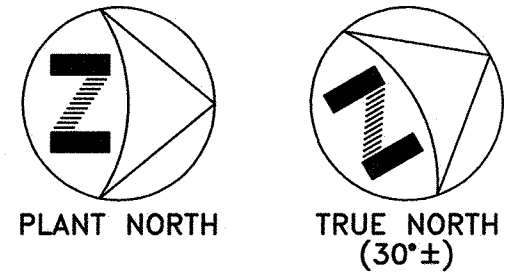
DRAWING  
**1M-4**  
27 OF 69 SHEETS  
11737  
R.C.S.D. PLAN No.



DWG. NO.: 02-14-14-14\_PLOT DATE: 02/14/14\_PLOT TIME: 1:28PM\_PLOT SCALE: 1=1  
 MRN\_PROJL. ENG.: PES\_PLOT DATE: 02/14/14\_PLOT TIME: 1:28PM\_PLOT SCALE: 1=1  
 FILE NO.: 587-19.54\_UPDATE BY:



**EQUIPMENT BUILDING FLOOR PLAN**  
 SCALE: 3/8"=1'-0"

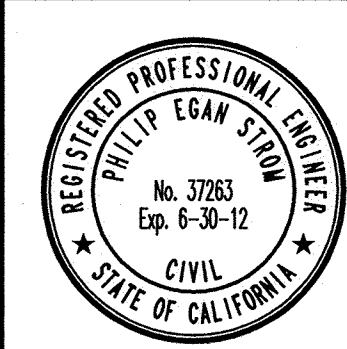


- MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 2M-1 THROUGH 2M-4:**
- 300 LB PER DAY ONSITE SODIUM HYPOCHLORITE GENERATION SYSTEM CELL, RECTIFIER, BRINE PUMP, PLC, AND APPURTENANCES (CHLORINE GENERATOR) BY CSS. CHLORINE GENERATOR SHALL BE EXPANDABLE TO A FUTURE CAPACITY OF 500 LB. PER DAY. (FUTURE)
  - 15 TON, PNEUMATICALLY FILLED FRP BRINE MAKEUP TANK AND APPURTENANCES (MAX. 8'-0" DIA. X 8'-6" SIDE WALL HT.). CONNECT SOFTENED FILL WATER, BRINE SOLUTION, AND DRAIN PIPING AS SHOWN. (FUTURE)
  - 5,400 GALLON SODIUM HYPOCHLORITE (CHLORINE SOLUTION) DOUBLE-WALLED FRP STORAGE TANK AND APPURTENANCES (MAX. 10'-0" O.D. X 10'-6" SIDE WALL HT. INCL. 12" FREEBOARD). (FUTURE)
  - CHLORINE SOLUTION METERING PUMPS, TWO DUTY, ONE STANDBY.
  - CHLORINE SOLUTION TANK DILUTION AIR BLOWER WITH 6" FLANGED OUTLET (2 TOTAL) BY CSS. (FUTURE)
  - WATER SOFTENING SYSTEM. DISTRICT WILL PROVIDE 3.6 CU. FT. FRP TANKS (4 TOTAL). CONTRACTOR SHALL INSTALL TANKS. CONTRACTOR SHALL FURNISH AND INSTALL ALL PIPING, VALVES, FILTERS, AND APPURTENANCES ASSOCIATED WITH THE WATER SOFTENER SYSTEM. (FUTURE)
  - FUTURE CHLORINE SOLUTION METERING PUMP.
  - PVC WYE STRAINER WITH FINE MESH SCREEN.
  - FABRICATED FRP SUPPORT STAND FOR CHLORINE SOLUTION METERING PUMPS.
  - 42"L X 22"D X 35 3/4"H BASE CABINET (2 TOTAL), WVR MODEL NO. CFE-2417-12, OR EQUAL. PROVIDE 4"H VINYL BASE MOLDING.
  - 36"L X 22"D X 35 3/4"H BASE CABINET (1 TOTAL), WVR MODEL NO. CFG-2006-F22, OR EQUAL. PROVIDE 4"H BASE MOLDING.
  - 25"L X 15"W X 10"D SINK (1 TOTAL) WVR MODEL NO. VF-1005-DI-B, OR EQUAL. PROVIDE SINK DRAIN, INCLUDING ABS P-TRAP AND CONNECTION TO 2" VENT TO ROOF.
  - 8" SPREAD FAUCET (1 TOTAL), WVR MODEL NO. VFL412-BVB-BH, OR EQUAL. PROVIDE ST. STL. BRAIDED HOSES AND ST. STL. ISOLATION VALVES FOR WATER SUPPLY CONNECTION TO FAUCET.
  - 36"L X 12 3/4"D X 30"H WALL CABINET (2 TOTAL), WVR MODEL NO. CFW20M3036, OR EQUAL. MOUNT CABINET 22" ABOVE COUNTER TOP.
  - 2" FLANGED BOTTOM NOZZLE. PROVIDE 2" CPVC REDUCING FLANGE WITH OUTLET SIZED TO MATCH CONNECTING PIPING.
  - 2" THREADED (FEMALE) BOTTOM DRAIN NOZZLE.
  - 6" FLANGED TOP NOZZLE WITH BLIND FLANGE TAPPED FOR LEVEL SENSOR.
  - 6" FLANGED TOP NOZZLE WITH 6" INTERIOR DOWNPIPE TO BOTTOM OF TANK.
  - 6" FLANGED HYDROGEN GAS DILUTION TOP VENT NOZZLE.
  - 24" FLANGED MANWAY, BOLTED AND GASKETED TO PROVIDE A GAS-TIGHT SEAL.
  - SEISMIC RESTRAINT LUG AND 316 STAINLESS STEEL ANCHOR BOLTS AS DESIGNED BY TANK MANUFACTURER FOR 2007 CBC LATERAL FORCES. REFER TO SPECIFICATIONS FOR DESIGN REQUIREMENTS INCLUDING SIGNED AND STAMPED CALCULATIONS. MAXIMUM ANCHOR BOLT EMBEDMENT DEPTH SHALL BE 9".
  - TANK LIFTING LUGS (4 TOTAL) AS DESIGNED BY TANK MANUFACTURER.
  - FRP LADDER AND HANDRAIL SYSTEM PER SPECIFICATIONS. FRP TANK MANUFACTURER SHALL INTEGRALLY MOLD ALL LADDER AND HANDRAIL SUPPORTS IN COORDINATION WITH THE FRP LADDER AND HANDRAIL MANUFACTURER.
  - DIFFERENTIAL PRESSURE SWITCH BY CSS FOR CHLORINE SOLUTION STORAGE TANK AIR VENTILATION SYSTEM.
  - SPARE 6" FLANGED TOP NOZZLE WITH CPVC BLIND FLANGE.
  - 4" FLANGED OVERFLOW ASSEMBLY WITH 4" INTERIOR DOWNPIPE TO BOTTOM OF TANK AND 4" CPVC SCHED. 40 EXTERNAL DOWNPIPE.
  - 316 ST. STL. EXTERIOR OR FRP INTERIOR PIPE SUPPORT (SUPPORT ARM AND CLAMP). FRP TANK SHALL BE PROVIDED WITH INTEGRALLY MOLDED BRACKETS FOR SUPPORT ATTACHMENT.
  28. PS3 WITH ANGLE CLIPS TO CURB AND GIRT AS REQUIRED FOR ATTACHING WALL MOUNTED EQUIPMENT, PIPING, AND APPURTENANCES. CONTRACTOR SHALL COORDINATE FRAMING LOCATIONS WITH PREFABRICATED METAL ENCLOSURE SUPPLIER.
  - 2" PNEUMATICALLY ACTUATED, FAIL CLOSED, TRUE UNION CPVC BALL VALVE WITH MULTI-PORT SOLENOID VALVE (GEORGE FISCHER TYPE 546, OR EQUAL). CONNECT HPA PIPING TO ACTUATOR WITH STAINLESS BRAIDED FLEXIBLE HOSE RATED FOR 200 PSI AIR WORKING PRESSURE, COMPLETE WITH PIPE TO HOSE ADAPTERS.
  - ULTRASONIC LEVEL TRANSMITTER.
  - ST. STL. BRAIDED FLEXIBLE PVC HOSE WITH I.D. TO MATCH PIPING, RATED FOR 150 PSI WATER WORKING PRESSURE, COMPLETE WITH ST. STL. PIPE TO HOSE ADAPTERS (FEMALE THREADED ENDS).
  - 2" FLANGED TOP NOZZLE SOFTENED WATER INLET WITH 1" REDUCING FLANGE CONNECTION AND INTERNAL SPIRAL DISTRIBUTION HEAD.
  - 2" FLANGED BRINE OUTLET WITH CPVC REDUCING FLANGE FOR CONNECTION TO 1"BS PIPING.
  - 24" FLANGED SIDE-SHELL MANWAY.
  - 24" TOP MANWAY WITH SAFE-SURGE TECHNOLOGY BY POLYPROCESSING, OR APPROVED EQUAL FOR EMERGENCY AIR SURGE PROTECTION.
  - 8" FLANGED TOP NOZZLE FOR VENT.
  - 8" VENT PIPING, CONTRACTOR SHALL COORDINATE TANK FABRICATION WITH PIPING INSTALLATION.
  - REMOVABLE DUST BAG. INSTALL OVER END OF VENT PIPING WITH TWO ADJUSTABLE ST. STL. CLAMPS (1" MIN. WIDTH BANDS).
  - SALT INLET ASSEMBLY. 4" TYPE 316 ST. STL. (SCHED. 10S, MIN.) WITH FULL RADIUS TOP BEND, ANSI 150 LB. FLANGED TANK CONNECTION, CAMLOCK INLET WITH END CAP (TYPE 316 ST. STL.) AND 3/4" SCHED. 40 (TYPE 316 ST. STL.) WATER INLET WITH HOSE CONNECTION FOR SALT DUST CONTROL.
  - CPVC TRUE UNION BALL VALVE WITH CPVC SCHED. 80 PIPING AND FITTINGS FOR CONNECTION TO TANK. PROVIDE THREADED OR FLANGED PIPING AS REQUIRED FOR CONNECTION TO SPECIFIED TANK INLET/OUTLET CONFIGURATION.
- SEE DRAWING 2M-2 FOR CONTINUATION.

**RECORD DRAWING**  
 BY: *Bob C. Williams* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
 1-800-227-2600  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
▲	CHLORINE GENERATOR PROJECT	02/13/14	BCV
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Philip Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING FLOOR PLAN**

**2M-1**  
 28 OF 69 SHEETS  
 11738  
 R.C.S.D. PLAN NO. 587-19.54

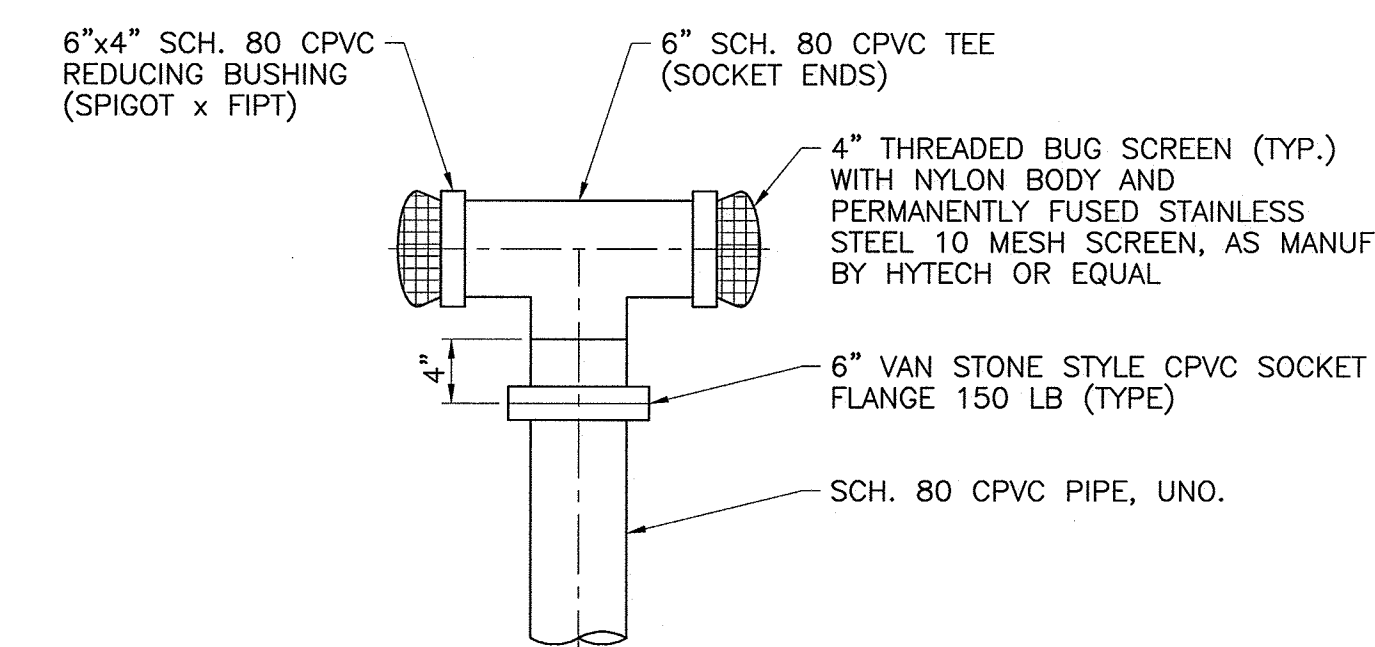
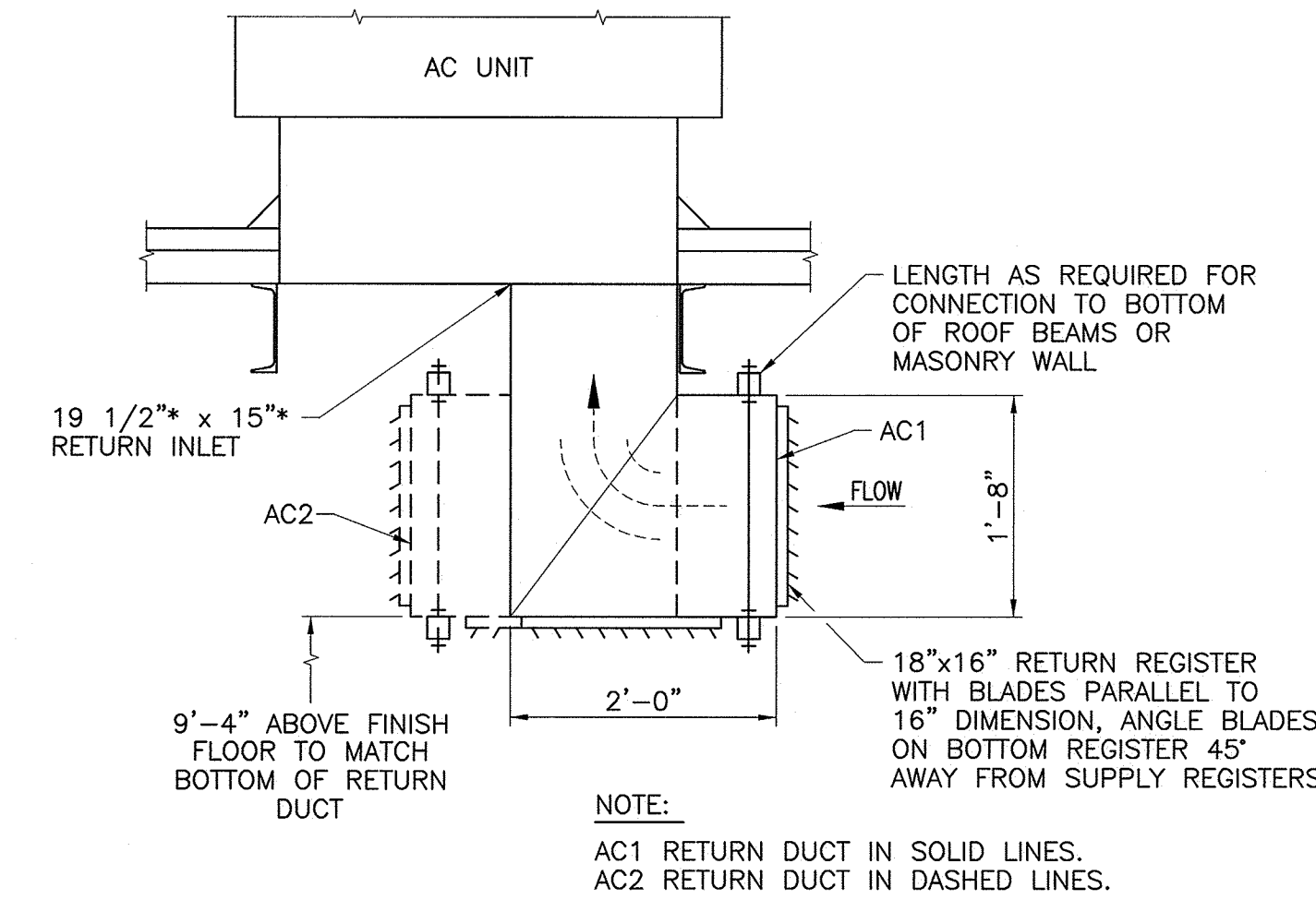
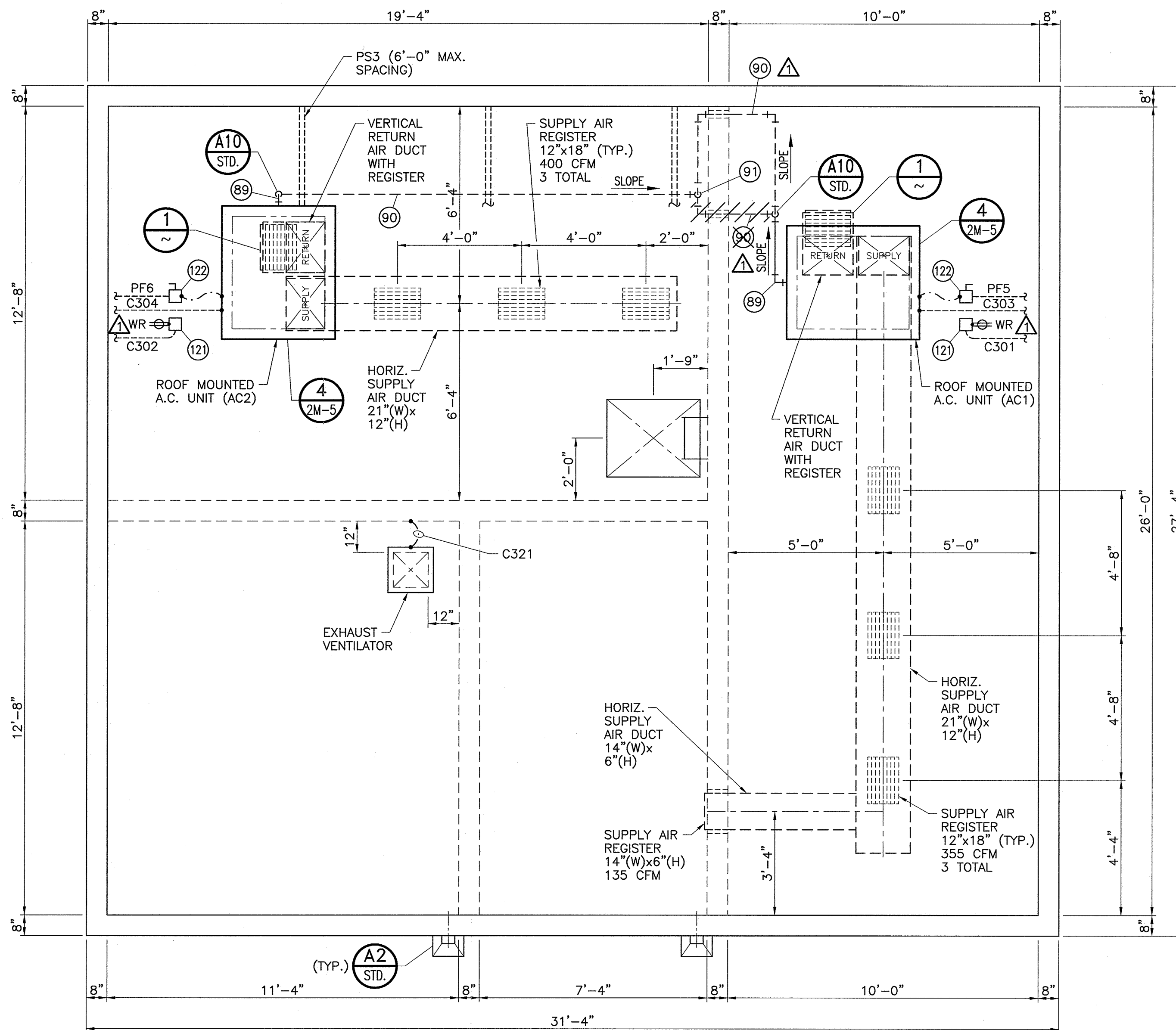


DWG. NO.: 05-587-19.54. FILE NO.: 587-19.54. UPDATE BY: MRN. PROJ. ENG.: PES. PLOT DATE: 02/14/14. PLOT TIME: 1:45PM. PLOT SCALE: 1/1=

**MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 2M-1 THROUGH 2M-4 (CONT.):**

41. EMERGENCY SHOWER AND EYE/FACE WASH STATION.
42. SOLENOID FILL VALVE.
43. AIR COMPRESSOR AND 60 GALLON ASME AIR RECEIVER BY FSS.
44. VIBRATION ISOLATION PADS BY FSS.
45. AUTOMATIC DRAIN VALVE BY FSS, CONNECT TO 120V RECEPTACLE.
46. AIR DRYER BY FSS.
47. 3/4" PRESSURE REGULATOR WITH INTEGRAL PRESSURE GAUGE BY FSS.
48. 1/2" AIR FILTER WITH 1/8" MPT BOTTOM DRAIN BY FSS.
49. COMPRESSOR CONTROL PANEL, WALL MOUNTED, BY FSS. CONTRACTOR SHALL MOUNT CONTROL PANEL TO WALL WITH 3/8" ST. STL. SLEEVE ANCHORS (4" EMBEDMENT). TOP OF PANEL SHALL BE 5'-6" ABOVE FINISHED FLOOR.
50. 6" WAFER STYLE TYPE 316 ST. STL. BUTTERFLY VALVE, SUITABLE FOR AIR SERVICE AT 150°F BY CSS.
51. 6" WAFER STYLE DUAL DISC CHECK VALVE, SUITABLE FOR LOW PRESSURE AIR SERVICE AT 150°F. VALVE SHALL BE PROVIDED WITH CLASS 150 TYPE 316 ST. STL. BODY AND PLATES, EPDM SEAL, AND 316 ST. STL. HINGE PIN, SPRING, STOP PIN AND RETAINER. CONTRACTOR SHALL COORDINATE SPRING TORQUE WITH AIR BLOWER MANUFACTURER. CHECK VALVE SHALL BE AS MANUFACTURED BY CRANE-DUGO-CHEK, OR EQUAL BY CSS.
52. 6"x6"x6" TEE, CPVC SCHED. 80 (SOCKET x SOCKET x SOCKET).
53. ORP PROBE BY FSS.
54. ORP ANALYZER BY FSS. WALL MOUNT AT 5'-6" ABOVE FINISHED FLOOR WITH ST. STL. WEDGE ANCHORS (4" EMBEDMENT).
55. HACH CL17 FREE RESIDUAL CHLORINE ANALYZER. WALL MOUNT ANALYZER WITH ST. STL. STRUT CHANNEL. PROVIDE HACH SAMPLE CONDITIONING KIT AND CONNECT KIT TO MONITOR PER MANUFACTURER'S PRINTED INSTRUCTIONS.
56. CHLORINE SOLUTION METERING PUMP CONTROL PANEL (3 TOTAL). SEE E-DRAWINGS FOR DETAILS. SUBMIT PANEL ELEVATION LAYOUT DRAWING FOR DISTRICT APPROVAL PRIOR TO FABRICATION. PUMP CONTROL PANEL SHALL HAVE A MAXIMUM DEPTH OF 8" AND SHALL BE MOUNTED DIRECTLY TO THE MASONRY WALL WITH EPOXY ANCHORS (4" MIN. EMBEDMENT DEPTH).
57. UTILITY TRENCH WITH FRP GRATING COVER.
58. CONTROL MODULE FOR CHLORINE SOLUTION TANK ULTRASONIC LEVEL SENSOR.
59. FIRE EXTINGUISHER AND WALL BRACKET MOUNTED TO MASONRY WALL (4 TOTAL). CONFIRM LOCATIONS WITH DISTRICT PRIOR TO INSTALLATION.
60. WARRICK SERIES 3F FLANGED MOUNTING FIXTURE, OR EQUAL, AT TOP OF STILLING WELL FOR INSTALLATION OF LEAK DETECTION CONDUCTIVITY PROBES.
61. 24"W X 36"L URETHANE HOSE AND CABLE BRIDGE AS MANUFACTURED BY VESTIL MANUFACTURING CORP., OR EQUAL. BRIDGE SHALL BE RATED FOR A MIN. LIVE LOAD OF 100 PSF WITH MAX. DEFLECTION LESS THAN L/360. USABLE SPAN SHALL BE 6", HT. SHALL BE 3" (CLR.). EXPOSED SURFACES SHALL BE PROVIDED WITH TRACTION CLEATS TO PREVENT SLIPPAGE.
62. 4" FLANGED TOP NOZZLE.
63. 316 ST. STL. EPOXY ANCHORS BY FSS.
64. 2 GANG, 2 DUPLEX RECEPTACLE.
65. COMPRESSOR MOUNTED JUNCTION BOX BY FSS. CONTRACTOR SHALL FURNISH AND INSTALL CONDUIT AND CONDUCTORS BETWEEN COMPRESSOR CONTROL PANEL AND JUNCTION BOX.
66. FUTURE CHLORINE SOLUTION METERING PUMP CONTROL PANEL.
67. WALL MOUNTED CARTRIDGE WATER FILTER (2 TOTAL) WITH 1" FEMALE THREADED INLET AND OUTLET, INLET AND OUTLET PRESSURE GAUGES (2" DIA. WITH ST. STL. CASES), AND 20 MICRON FILTER CARTRIDGE. PROVIDE 6 SPARE FILTER CARTRIDGES.
68. 1" PRESSURE REGULATING VALVE WITH BRONZE BODY, BUNA SEAT DISC, ST. STL. BODY SEAT, BUILT-IN BACK-PASS CHECK VALVE, CLEAN-OUT PLUG WITH MONEL STRAINER SCREEN, FEMALE THREADED UNION INLET, FEMALE THREADED OUTLET, AND SUITABLE FOR A MAX. INLET PRESSURE OF 300 PSI. SET INITIAL OUTLET PRESSURE AT 50 PSI.
69. 316 ST. STL. BALL VALVE.
70. 1" WATER METER WITH LOW LEAD ALLOY HOUSING, PERMANENTLY SEALED MAGNETIC DRIVE, 3/4" MALE THREAD CONNECTIONS, AND FLOW IN GALLONS. WATER METER SHALL BE AS MANUFACTURED BY BADGER METER, OR EQUAL.
71. 1" FLEXIBLE PVC HOSE (RATED FOR MIN. 150 PSI WORKING PRESSURE) WITH BARBED X MPT AND FEMALE OR MALE HOSE END CONNECTORS AS REQUIRED FOR PIPING AND TANK CONNECTIONS.
72. 1" FEMALE THREADED TEE WITH 3/4" THREADED REDUCING BUSHING AND PLUG.
73. 1" WYE STRAINER WITH 250 LB. ST. STL. BODY, NO. 40 MESH STRAINER SCREEN AND THREADED SCREEN CAP.
74. 1" H (MAX.) GROUT PAD FOR WATER SOFTENER TANKS. TOP OF GROUT PAD SHALL BE LEVEL. GROUT SHALL BE SIKATOP 111 PLUS AS MANUFACTURED BY SIKA CORP. CONCRETE SURFACES TO RECEIVE GROUT SHALL BE ROUGHENED BY MECHANICAL MEANS TO OBTAIN AN AGGREGATE-FRACTURED SURFACE WITH A MIN. PROFILE OF 1/8".
75. 6" FLANGED END BELLOWS EXPANSION JOINT, 3 CONVOLUTIONS MIN., WITH PTFE BELLOWS AND DUCTILE IRON FLANGES. EXPANSION JOINT SHALL BE SUITABLE FOR A MIN. WORKING PRESSURE OF 50 PSI AT 300°F AND SHALL BE AS MANUFACTURED BY RESISTOFLEX, OR EQUAL BY CSS.
76. ST. STL. BRAIDED METAL OVER CLOSE PITCH, ANNULAR CORRUGATED HOSE FLEXIBLE CONNECTOR WITH ST. STL. 1/2" MNPT THREADED ENDS (RATED FOR 300 PSI MIN. AIR PRESSURE), AS MANUFACTURED BY FLEXICRAFT, PENFLEX, OR EQUAL.
77. 2" SCHED. 80 CPVC STILLING WELL AND LEAK DETECTION PROBE. PROVIDE THREADED OUTLET AT BOTTOM OF SECONDARY CONTAINMENT TANK FOR CONNECTION OF STILLING WELL PIPING. CONTRACTOR SHALL CONFIRM SIZE OF STILLING WELL PIPING WITH LEAK DETECTION PROBE MANUFACTURER. CONDUIT RISER FOR LEAK DETECTION PROBE CABLE SHALL BE ATTACHED TO AND SUPPORTED BY THE LEAK DETECTION PIPING ASSEMBLY.

SEE DRAWING 2M-3 FOR CONTINUATION.



**RECORD DRAWING**

BY: *[Signature]* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
△	CHLORINE GENERATOR PROJECT	02/13/14	BCV
△	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *[Signature]*  
REGISTERED ENGINEER No. 70939 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	TMW
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**EQUIPMENT BUILDING ROOF PLAN**

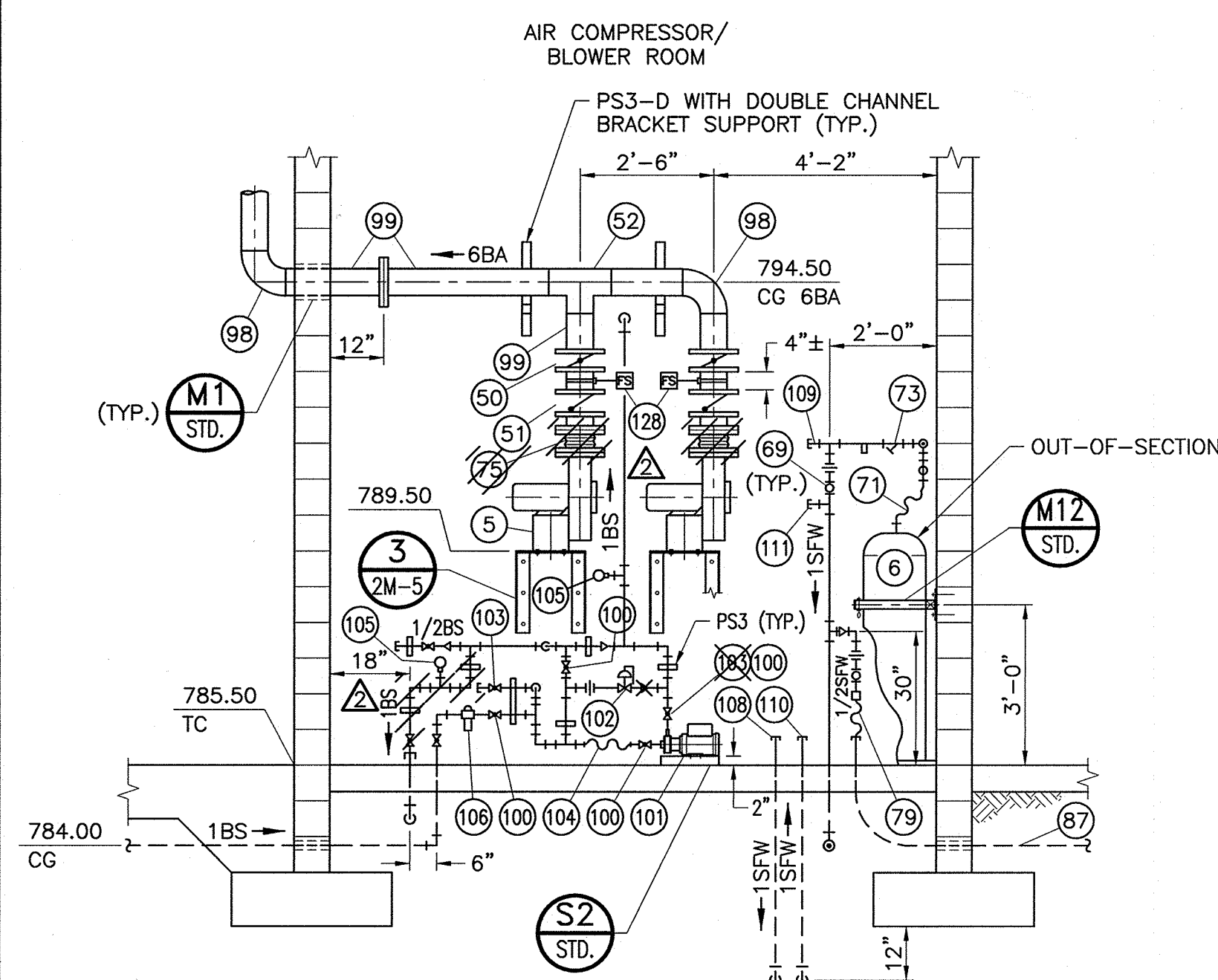
DRAWING  
**2M-2**  
29 OF 69 SHEETS  
11739  
R.C.S.D. PLAN No.







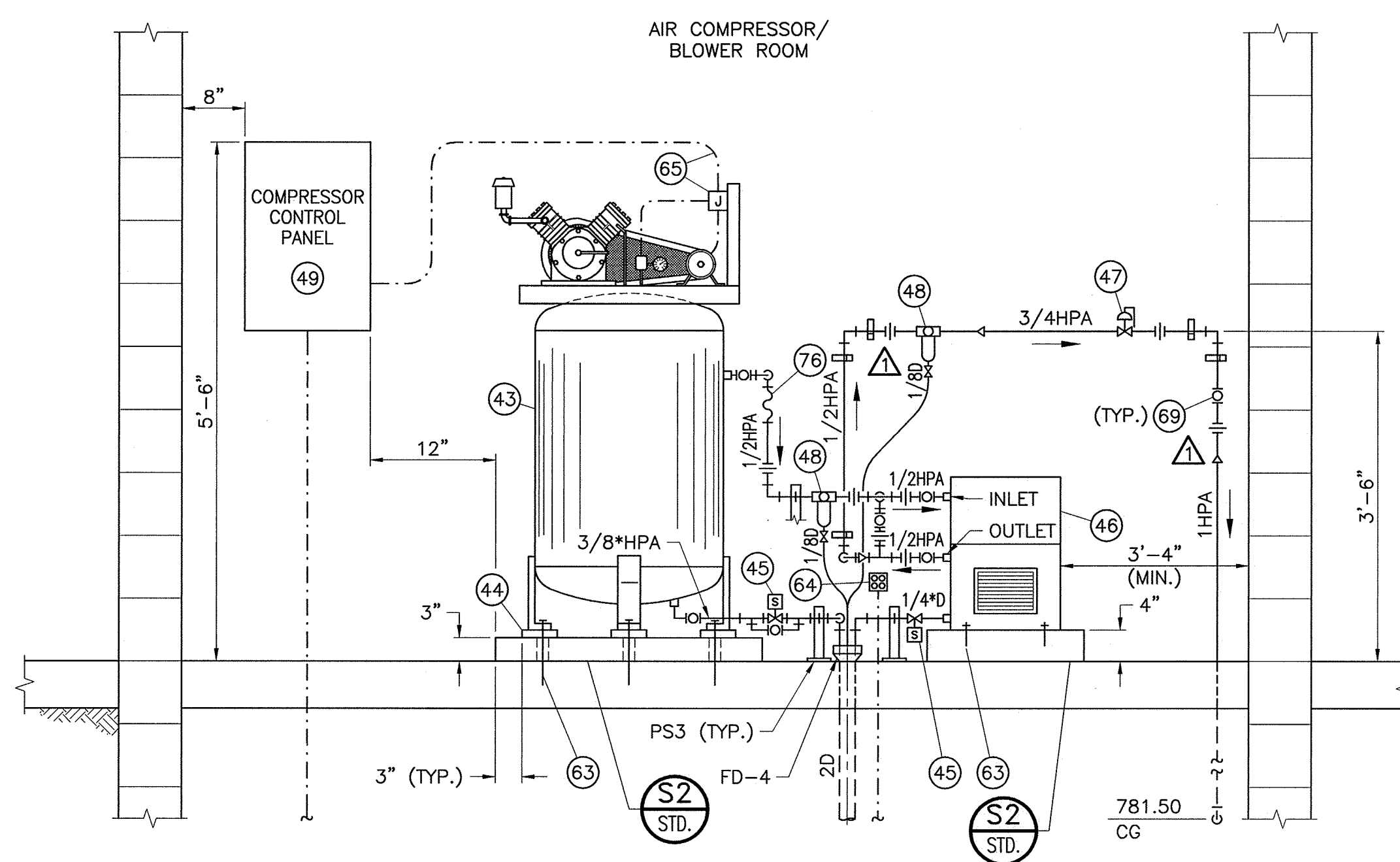
DMC NO.: RE-98-19-34-204 FILE NO.: 587-19-54 UPDATE BY: MRN PROJ. ENG.: PES PLOT DATE: 02/14/14 PLOT TIME: 3:22PM PLOT SCALE: 1"=1'



**SECTION**

SCALE: 3/8"=1'-0"

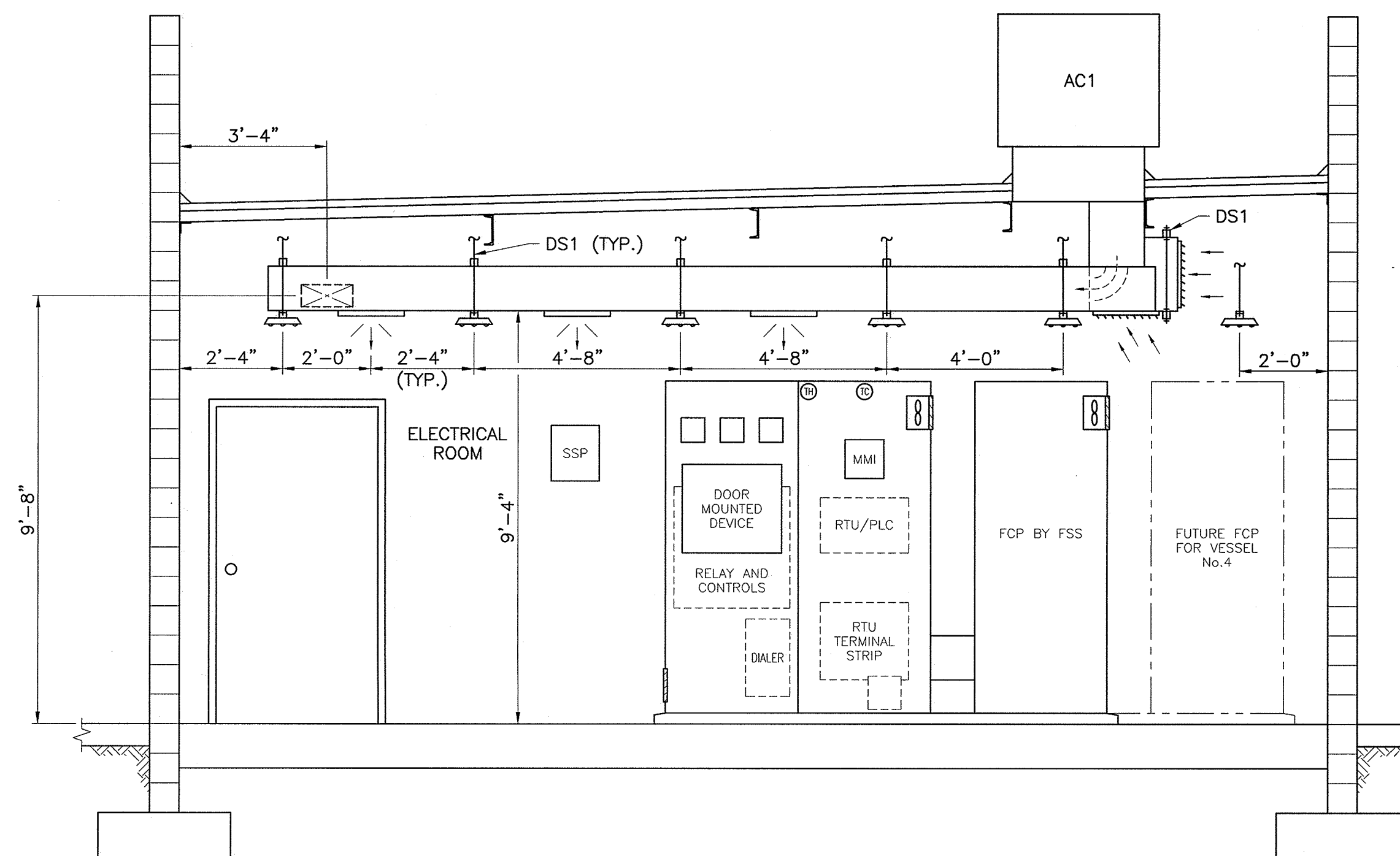
**D**  
2M-1



**SECTION**

N.T.S.

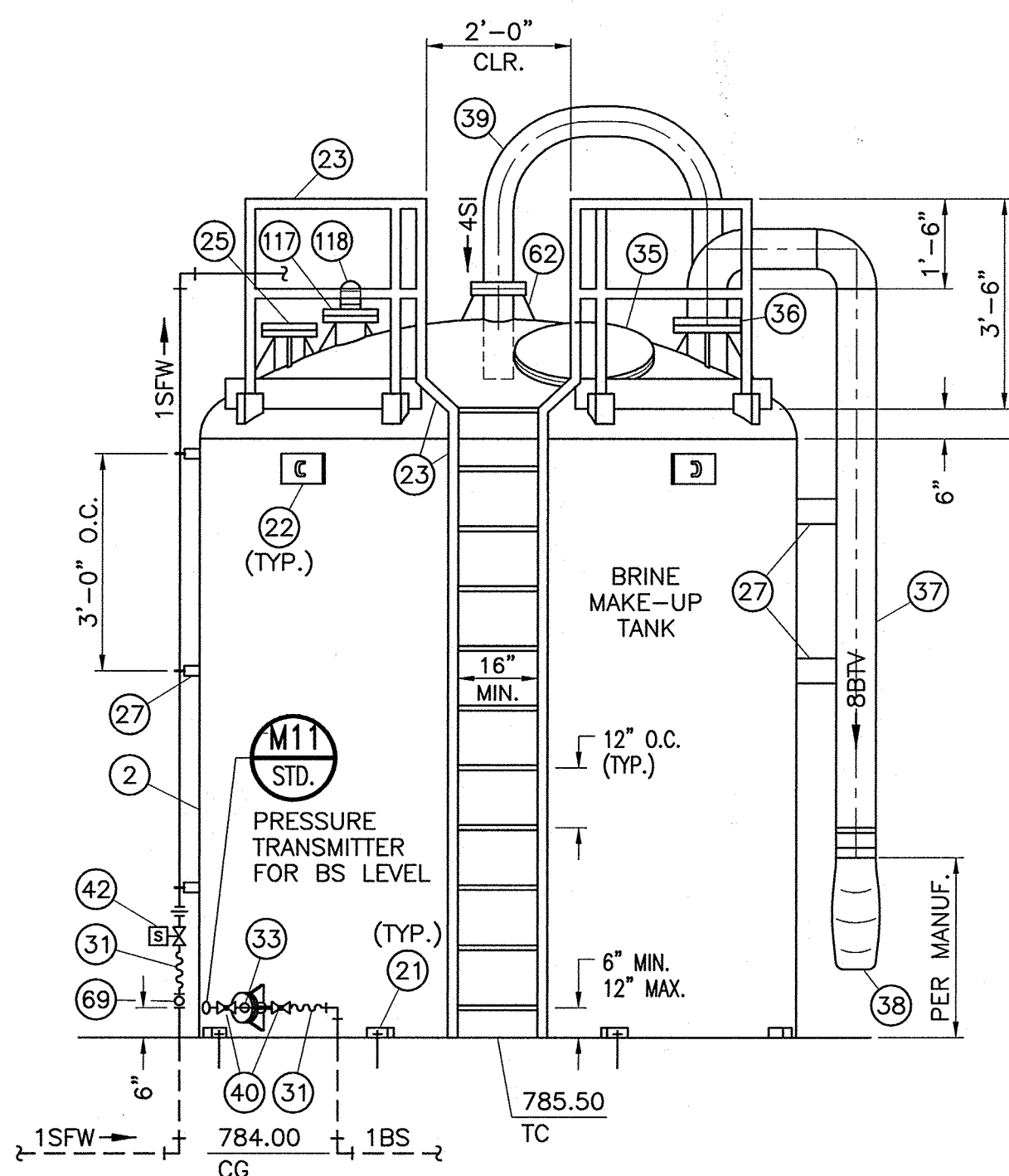
**E**  
2M-1



**SECTION**

SCALE: 3/8"=1'-0"

**F**  
2M-1

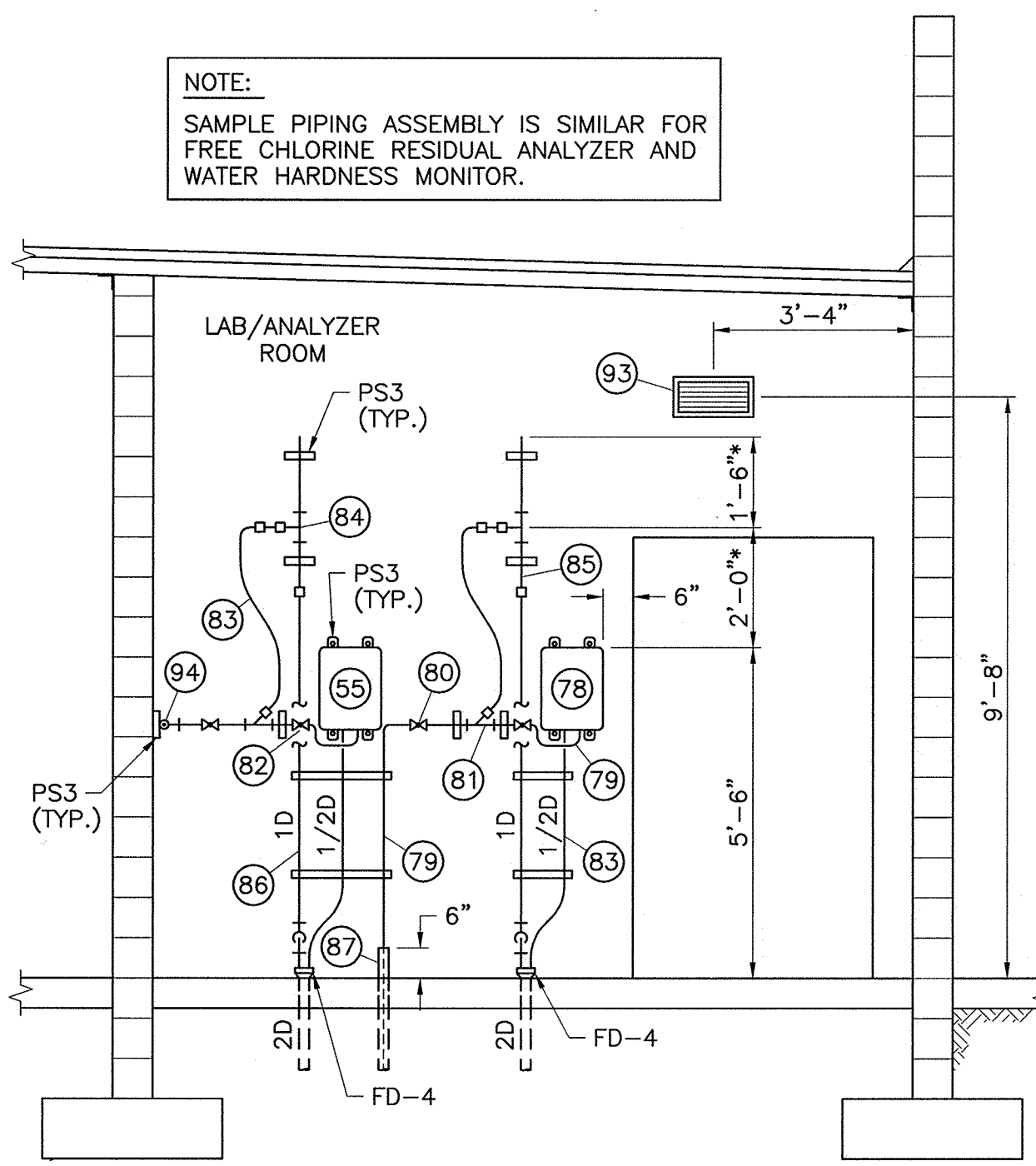


**SECTION**

N.T.S.

**G**  
2M-1

NOTE:  
REFER TO PLAN VIEW FOR ACTUAL ORIENTATION OF ALL TANK APPURTENANCES.

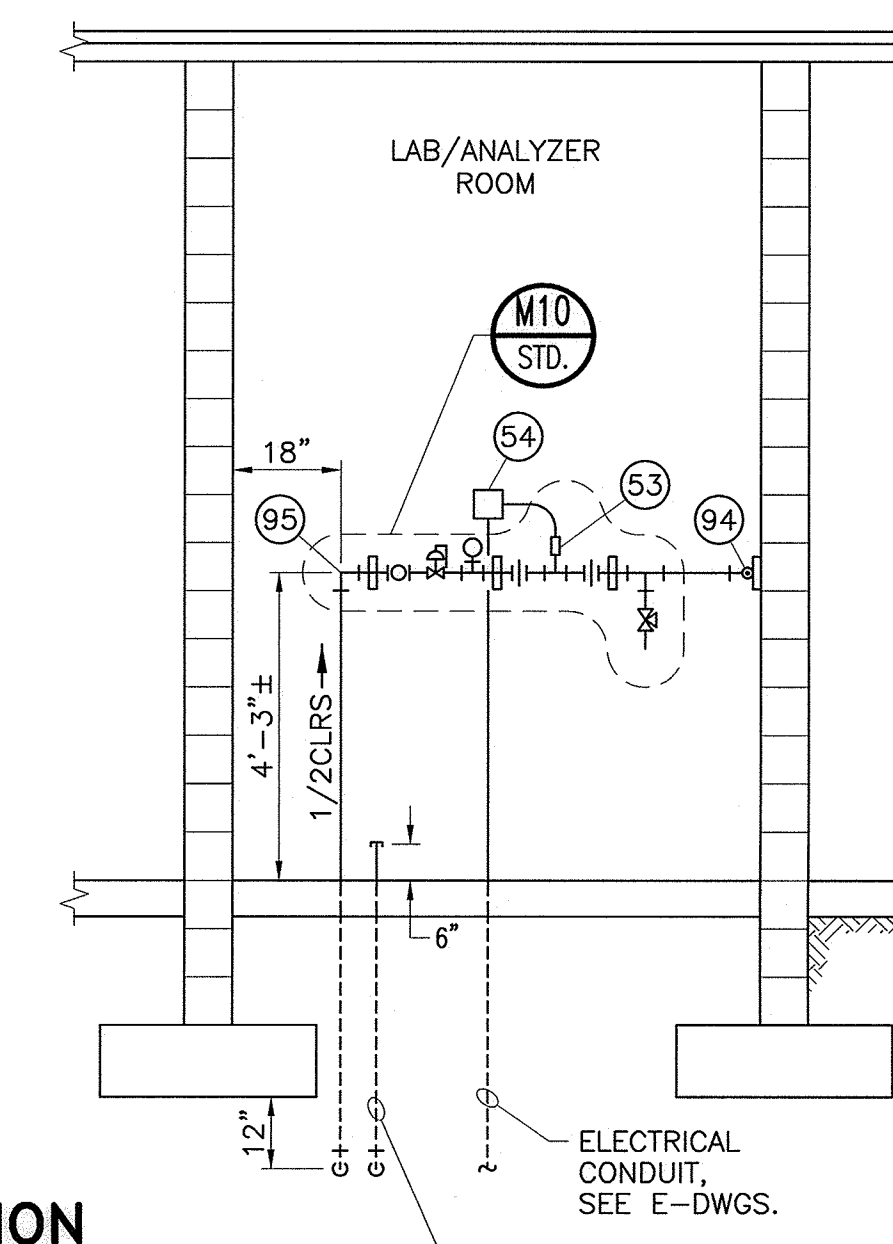


**SECTION**

SCALE: 3/8"=1'-0"

**H**  
2M-1

NOTE:  
SAMPLE PIPING ASSEMBLY IS SIMILAR FOR FREE CHLORINE RESIDUAL ANALYZER AND WATER HARDNESS MONITOR.



**SECTION**

SCALE: 3/8"=1'-0"

**I**  
2M-1

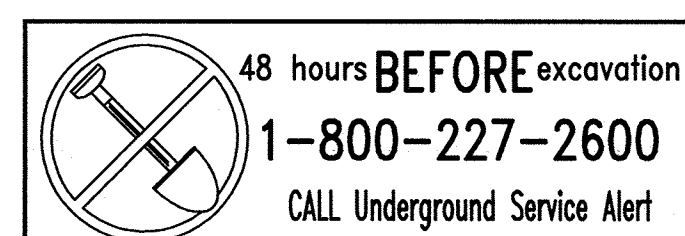
2" CONDUIT WITH PULL-ROPE AND CAP FOR FUTURE CLR'S TUBING

**Ⓞ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 2M-1 THROUGH 2M-4 (CONT.):**

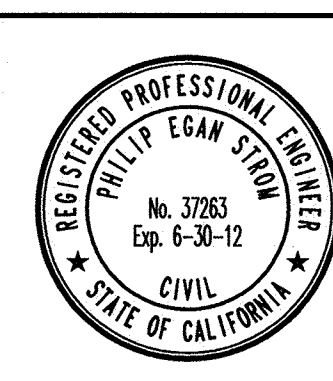
- 119. SMARTBOB REMOTE START UNIT.
- 120. SWITCH FOR "NORMAL OPERATION" AND "SALT FILLING".
- 121. WEATHER RESISTANT GFI RECEPTACLE.
- 122. FUSED DISCONNECT SWITCH IN NEMA 3R WEATHERPROOF ENCLOSURE.
- 123. DILUTION AIR BLOWER LOCAL CONTROL PANEL (1 TOTAL). SEE E-DRAWINGS FOR DETAILS. BY CSS.
- 124. 6" FLANGED TOP NOZZLE WITH CPVC REDUCING FLANGE FOR CONNECTION TO 2"CLS PIPING.
- 125. 2" QUICK DISCONNECT CAMLOCK COUPLER (COUPLER x FEMALE NPT THREAD) AND DUST PLUG ADAPTER. COUPLER AND DUST PLUG SHALL BE CONSTRUCTED OF POLYPROPYLENE WITH VITON GASKETS. COUPLER AND DUST PLUG SHALL BE AS MANUFACTURED BY PT COUPLING CO., OR EQUAL.
- 126. 2" CPVC SCH. 80 COUPLING (SOCKET x FEMALE THREADED) AND 2" CPVC SCH. 80 THREADED PIPE NIPPLE, 6" LONG.
- 127. WALL MOUNTED OUTDOOR WARNING SIGN PER SPECIFICATIONS LABELED, "WARNING: SOFTENED WATER FOR SODIUM HYPOCHLORITE DILUTION. DO NOT USE FOR WASH DOWN". PROVIDE STAINLESS STEEL BUSHINGS BEHIND SIGN FOR MOUNTING TO SPLIT FACE MASONRY BLOCK. MOUNT SIGN DIRECTLY ABOVE SOFTENED WATER HOSE BIB.
- 128. EXPLOSION-PROOF FLOW SWITCH WITH 316 STAINLESS STEEL BODY AND VANE. FLOW SWITCH SHALL BE SUITABLE FOR INSTALLATION IN VERTICAL PIPING WITH UPWARD FLOW AND SHALL ACTUATE AT A MINIMUM AIR FLOW OF 130 SCFM. FLOW SWITCH SHALL BE PROVIDED WITH A 304 STAINLESS STEEL SERVICE SADDLE WITH THREADED OUTLET TO MATCH SWITCH AND SUITABLE FOR MOUNTING ON A 6" SCH. 80 CPVC PIPE. PIPE SADDLE SHALL BE FURNISHED BY FLOW SWITCH MANUFACTURER TO ENSURE COMPATIBILITY WITH SWITCH. FLOW SWITCH SHALL BE SERIES V4 AS MANUFACTURED BY W.E. ANDERSON, OR EQUAL BY CSS.
- 129. 3" HIGH CONCRETE EQUIPMENT PAD. THE MAXIMUM EQUIPMENT PAD DIMENSIONS SHALL BE 5'-8" x 2'-11" W TO PROVIDE ADEQUATE SPACE FOR FUTURE CHLORINE GENERATOR, AND ADEQUATE CLEARANCES FOR MAINTENANCE AND OPERATION, CELL CLEANING, REPAIR AND REPLACEMENT, AND ADJACENT EQUIPMENT.
- 130. 316 STAINLESS STEEL EPOXY ANCHOR BOLTS. CONTRACTOR SHALL SUBMIT ANCHORAGE CALCULATIONS IN ACCORDANCE WITH SPECIFICATION REQUIREMENTS. ANCHOR EMBEDMENT SHALL BE INTO FLOOR SLAB AND SHALL NOT INCLUDE THE 3" HIGH HOUSEKEEPING PAD.
- 131. FUTURE STANDBY CHLORINE GENERATOR.
- 132. COUNTERTOPS SHALL BE 31" DEEP x 1" THICK, KEMRESIN BY KEWAUNEE SCIENTIFIC CORPORATION OR APPROVED EQUAL. COUNTERTOPS SHALL BE DURABLE, NON-POROUS, AND CHEMICAL, HEAT, IMPACT, AND STAIN RESISTANT. COUNTERTOP SHALL BE A BLACK, NON-GLARE SURFACE MADE OF MOLDED EPOXY RESIN, AND THE FRONT EDGE SHALL HAVE A BEVELED TOP AND DRIP GROOVE ON THE BOTTOM. A 4" TALL x 3/4" DEEP BACKSLASH CURB OF THE SAME MATERIAL SHALL BE PROVIDED ALONG THE BACK EDGE OF THE COUNTERTOP, ALONG THE WALL.

**RECORD DRAWING**

BY: *B. C. Williams* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	CHLORINE GENERATOR PROJECT	02/13/14	BCV
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA 92501 • 951-684-6900

APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No. 17 AND No. 18  
IRON AND MANGANESE REMOVAL FACILITY

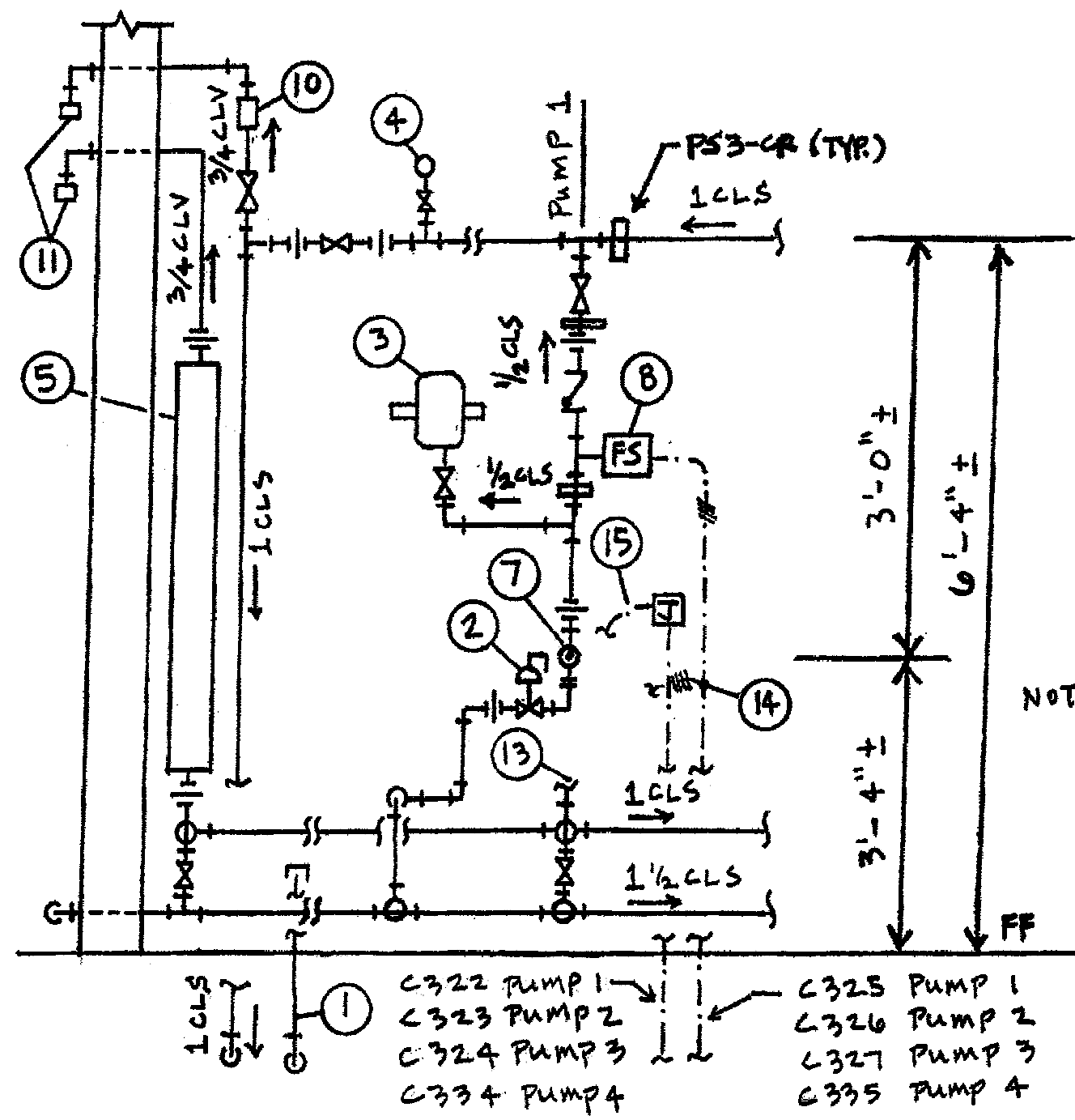
**EQUIPMENT BUILDING SECTIONS**

DRAWING  
**2M-4**  
31 OF 69 SHEETS  
11741  
R.C.S.D. PLAN No.  
587-19-54

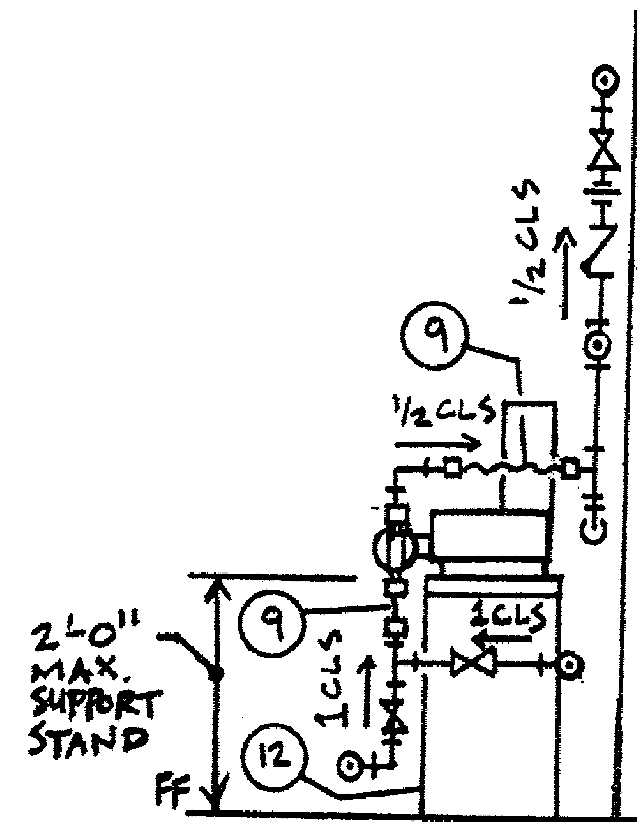


**① MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DETAIL 1:**

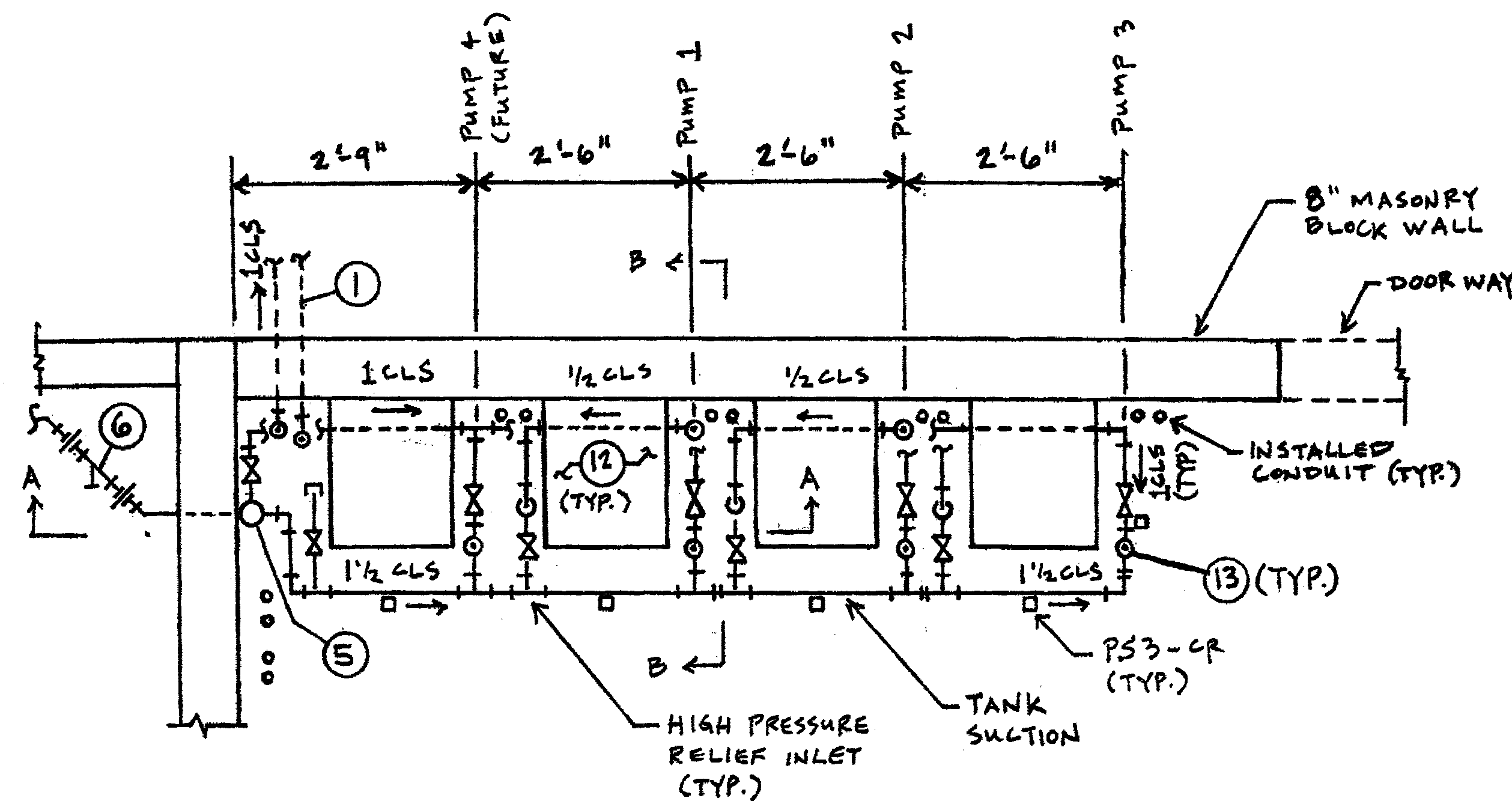
- 2" PVC SCH. 40 CONDUIT ONLY. PROVIDE LONG RADIUS SWEEPS FOR ALL BENDS. PROVIDE PULL ROPE AND CAPS AT EACH END.
- PRESSURE RELIEF VALVE.
- PULSATION DAMPENER.
- DIAPHRAGM SEALED PRESSURE GAUGE.
- CALIBRATION COLUMN.
- STRAINER WITH FINE MESH SCREEN.
- METERING PUMP DISCHARGE.
- FLOW SWITCH.
- TUBING ADAPTER AND TUBING CONNECTION TO PUMP HEAD.
- CPVC AIR RELEASE VALVE.
- CPVC 90° ELBOW (FEMALE THREADED ENDS) WITH MALE THREADED POLYETHYLENE INSECT SCREEN WITH STAINLESS STEEL MESH.
- METERING PUMP SUCTION.
- FREE STANDING FABRICATED FRP SUPPORT STAND FOR CHLORINE SOLUTION METERING PUMPS. SUPPORT STAND SHALL BE FABRICATED FROM FRP CHANNELS, ANGLES, AND PLATES. TOP OF STAND SHALL BE PROVIDED WITH 3/8" THICK SOLID FRP PLATE. SUPPORT ANGLES SHALL BE PROVIDED BENEATH EACH PUMP. ALL FASTENERS SHALL BE CONSTRUCTED OF 316 STAINLESS STEEL. REFER TO SPECIFICATIONS FOR DESIGN AND FABRICATION REQUIREMENTS.
- METERING PUMP SUCTION.
- PROVIDE L.B. FITTING, FLEX TO PUMP HEAD LEAK PROTECTION.
- FLEX TO MOTOR.



SECTION A-A



SECTION B-B



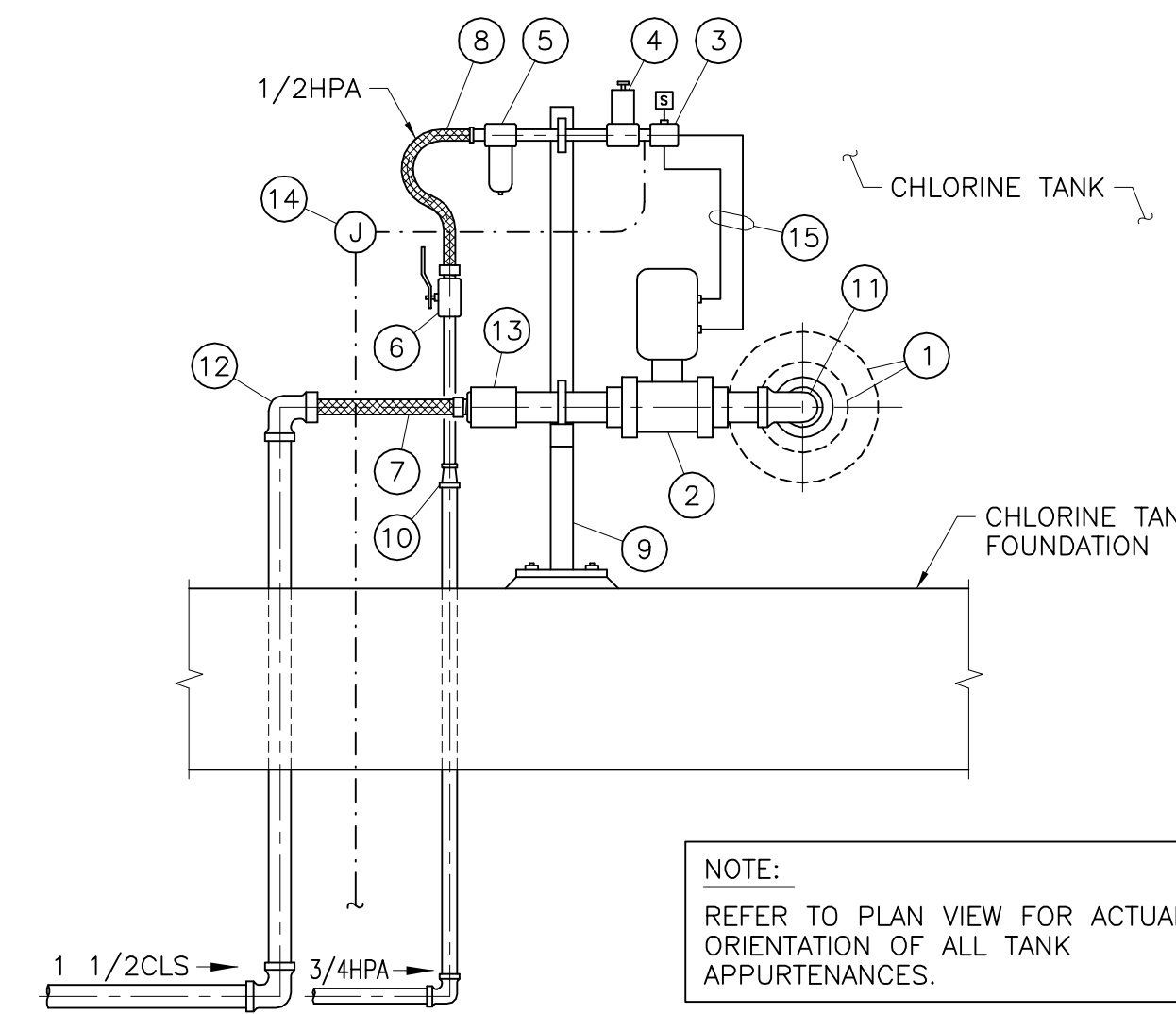
PUMP CONFIGURATION DETAIL

N.T.S.

1  
2M-1

**② MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DETAIL 2:**

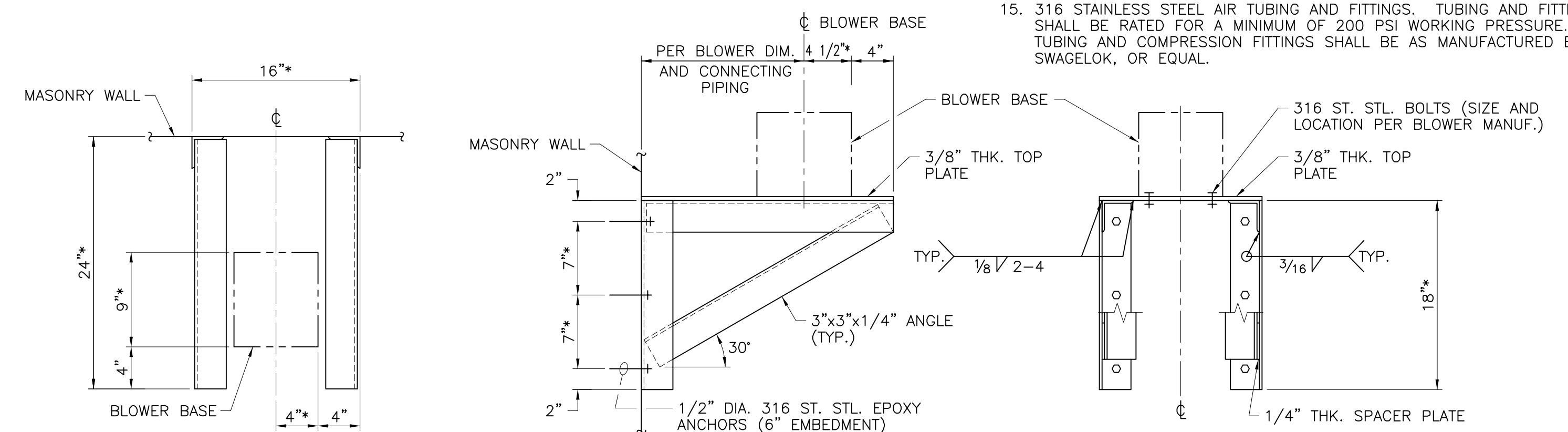
- CHLORINE SOLUTION TANK FLANGED NOZZLE WITH CPVC FLANGE.
- 2" PNEUMATICALLY ACTUATED, FAIL-CLOSED, CPVC TRUE UNION BALL VALVE SHUT-OFF.
- MULTI-PORT SOLENOID VALVE.
- 1/2" PRESSURE REGULATOR WITH INTEGRAL PRESSURE GAUGE.
- 1/2" AIR FILTER WITH DRIP TRAP.
- 1/2" TYPE 316 STAINLESS STEEL BALL VALVE.
- STAINLESS STEEL BRAIDED FLEXIBLE PVC HOSE WITH I.D. TO MATCH CHLORINE PIPING (150 PSI WATER WORKING PRESSURE) COMPLETE WITH STAINLESS STEEL PIPE TO HOSE ADAPTERS (FEMALE THREADED ENDS).
- STAINLESS STEEL BRAIDED METAL OVER CLOSE PITCH, ANNULAR CORRUGATED HOSE FLEXIBLE CONNECTOR WITH STAINLESS STEEL 1/2" MNPT THREADED ENDS (RATED FOR 300 PSI MIN. AIR PRESSURE), AS MANUFACTURED BY FLEXICRAFT, PENFLEX, OR EQUAL.
- PS3 STRUT CHANNEL SUPPORT WITH BASE PLATE, SUPPORT ARMS AND PIPE CLAMPS AS NECESSARY TO SUPPORT HPA AND CLS PIPING.
- 3/4"x1/2" THREADED CONCENTRIC REDUCER.
- 2" CPVC SCHED. 80 PIPE NIPPLE AND 90° ELBOW, SOLVENT WELDED.
- 1 1/2" CPVC SCHED. 80 90° ELBOW, (SOCKET x MALE THREAD).
- 2"x1 1/2" CPVC SCHED. 80 REDUCING MALE ADAPTER, (MALE THREAD x SOCKET).
- JUNCTION BOX, PVC COATED 2 GANG CAST CONDULET DEVICE BOX WITH SOLID COVER. MOUNT TO CONDUIT RISER AT APPROXIMATELY 12" ABOVE FINISHED FLOOR. PROVIDE LIQUID-TIGHT FLEXIBLE CONDUIT TO SOLENOID VALVE.
- 316 STAINLESS STEEL AIR TUBING AND FITTINGS. TUBING AND FITTINGS SHALL BE RATED FOR A MINIMUM OF 200 PSI WORKING PRESSURE. TUBING AND COMPRESSION FITTINGS SHALL BE AS MANUFACTURED BY SWAGelok, OR EQUAL.



CHLORINE SOLUTION TANK AUTOMATIC VALVE DETAIL

N.T.S.

2  
2M-1



TOP VIEW

(TOP PLATE OMITTED FOR CLARITY)

SIDE VIEW

FRONT VIEW

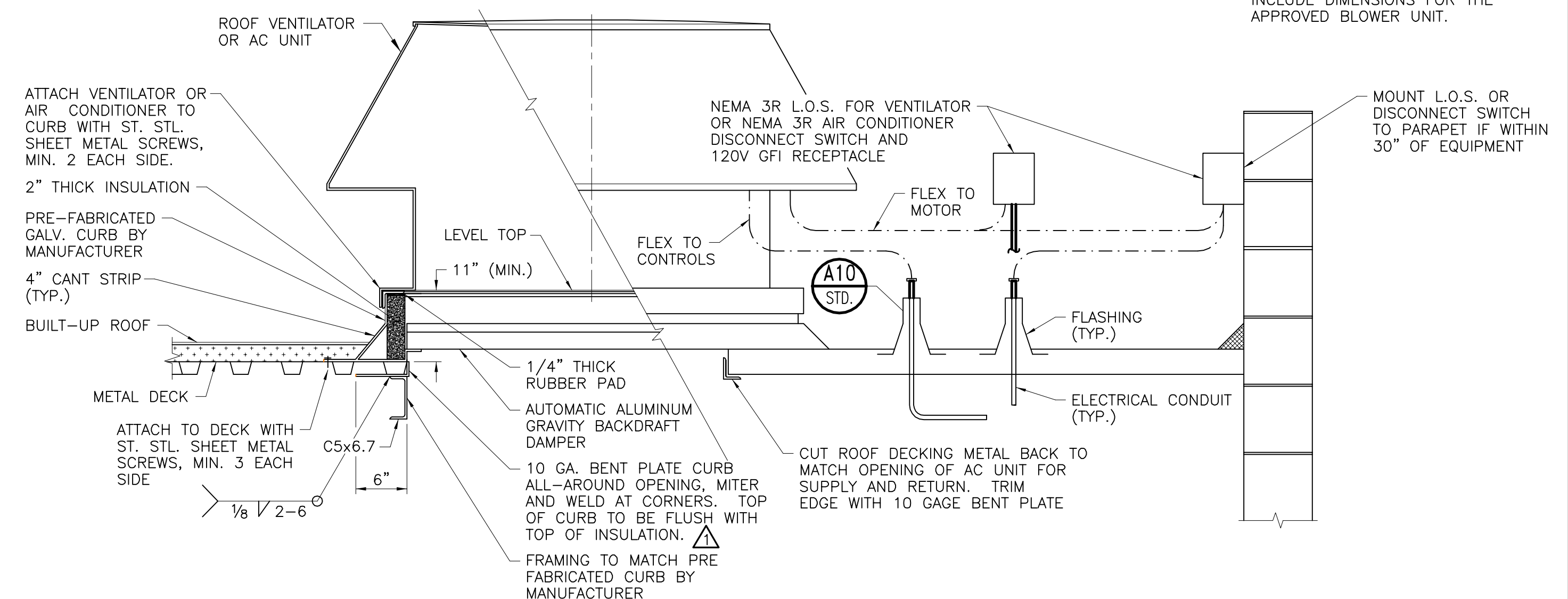
NOTES:

- UNO, ALL MATERIALS SHALL BE A36 STEEL. HDG AFTER FABRICATION.
- SUPPORT BRACKET DIMENSIONS ARE DEPENDENT UPON BLOWER UNIT PROVIDED BY CONTRACTOR. BRACKET SHOP DRAWINGS SHALL INCLUDE DIMENSIONS FOR THE APPROVED BLOWER UNIT.

AIR BLOWER SUPPORT BRACKET DETAIL

N.T.S.

3  
2M-4



ROOF VENTILATOR AND AIR CONDITIONER MOUNTING DETAIL

N.T.S.

4  
2M-2

RECORD DRAWING

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

RUBIDOUX COMMUNITY SERVICES DISTRICT

WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

EQUIPMENT BUILDING DETAILS

DRAWING

**2M-5**

32 OF 69 SHEETS

11742

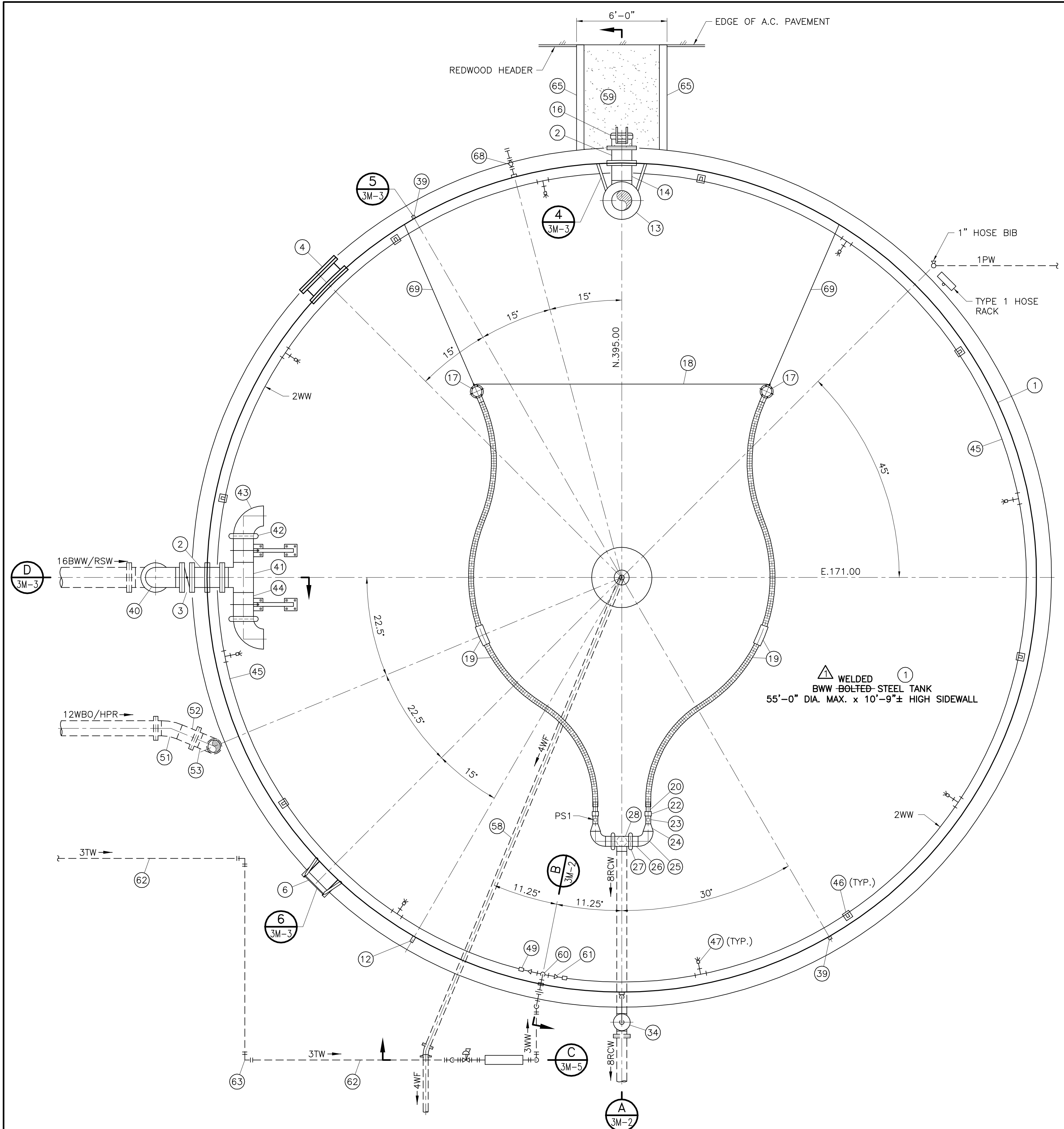
R.C.S.D. PLAN No.

587-19.54

DWG. NO.: RC-80-18.54-705 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:42AM PLOT SCALE: 1=1



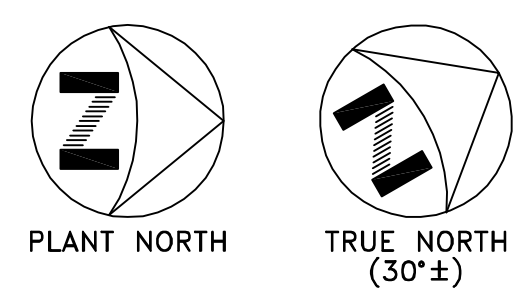
DWG. NO.: 05-21-13-54-01 FILE NO.: 587-19-54\_UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:44AM PLOT SCALE: 1"=1'



**Ⓜ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 3M-1 AND 3M-2:**

1. WELDED STEEL TANK PER SPECIFICATIONS SECTION 09910 (COATING FOR WELDED STEEL RESERVOIR) AND 13250.
2. FLANGED TANK NOZZLE BOLTED TO TANK WALL WITH PROJECTION AND SIZE AS SHOWN (STD. WT. WSP WITH ANSI B16.5 LB. F.F. FLANGE). NOZZLE SHALL BE EPOXY LINED AND COATED TO MATCH TANK INTERIOR AND EXTERIOR COATING, RESPECTIVELY.
3. 16" FLANGED BUTTERFLY VALVE WITH WORM GEAR OPERATOR AND HANDWHEEL.
4. 30" DIAMETER TANK SHELL MANWAY PER SPECIFICATIONS.
5. TANK ROOF HATCH PER SPECIFICATIONS.
6. 16" WIDE x 10'± TALL EXTERIOR LADDER WITH SECURITY CAGE PER DETAIL 6, DRAWING 3M-3.
7. 6" DIAMETER x 6" HIGH FLANGED ROOF ACCESS PORT WITH BLIND FLANGE.
8. ULTRASONIC LEVEL TRANSDUCER PER SPECIFICATIONS.
9. 12" OBSERVATION PORT WITH HINGE AND LOCKING HASP PER SPECIFICATIONS.
10. 3'-6" HIGH HDG 1 1/2" SCH. 40 STEEL HANDRAIL. PROVIDE HANDRAIL PER SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS.
11. ROOF CENTER SUPPORT COLUMNS PER TANK MANUFACTURER. COLUMNS SHALL BE 316 STAINLESS STEEL SUPPORTED INDEPENDENTLY FROM THE TANK FLOOR SLAB, BENEATH THE FLOOR SLAB ON SPREAD FOOTINGS.
12. TANK GROUNDING LUG PER SPECIFICATIONS.
13. 30"x16" STEEL WEIR CONE, 0.25" WALL THICKNESS, 24" LONG.
14. 16" STD. WT. WSP, LENGTH AS REQUIRED.
15. 16" SHORT RADIUS 90° ELBOW, STD. WT. STL. (FLG x PE).
16. 16" FLANGED END FLAP VALVE WITH CAST IRON BODY, BRONZE HINGE PIN, BRONZE FLAP RING AND BRONZE SEAT RING, AS MANUFACTURED BY CLOW, OR EQUAL.
17. 6" FLOATING SUCTION STRAINER, 775 GPM (MIN.) CAPACITY, AS MANUFACTURED BY MEGATOR LIMITED, OR EQUAL (2 REQUIRED).
18. FLOATING SUCTION STRAINER SEPARATOR ROD, 1/2" SCH. 10, TYPE 316 STAINLESS STEEL PIPE (15'± LONG) WITH END CAPS. PROVIDE STAINLESS STEEL SWIVEL SNAPS AT EACH END FOR CONNECTION TO SUCTION STRAINER.
19. 6" DIA. x 32' LONG NYLON REINFORCED PVC SUCTION HOSE AND HOSE FLOAT ASSEMBLY AS MANUFACTURED BY TIGERFLEX (2 REQUIRED). COORDINATE HOSE SELECTION WITH FLOATING SUCTION STRAINER MANUFACTURER. PROVIDE STAINLESS STEEL HEAVY DUTY HOSE CLAMPS AND FASTENERS AT EACH END OF HOSE.
20. 6" HOSE NIPPLE (BARBED x MALE THREADED), TYPE 316 STAINLESS STEEL. CONTRACTOR TO COORDINATE FITTING SIZE AND TYPE AS REQUIRED FOR CONNECTION TO SUCTION HOSE. PROVIDE STAINLESS STEEL HEAVY DUTY HOSE CLAMPS AND FASTENERS FOR HOSE/FITTING CONNECTIONS.
21. TYPE 316 STAINLESS STEEL D-RING SAFETY HOOK (5,000 LB. MIN. ULTIMATE LOAD RATING) BOLTED THROUGH ROOF RAFTER WITH 316 STAINLESS STEEL BOLTS.
22. 6" THREADED COUPLING, TYPE 316 STAINLESS STEEL.
23. 6" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL (PE x THREADED), 8" LONG.
24. 8"x6" CONCENTRIC REDUCER, STD. WT. TYPE 316 STAINLESS STEEL.
25. 8" SHORT RADIUS 90° ELBOW, STD. WT. TYPE 316 STAINLESS STEEL (PE x PE).
26. 8" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL (GROOVED x PE), 6" LONG.
27. VICTAULIC COUPLING, STYLE 489, TYPE 316 STAINLESS STEEL.
28. 8"x8"x8" VICTAULIC TEE SCH. 40S, TYPE 316 STAINLESS STEEL WITH STYLE 441 VIC-FLANGE ADAPTER, TYPE 316 STAINLESS STEEL ON BRANCH.
29. 8" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL (FLG x PE) WITH 1/2" THICK FULLY WELDED WEEP RING CENTERED IN TANK SLAB.
30. 8" SHORT RADIUS 90° ELBOW, STD. WT. TYPE 316 STAINLESS STEEL (PE x PE).
31. 8" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL, LENGTH AS REQUIRED.
32. 8"x8"x8" TEE, STD. WT. TYPE 316 STAINLESS STEEL (FLG x PE x PE).
33. 8" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL (FLG x PE), LENGTH AS REQUIRED.
34. 8" ANSI B16.5 150 LB. BLIND FLANGE, TYPE 316 STAINLESS STEEL, DRILLED AND TAPPED FOR 2" OUTLET.
35. 2" SHORT RADIUS 45° ELBOW, STD. WT. TYPE 316 STAINLESS STEEL.
36. 2" SCH. 40, TYPE 316 STAINLESS STEEL PIPE WITH 180° GOOSE NECK AND TYPE 316 STAINLESS STEEL 40 MESH THREADED INSECT SCREEN. ATTACH VENT TO SIDE OF TANK WITH STAINLESS STEEL SUPPORTS PER TANK MANUFACTURER'S REQUIREMENTS (MIN. 2 SUPPORTS).
37. BACKFILL PIPING BELOW TANK (4WF, 8RCW) WITH TWO-SACK CEMENT/SAND SLURRY, EXTEND CEMENT/SAND SLURRY 1'-0" (MIN.) BEYOND RINGWALL FOUNDATION.
38. 4" STD. WT. STL. PIPE WITH 10" SQ. x 1/2" THICK BASE PLATE. ATTACH BASE PLATE TO CONCRETE WITH 4- 1/2" DIA. STAINLESS STEEL EPOXY ANCHORS (6" MIN. EMBEDMENT) AND PROVIDE 1" THICK NON-SHRINK GROUT BENEATH PLATE.
39. WATER SAMPLING STATION (4 TOTAL).
40. 16" SHORT RADIUS 90° ELBOW, STD. WT. STL. (FLG x FLG).
41. 16"x16"x16" STD. WT. STL. TEE (PE x PE x FLG).
42. VICTAULIC COUPLING, STYLE 77.
43. 16" SHORT RADIUS 90° VICTAULIC ELBOW, IPS (GROOVED x GROOVED).
44. 16" STD. WT. WSP (PE x GROOVED), 21" LONG.
45. TANK FLOOR WASH DOWN SYSTEM CONSISTING OF 2" CPVC SCH. 80 CURVED (FIELD BENT) PIPING AROUND TANK WITH SPRAY NOZZLES AT 45" SPACING (8 TOTAL). PROVIDE 2"x2"x3/4" CPVC TEE AND 3/4" CPVC NIPPLE FOR 3/4" SPRAY NOZZLE CONNECTION. DIRECT TO SPRAY FLOOR INTO CENTER SUMP. PROVIDE PS3 SUPPORTS ADJACENT TO EACH SPRAY NOZZLE AND 6" O.C. (MAX.) SPACING BETWEEN NOZZLES.
46. PS3 TYPE PIPE SUPPORT WITH VERTICAL STRUT AND BASE PLATE WITH 4- 3/8" STAINLESS STEEL EPOXY ANCHOR BOLTS.
47. 3/4" MODEL 3/4K-316SS-90 SPRAY NOZZLE WITH WIDE ANGLE FLAT SPRAY PATTERN, AS MANUFACTURED BY SPRAY SYSTEMS COMPANY, OR EQUAL.
48. 3" BALL VALVE TYPE 316 STAINLESS STEEL WITH THREADED ENDS.
49. 2" THREADED COUPLING, ANSI 16.5 CLASS 150, TYPE 316 STAINLESS STEEL. TRANSITION FROM 316 STAINLESS STEEL TO CPVC.
50. THREADED TANK NOZZLE BOLTED TO TANK WALL WITH SIZE AS SHOWN. NOZZLE SHALL BE EPOXY LINED AND COATED TO MATCH TANK INTERIOR AND EXTERIOR COATINGS, RESPECTIVELY.
51. 12" 22.5°± ELBOW, STD. WT. STEEL (FLG x PE). FIELD VERIFY ANGLE PRIOR TO FABRICATION.
52. 12" SCH. 40 STEEL PIPE SPOOL (PE x FLG), LENGTH AS REQUIRED PLUS 6" CUT-TO-FIT.
53. 12" 90° ELBOW, STD. WT. TYPE 304 STAINLESS STEEL (PE x FLG).
54. 10" 90° ELBOW, STD. WT. TYPE 304 STAINLESS STEEL (FLG x PE).
55. 10" SCH. 40 TYPE 304 STAINLESS STEEL PIPE SPOOL (PE x FLG), LENGTH AS REQUIRED.
56. 4" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL WITH 1/2" THICK FULLY WELDED WEEP RING AS SHOWN (FLG x PE), LENGTH AS REQUIRED.
57. 4" LONG RADIUS 90° ELBOW, STD. WT. TYPE 316 STAINLESS STEEL (PE x PE).
58. 4" SCH. 40, TYPE 316 STAINLESS STEEL PIPE SPOOL (PE x FLG), LENGTH AS REQUIRED.
59. 6" THICK CONCRETE SLAB PER STANDARD DETAIL S8.
60. 3"x3"x3" THREADED TEE, ANSI 16.5 CLASS 150, TYPE 316 STAINLESS STEEL.
61. 3"x2" THREADED REDUCER, ANSI 16.5 CLASS 150, TYPE 316 STAINLESS STEEL.
62. 3" FLANGED SPOOL, DIP, LENGTH AS REQUIRED.
63. 3" 90° ELBOW, DI (FLG x FLG).
64. 3" SCH. 40, TYPE 316 STAINLESS STEEL SPOOL (FLG x THREADED), LENGTH AS REQUIRED. PROVIDE ISOLATING FLANGE BOLTS AND GASKET AT CONNECTION WITH DIP.
65. CONCRETE CURB WITH BATTERED FACE (1:12), 6" WIDE AT TOP. PROVIDE 1- #5 LONGITUDINAL BAR AND #4 L-SHAPED DOWELS AT 12" O.C. FROM 6" THICK SLAB. DOWEL HEIGHT TO TAPER WITH TOP OF CURB.
66. 12"x10" CONCENTRIC REDUCER, STD. WT. TYPE 304 STAINLESS STEEL (PE x PE).
67. 10" SCH. 40 TYPE 304 STAINLESS STEEL PIPE SPOOL (PE x FLG), LENGTH AS REQUIRED PLUS 6" CUT-TO-FIT.
68. 3" FLANGED TANK DRAIN NOZZLE WITH 3" FLANGED ECCENTRIC PLUG VALVE WITH WORM GEAR OPERATOR, 6" LONG FLANGED DI PIPE SPOOL, AND BLIND FLANGE. SET AT 6" ABOVE RINGWALL.
69. 1/4" TYPE 316 STAINLESS STEEL WIRE ROPE AND STAINLESS STEEL SWIVEL SNAPS AT EACH END FOR CONNECTION TO STRAINER AND BOTTOM OF ROOF RAFTER AT TANK SIDEWALL. CABLE LENGTH SHALL BE SUFFICIENT LENGTH TO ALLOW STRAINERS TO REST ON TANK FLOOR WHEN EMPTY. PROVIDE 3/8" TYPE 316 STAINLESS STEEL EYEBOLT AT BOTTOM OF ROOF RAFTER.

**BWV TANK PIPING PLAN**  
SCALE: 1/4"=1'-0"



**RECORD DRAWING**  
BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

RECORD DRAWING	05/21/13	BCV
SYMBOL	REVISIONS	DATE BY



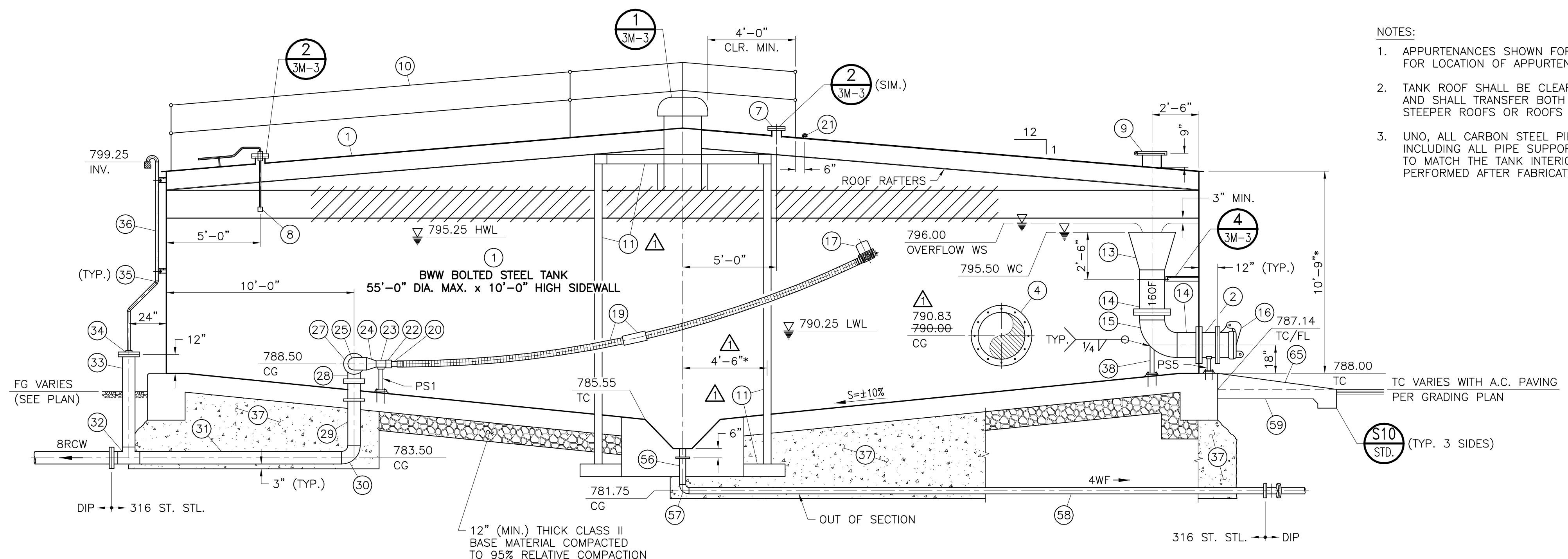
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMM
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**BACKWASH WASTE TANK PLAN**

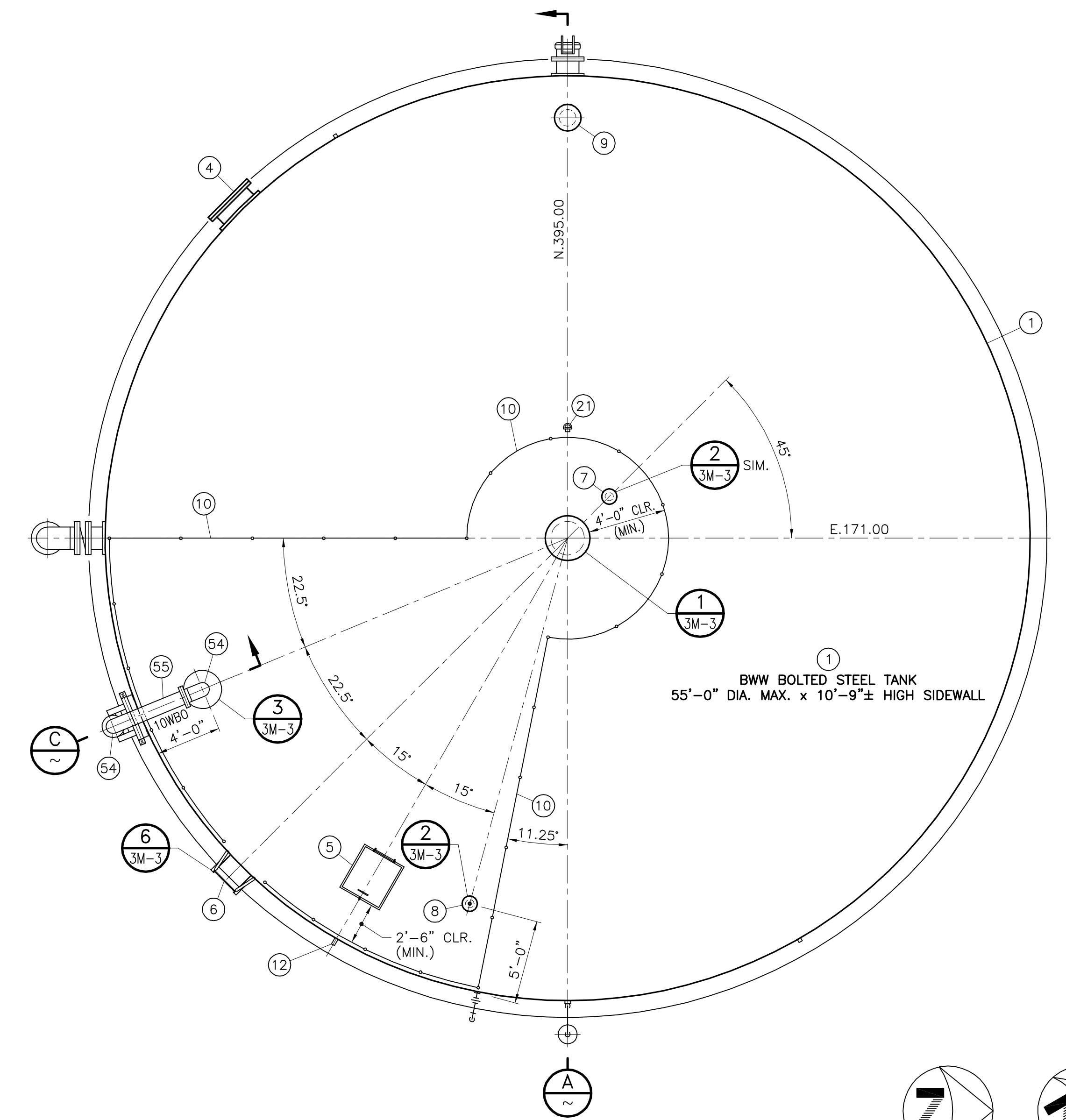
DRAWING  
**3M-1**  
33 OF 69 SHEETS  
11743  
R.C.S.D. PLAN No.

DWG. NO.: 18-54-302 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:45AM PLOT SCALE: 1"=1'

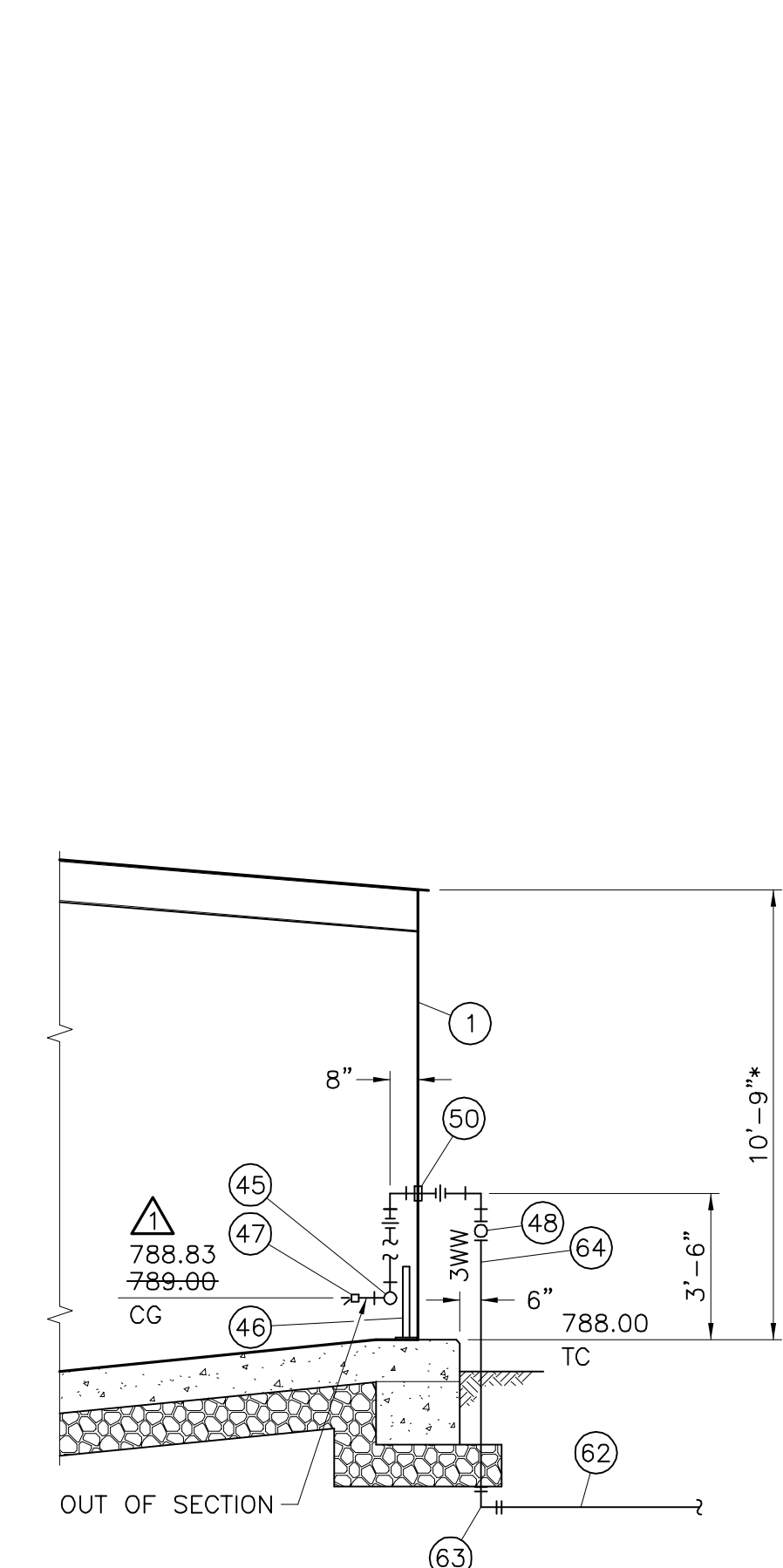


**SECTION A-A**  
SCALE: 1/4"=1'-0"

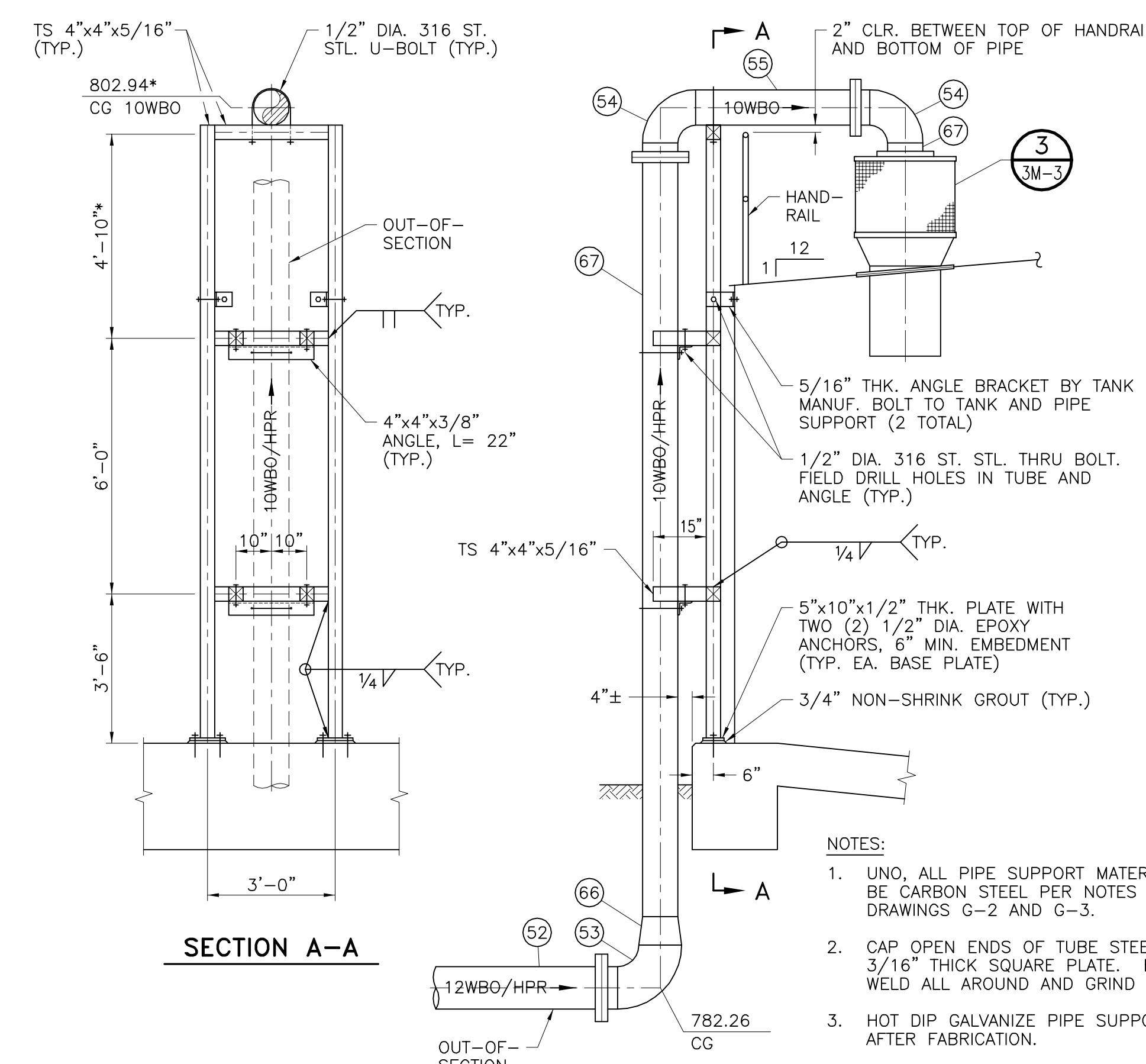
- NOTES:
- APPURTENANCES SHOWN FOR ELEVATION PURPOSES ONLY. SEE PLAN VIEWS FOR LOCATION OF APPURTENANCES ON SHELL AND ROOF.
  - TANK ROOF SHALL BE CLEAR-SPAN (SELF-SUPPORTING) FOR 1:12 ROOF SLOPE AND SHALL TRANSFER BOTH LIVE AND DEAD LOADS TO THE TANK SIDEWALL. STEEPER ROOFS OR ROOFS SUPPORTED BY COLUMN(S) WILL NOT BE PERMITTED.
  - UNO, ALL CARBON STEEL PIPE, FITTINGS, AND APPURTENANCES INSIDE THE TANK, INCLUDING ALL PIPE SUPPORTS, SHALL BE FUSION EPOXY LINED AND COATED TO MATCH THE TANK INTERIOR COATING SYSTEM. LINING AND COATING SHALL BE PERFORMED AFTER FABRICATION IS COMPLETE.



**BWW TANK ROOF PLAN**  
SCALE: 3/16"=1'-0"



**SECTION B-B**  
SCALE: 1/4"=1'-0"



**SECTION C-C**  
SCALE: 3/8"=1'-0"

- NOTES:
- UNO, ALL PIPE SUPPORT MATERIAL SHALL BE CARBON STEEL PER NOTES ON DRAWINGS G-2 AND G-3.
  - CAP OPEN ENDS OF TUBE STEEL WITH 3/16" THICK SQUARE PLATE. BUTT WELD ALL AROUND AND GRIND FLUSH.
  - HOT DIP GALVANIZE PIPE SUPPORT AFTER FABRICATION.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



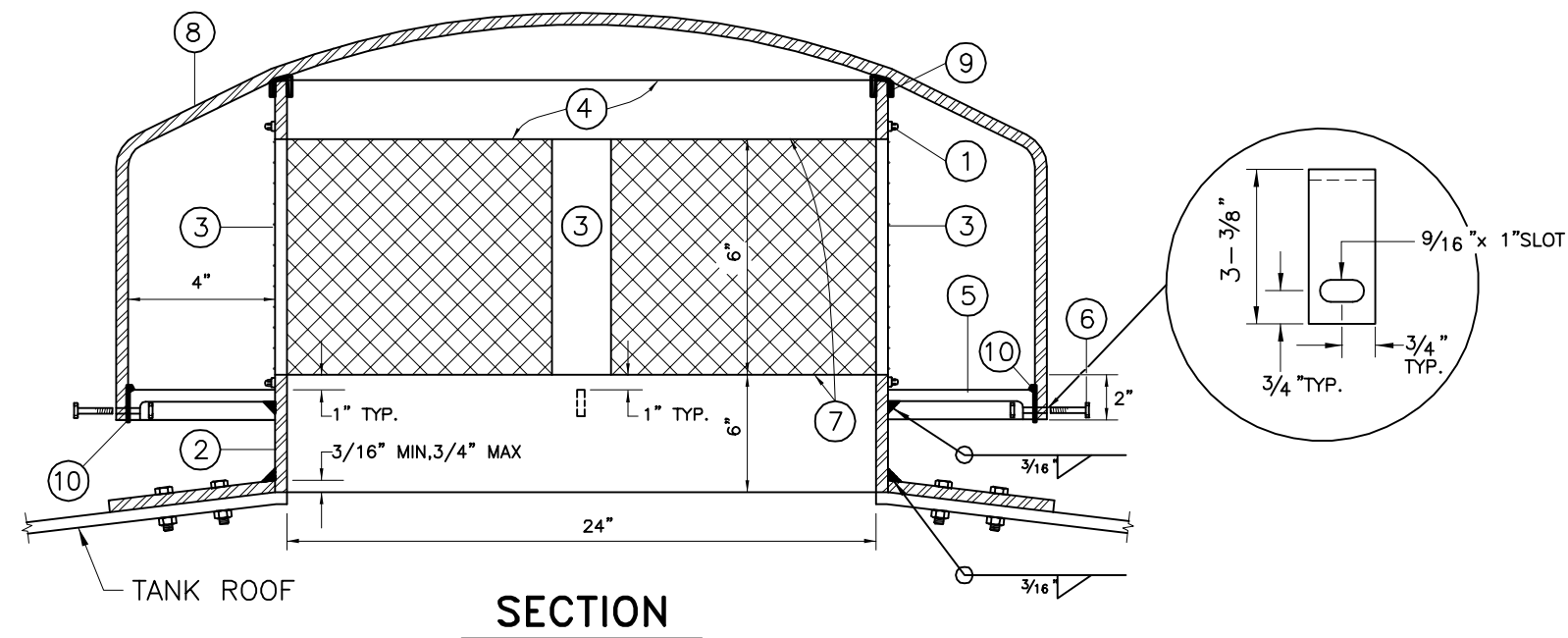
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

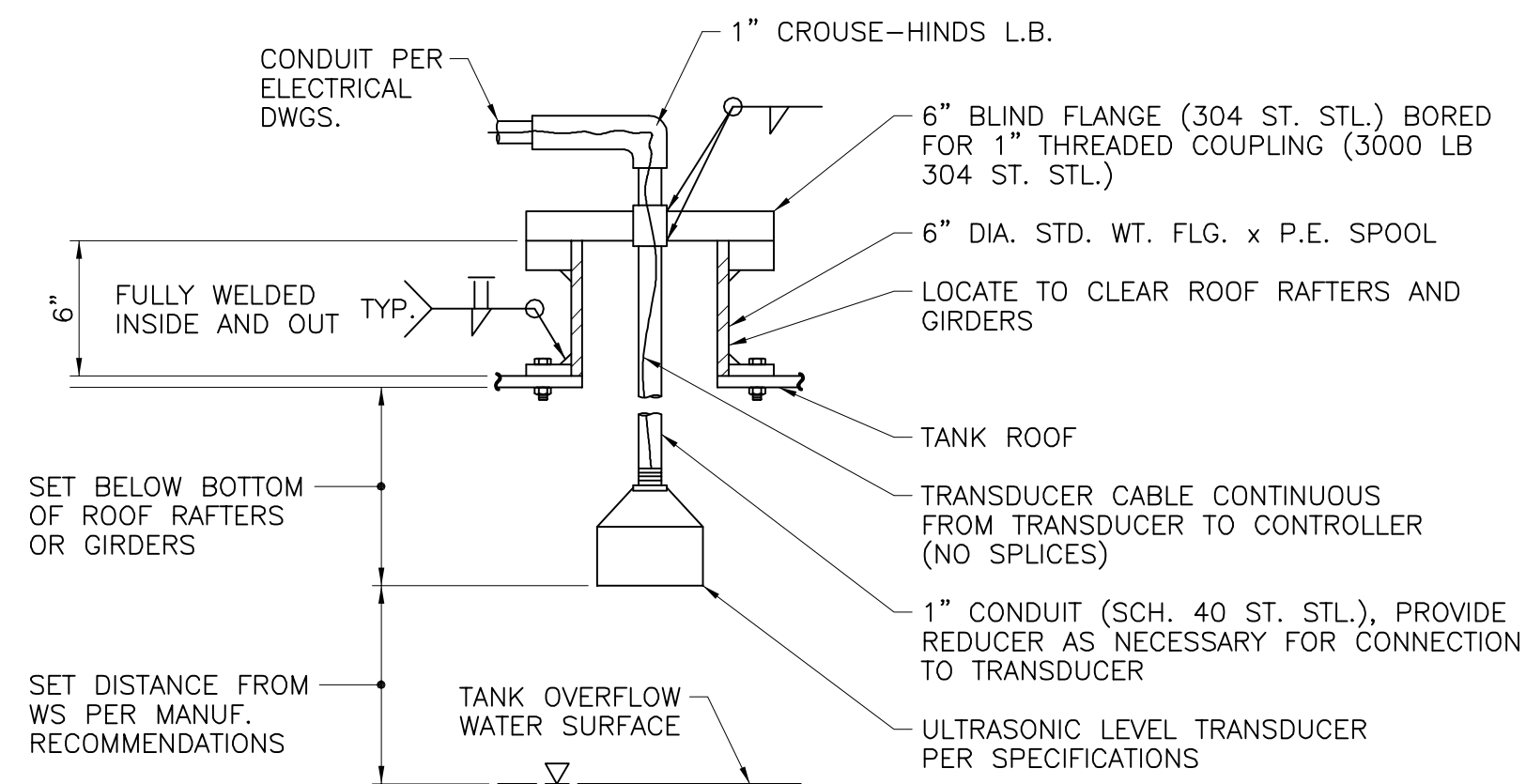
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**BACKWASH WASTE TANK**  
**ROOF PLAN AND SECTIONS**

DRAWING  
**3M-2**  
34 OF 69 SHEETS  
11744  
R.C.S.D. PLAN No.

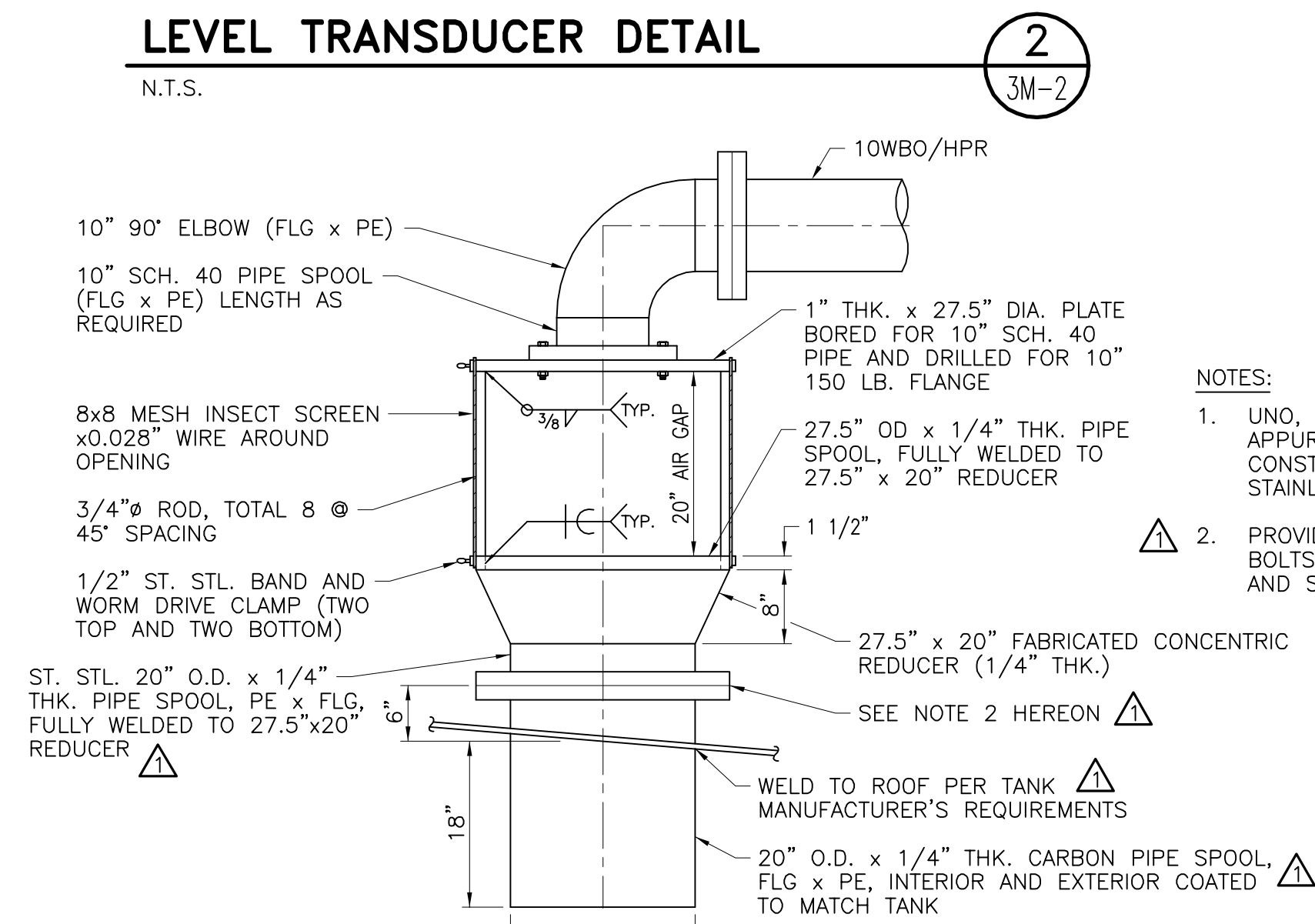
MATERIAL LIST- ROOF VENTS	
ITEM	DESCRIPTION
1	1/2" STAINLESS STEEL BAND AND WORM DRIVE CLAMP
2	1/4" X 12" ROLLED TO O.D. OF OPENING
3	FOUR-1/4" X 3" FB
4	1/4" X 2" FB - ROLLED TO O.D. OF OPENING
5	4 - 1/4" X 1-1/2" FB BEND & PUNCH AS SHOWN SPACED EVENLY AROUND ITEM 2. LENGTH AS REQUIRED FOR OPENING SHOWN.
6	4 - 1/2" X 1-1/2" NC BOLT & NUT
7	8 X 8 MESH INSECT SCREEN X 0.028" WIRE, BRONZE
8	3/16" THICK BUMPED ALUMINUM HEAD
9	PROVIDE NEOPRENE ISOLATION C-RING GASKET-1/4" 50 DURO HARD.
10	SQUARE NEOPRENE ISOLATION GASKET.



**TANK ROOF VENT DETAIL**  
N.T.S. 1 3M-2



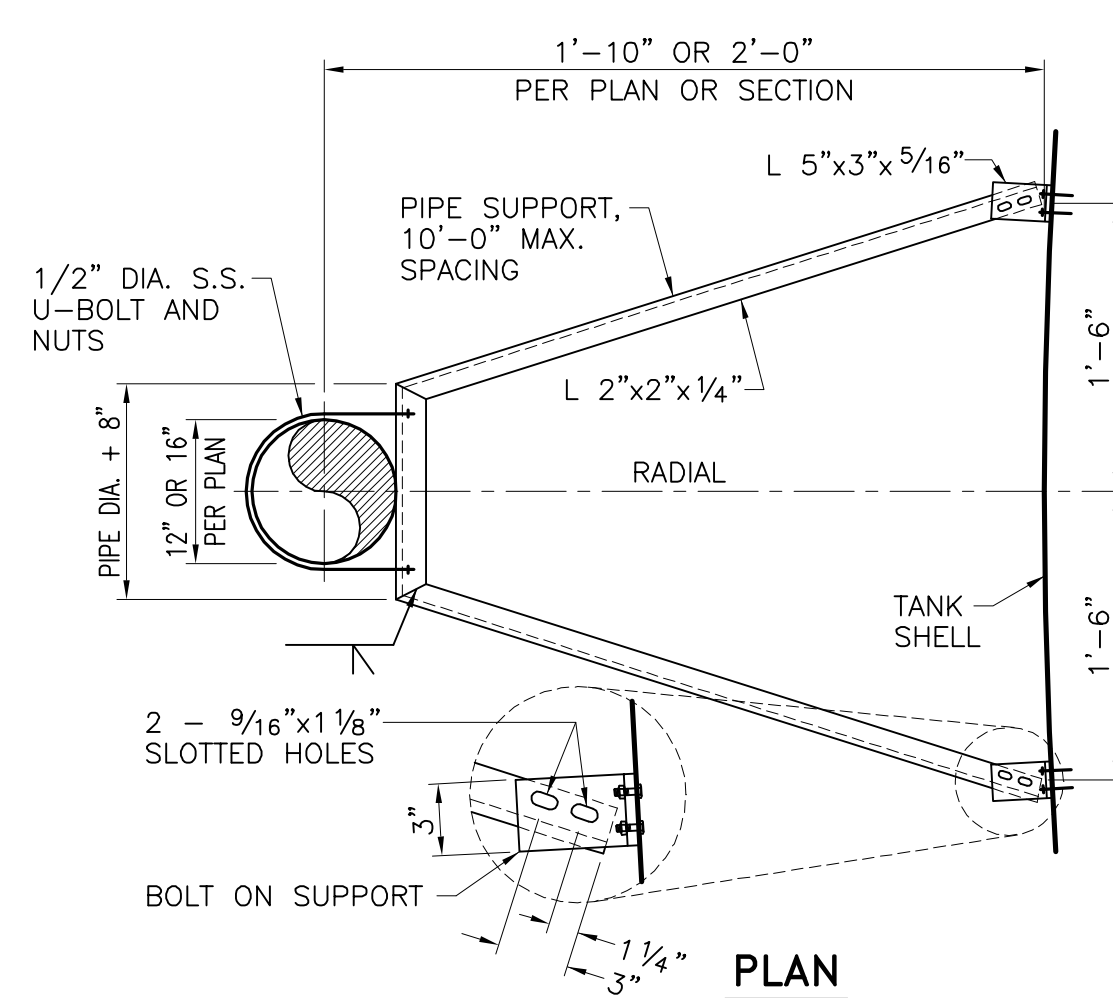
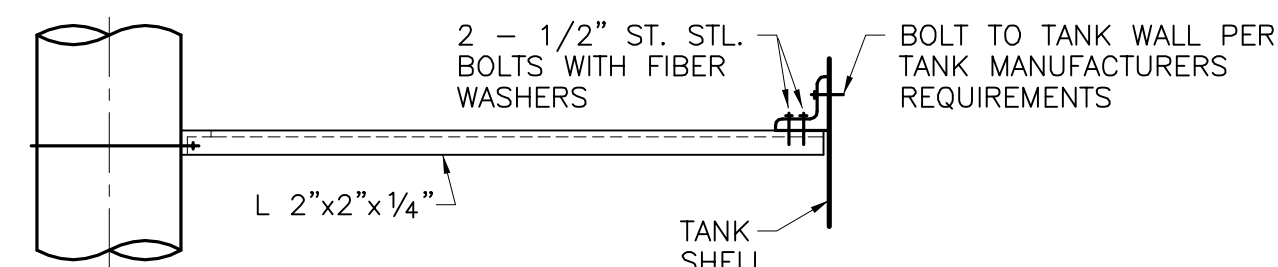
**LEVEL TRANSDUCER DETAIL**  
N.T.S. 2 3M-2



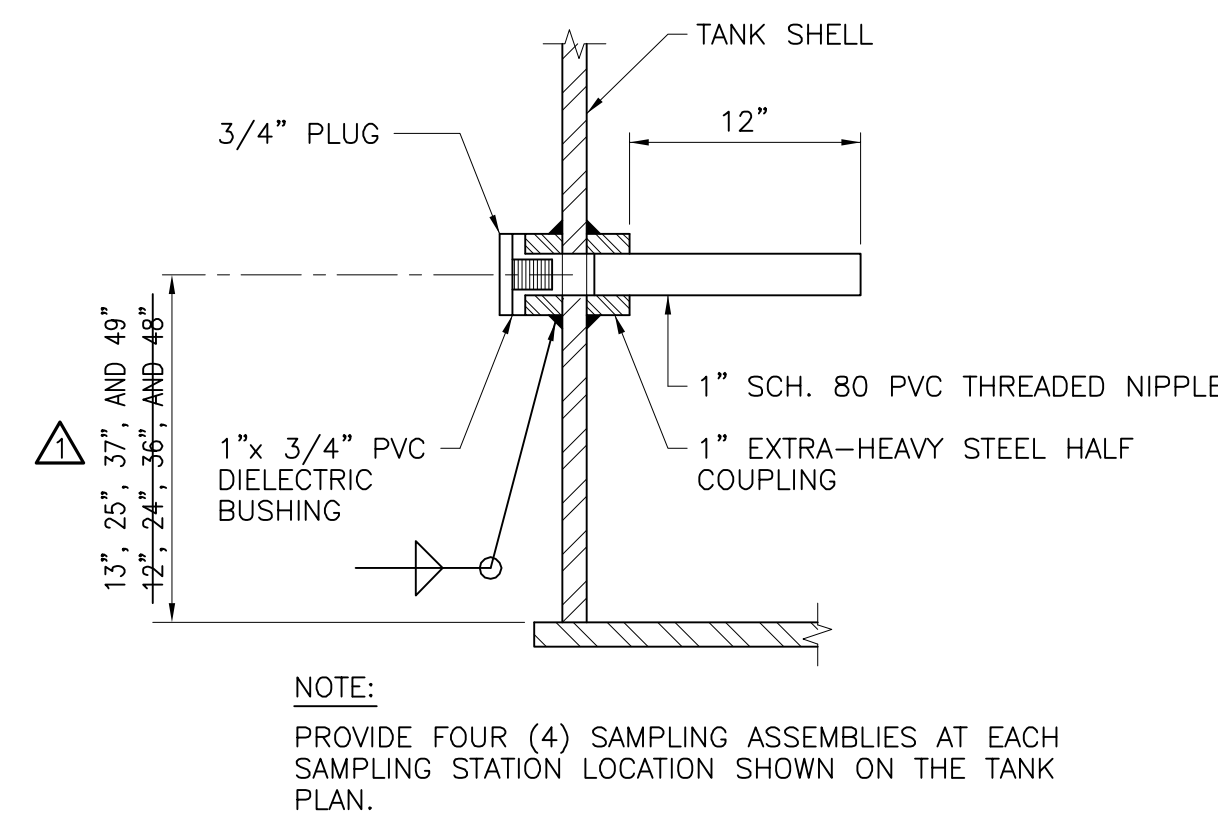
**AIR GAP DETAIL**  
N.T.S. 3 3M-2

MATERIAL LIST- LADDER AND DOOR (1)		
ITEM	DESCRIPTION	MATL
1	3/16" PLATE, FORM AS REQUIRED FOR LADDER DOOR	A36 HDG
2	PADLOCKABLE HASP (1)	A36 HDG
3	18-BSS HEAVY DUTY HINGE (1)	
4	LADDER RUNG LEVEL WITH ROOF	A36 HDG
5	FLAT BAR, 2" x 1/2" x 6" LG. (1)	316 ST. STL.
6	NEOPRENE GASKET, 1/4" x 3" x 4" LG. W/ 1/2" x 1-3/4" SLOT	
7	LADDER RUNG, ROUND BAR, 3/4" DIA. x 16" LG.	A36 HDG
8	FLAT BAR, 2"x3/8"	A36 HDG
9	FLAT BAR, 2-1/2"x3/8"	A36 HDG
10	FLAT BAR, 2"x1/4"	A36 HDG
11	FALL PROTECTION SYSTEM PER TANK SPECIFICATION	

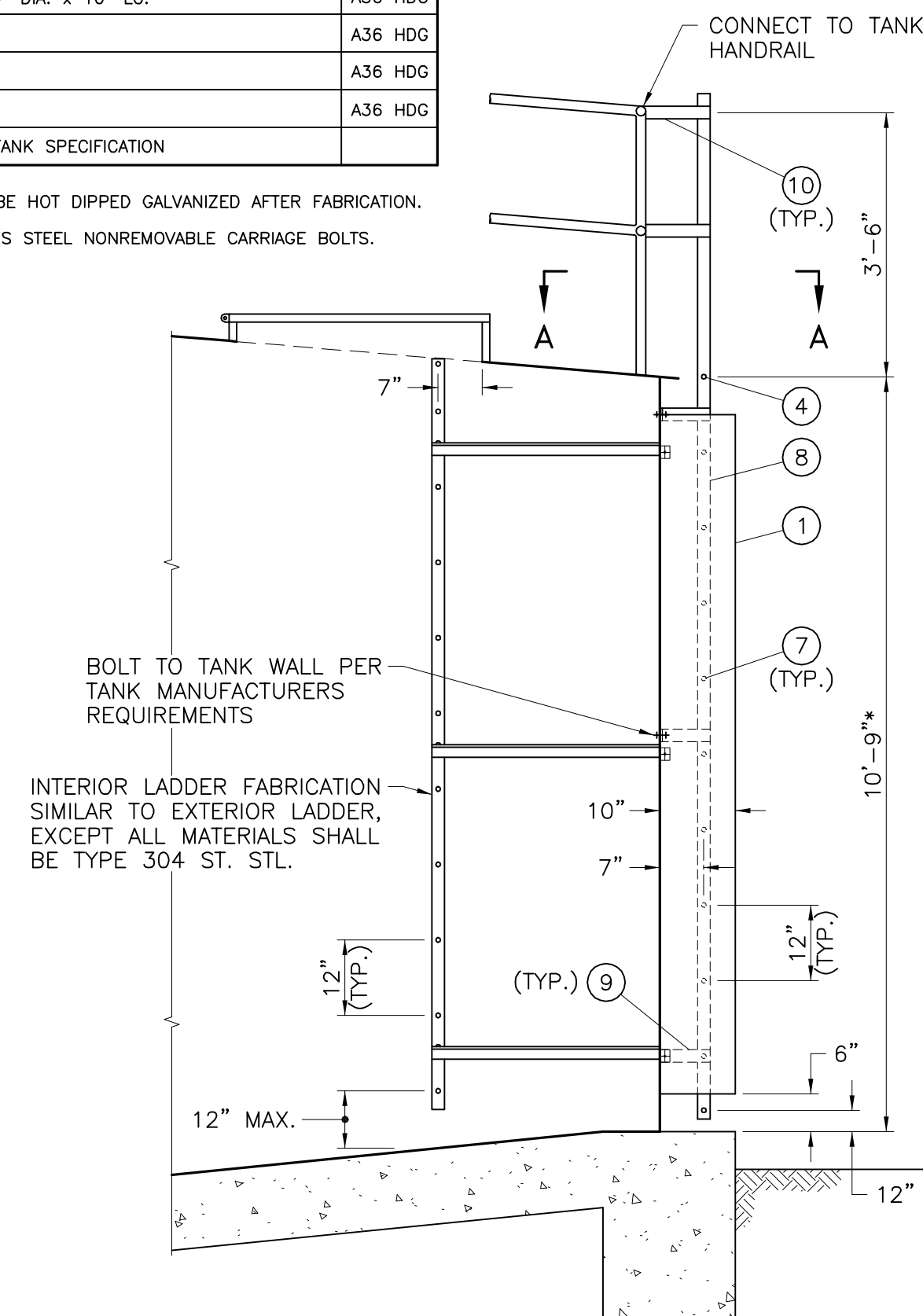
NOTES:  
(1) LADDER AND DOOR ASSEMBLIES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.  
(2) BOLT TO TANK WITH TYPE 316 STAINLESS STEEL NONREMOVABLE CARRIAGE BOLTS.



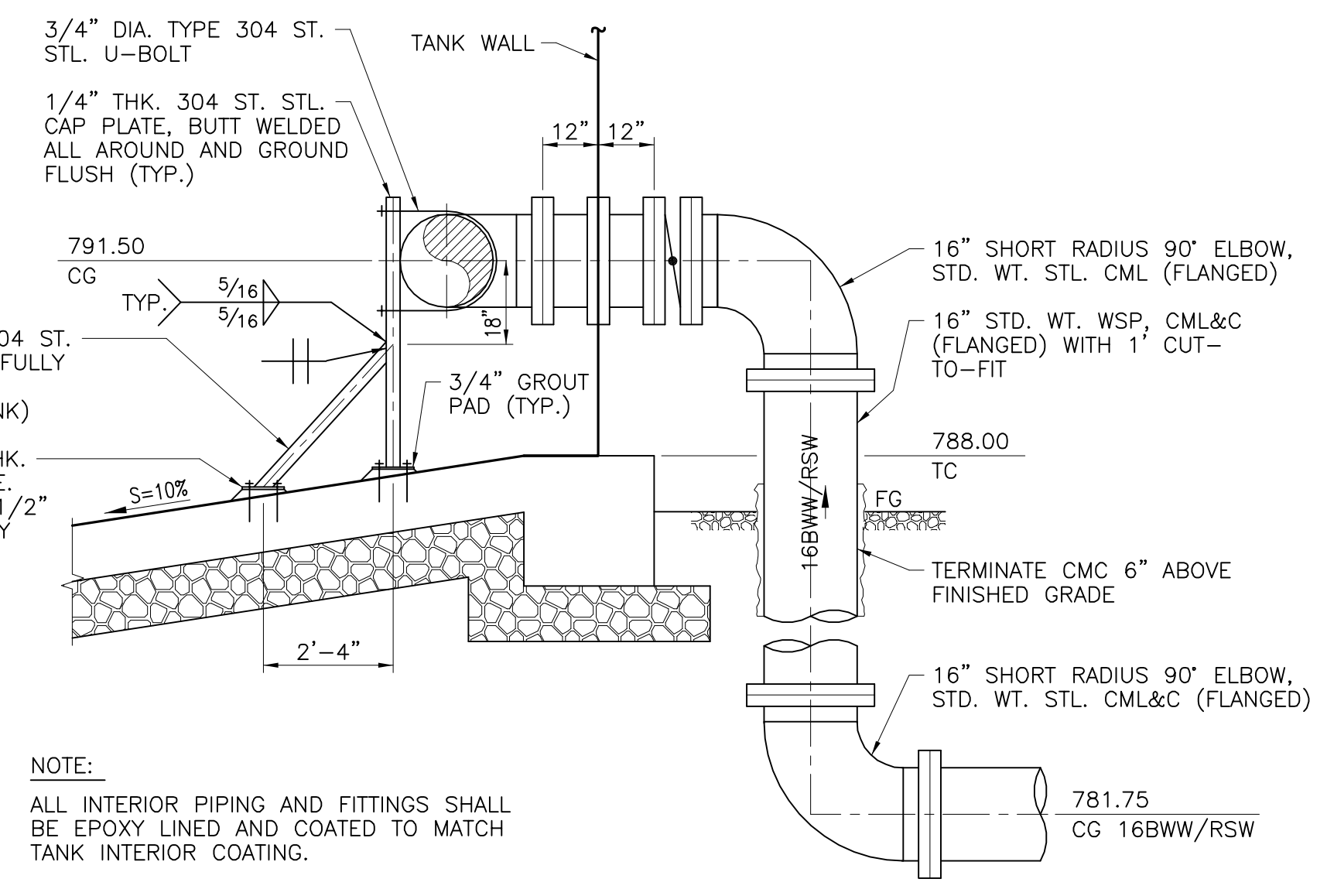
**TANK PIPE SUPPORT DETAIL**  
N.T.S. 4 3M-1 3M-2



**WATER SAMPLING STATION DETAIL**  
N.T.S. 5 3M-1



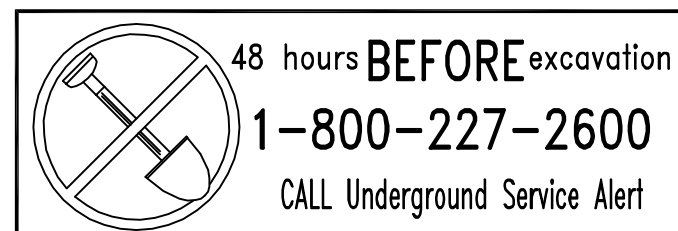
**INTERIOR/EXTERIOR LADDER DETAIL**  
N.T.S. 6 3M-1 3M-2



**SECTION D**  
N.T.S. D 3M-1

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

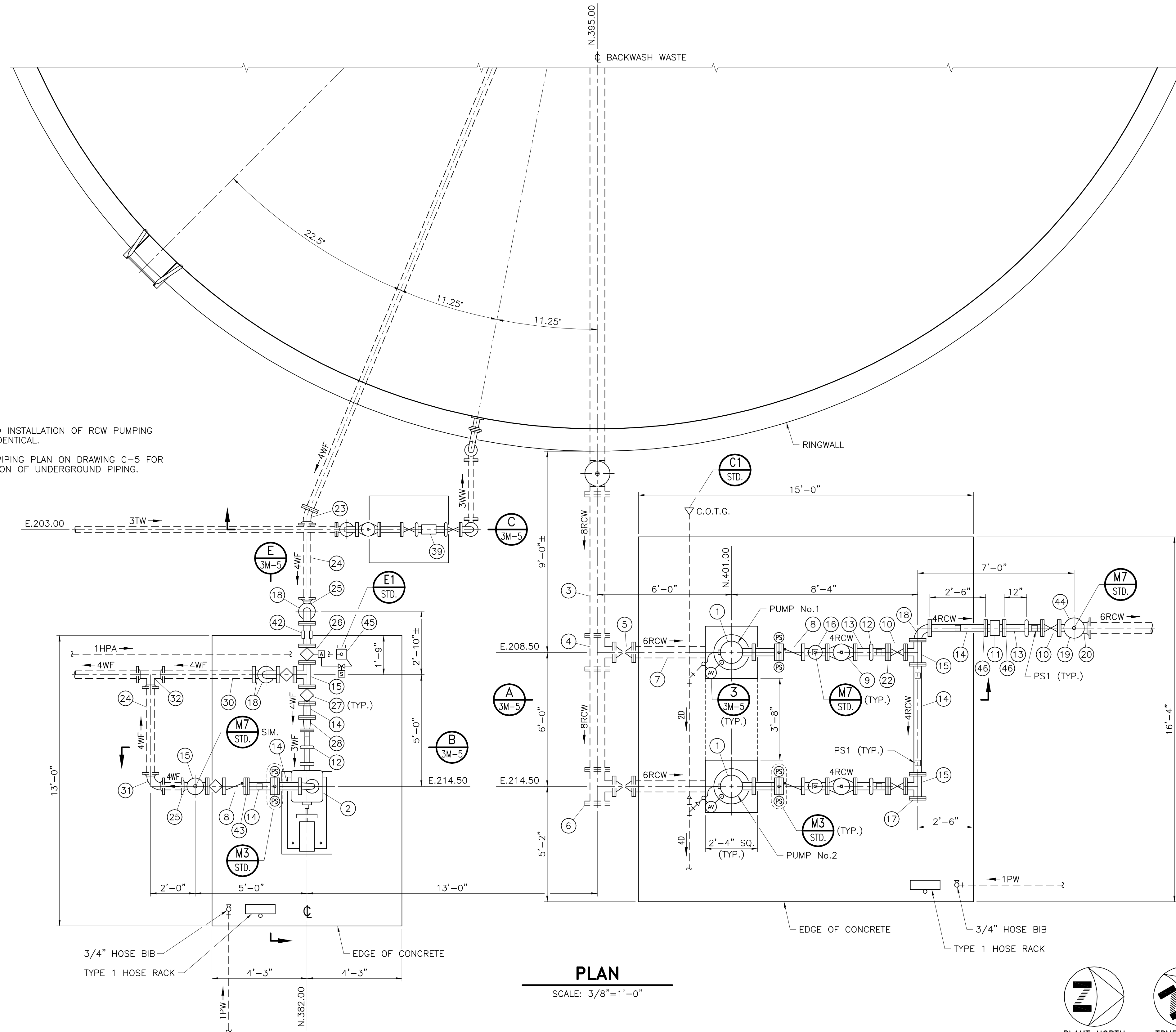
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**BACKWASH WASTE TANK  
SECTIONS AND DETAILS**

DRAWING  
**3M-3**  
35 OF 69 SHEETS  
11745  
R.C.S.D. PLAN NO.



DWG. NO.: REC-80-18-54-001 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:47AM PLOT SCALE: 1=1



**PLAN**  
SCALE: 3/8"=1'-0"

- NOTES:**
1. PIPING AND INSTALLATION OF RCW PUMPING UNITS IS IDENTICAL.
  2. SEE SITE PIPING PLAN ON DRAWING C-5 FOR CONTINUATION OF UNDERGROUND PIPING.

- ⑤ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS 3M-4 AND 3M-5:**
1. RECYCLED WATER (RCW) PUMP, VERTICAL TURBINE PUMPING UNIT WITH FABRICATED STEEL DISCHARGE HEAD (2 TOTAL).
  2. WASTE FILTRATE (WF) PUMP, SELF PRIMING PUMPING UNIT (2 TOTAL), BELT DRIVEN WITH MOTOR STAND (PIGGY BACK CONFIGURATION).
  3. 8" DI PIPE SPOOL (FLG x FLG), LENGTH AS REQUIRED.
  4. 8"x8"x6" TEE, DI (FLG x FLG x FLG).
  5. 6" FLANGED RESILIENT SEATED GATE VALVE WITH VALVE CAN AND RISER PER RCSD STD. DWG. W1020. VALVE CAN SHALL BE MARKED "WATER".
  6. 8" BLIND FLANGE, DI.
  7. 6" STD. WT. STL. CMC PUMP CAN SIDE INLET. SIDE INLET SHALL BE FABRICATED WITH 6" CUT-TO-FIT AND PROVIDED WITH LOOSE FLANGE FOR FIELD WELDING. SIDE INLET SHALL BE EPOXY LINED WITH PUMP CAN PER SPECIFICATION SECTION 09915. COATING DAMAGED BY WELDING SHALL BE REPAIRED WITH LIQUID EPOXY PER SPECIFICATION SECTION 09900, SERVICE CONDITION R.
  8. 4" SWING CHECK VALVE, SPRING AND LEVER OPERATED WITH STAINLESS STEEL FACING AND 125 LB. FLANGES, RATED FOR MINIMUM 200 PSI WORKING PRESSURE.
  9. 4" RATE OF FLOW CONTROL VALVE (FCV-5 AND FCV-6) WITH FLANGED ENDS AND ORIFICE PLATE ASSEMBLY PER SPECIFICATIONS, RATED FOR 250 PSI (MIN.) WORKING PRESSURE AND PROVIDED WITH 150 LB. ANSI FLANGES.
  10. 4" FLANGED RESILIENT SEATED GATE VALVE WITH HANDWHEEL, CLASS 125 FLANGES, RATED FOR A MINIMUM 200 PSI WORKING PRESSURE.
  11. 4" MAGNETIC FLOW METER WITH CLASS 250 FLANGED ENDS (1 TOTAL) LOCATE SIGNAL CONVERTER IN MCP.
  12. GROOVED COUPLING, VICTAULIC STYLE 31, OR EQUAL.
  13. 4" DI PIPE SPOOL (FLG x GROOVED), LENGTH AS REQUIRED. UNLESS SHOWN OTHERWISE, PROVIDE EQUAL LENGTH SPOOL ON EACH SIDE OF COUPLING.
  14. 4" DI PIPE SPOOL (FLG x FLG), LENGTH AS REQUIRED.
  15. 4"x4"x4" TEE, DI (FLG x FLG x FLG).
  16. 4"x4"x3" TEE, DI (FLG x FLG x FLG) WITH 3" CLASS 150 ANSI B16.5 STEEL BLIND FLANGE. BLIND FLANGE SHALL BE DRILLED FOR 1" DIA. 3000 LB. HALF COUPLING WELDED TO CENTER OF FLANGE.
  17. 4" BLIND FLANGE, DI.
  18. 4" 90° ELBOW, DI (FLG x FLG).
  19. 6"x6"x4" TEE, DI (FLG x FLG x FLG).
  20. 6" 90° ELBOW, DI (FLG x MJ).
  21. 4" FLEXIBLE SLEEVE PRESSURE SENSOR WITH CARBON STEEL HOUSING AND END FLANGES (ANSI 150 LB THROUGH BOLT HOLES) AND RATED FOR 275 PSI WORKING PRESSURE (MINIMUM).
  22. RATE OF FLOW CONTROL VALVE ORIFICE PLATE ASSEMBLY. MOUNT ORIFICE PLATE BETWEEN FLANGES AND PROVIDE STAINLESS STEEL TUBING (RATED FOR 200 PSI WORKING PRESSURE) BETWEEN ORIFICE PLATE AND DIFFERENTIAL CONTROL FOR RATE OF FLOW CONTROL VALVE (REFERENCE ITEM 9 HEREON). COORDINATE INSTALLATION WITH VALVE MANUFACTURER.
  23. 4" 22 1/2° ELBOW, DI (FLG x MJ).
  24. 4" DI PIPE SPOOL (PE x PE), LENGTH AS REQUIRED.
  25. 4" 90° ELBOW, DI (FLG x MJ).
  26. 4" FLANGED ECCENTRIC PLUG VALVE WITH PNEUMATIC ACTUATOR. PNEUMATIC ACTUATOR SHALL BE PROVIDED WITH "FAIL-CLOSED" SPRING RETURN.
  27. 4" FLANGED ECCENTRIC PLUG VALVE WITH WORM GEAR OPERATOR AND HANDWHEEL.
  28. 4"x3" ECCENTRIC REDUCER, DI (FLG x FLG), INSTALLED WITH TOP LEVEL.
  29. 3" DI PIPE SPOOL (FLG x GROOVED), LENGTH AS REQUIRED. UNLESS SHOWN OTHERWISE, PROVIDE EQUAL LENGTH SPOOL ON EACH SIDE OF COUPLING.
  30. 4" DI PIPE SPOOL (FLG x PE), LENGTH AS REQUIRED.
  31. 4" 90° ELBOW, DI (MJ x MJ).
  32. 4"x4"x4" TEE, DI (MJ x MJ x MJ).
  33. 3" DI PIPE SPOOL (FLG x FLG), LENGTH AS REQUIRED.
  34. 4"x3" 90° REDUCING ELBOW, DI (FLG x FLG).
  35. STAINLESS STEEL EQUIPMENT ANCHOR BOLTS PER PUMP MANUFACTURER (DRILL AND EPOXY OR CAST-IN-PLACE). SIZE, LOCATION, AND EMBEDMENT PER MANUFACTURER'S ANCHORAGE CALCULATIONS.
  36. 3" DI 90° ELBOW, FLG x FLG.
  37. 3" FLANGED SPOOL, DIP, LENGTH AS REQUIRED.
  38. 3" FLANGED RESILIENT SEATED GATE VALVE WITH NON-RISING STEM AND HANDWHEEL.
  39. REDUCED PRESSURE BACKFLOW DEVICE RATED FOR 175 PSI (MIN.) WORKING PRESSURE PER DISTRICT LIST OF APPROVED MANUFACTURED MATERIALS AND UL/FM APPROVED. BACKFLOW DEVICE SHALL CONSIST OF TWO INDEPENDENT TORSION SPRING CHECK MODULES, TWO RESILIENT SEATED GATE VALVES WITH OUTSIDE STEM AND YOKE, AND A DIFFERENTIAL PRESSURE RELIEF VALVE LOCATED BETWEEN THE CHECK MODULES. TORSION SPRING CHECK MODULES AND RELIEF VALVE SHALL BE CONTAINED WITH A SLEEVE ACCESSIBLE SINGLE HOUSING CONSTRUCTED OF 304 STAINLESS STEEL WITH GROOVED END CONNECTIONS.
  40. 3'-0" WIDE CONCRETE SLAB, 6" MIN. THICK WITH #5 BARS AT 12" O.C. EACH WAY, CENTERED IN SLAB THICKNESS.
  41. 3" PRESSURE REDUCING AND REGULATING VALVE. VALVE SHALL BE HYDRAULICALLY OPERATED, PILOT CONTROLLED, DIAPHRAGM-ACTUATED GLOBE VALVE PER SPECIFICATIONS WITH ANTI-CAVITATION TRIM. VALVE SHALL BE PROVIDED WITH 150 LB. ANSI FLANGED ENDS AND SHALL BE CAPABLE OF REDUCING A MAXIMUM INLET PRESSURE OF 175 PSI TO AN OUTLET PRESSURE OF 40-60 PSI.
  42. 4" IN-LINE SIGHT FLOW INDICATOR WITH FLANGED ENDS, AS MANUFACTURED BY CHEM FLOWTRONICS, L.J. STAR, OR EQUAL. PROVIDE PLAIN STYLE WITH TEMPERED BOROSILICATE GLASS SIGHT WINDOWS WITH ALL OTHER WETTED PARTS CONSTRUCTED OF 316 STAINLESS STEEL.
  43. 4" ANSI 150 LB. WAFER ORIFICE PLATE WITH 2" BORE, MODEL X52E AS MANUFACTURED BY CLA-VAL. PLATE HOLDER SHALL BE DUCTILE IRON, FUSION-BONDED EPOXY COATED.
  44. CLASS 150 ANSI B16.5 STEEL BLIND FLANGE. BLIND FLANGE SHALL BE DRILLED FOR 1" DIA. 3000 LB. HALF COUPLING WELDED TO CENTER OF FLANGE.
  45. PROVIDE HPA SOLENOID PANEL WITH PRESSURE REGULATOR, AIR FILTER, AND 3-WAY SOLENOID VALVE MOUNTED IN A NEMA 4X ST. STL. PANEL. PROVIDE STANCHION FOR PANEL AND ELECTRICAL J-BOX. PROVIDE ST. STL. TUBING BETWEEN SOLENOID VALVE AND PNEUMATIC ACTUATOR ON PLUG VALVE.
  46. PROVIDE DI SPOOL WITH CLASS 250 FLANGE AT MAG METER.

**RECORD DRAWING**  
BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



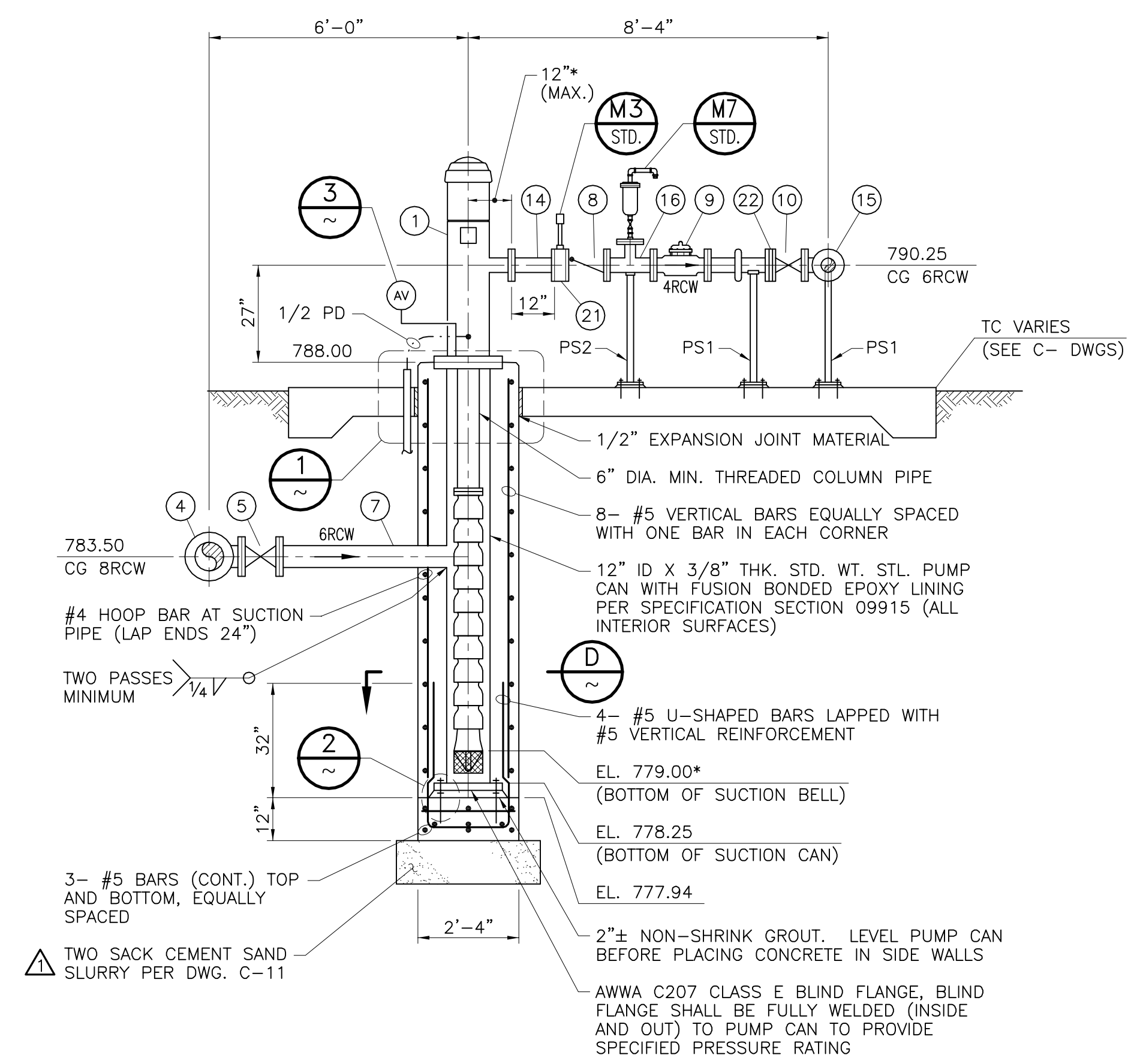
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Whife L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

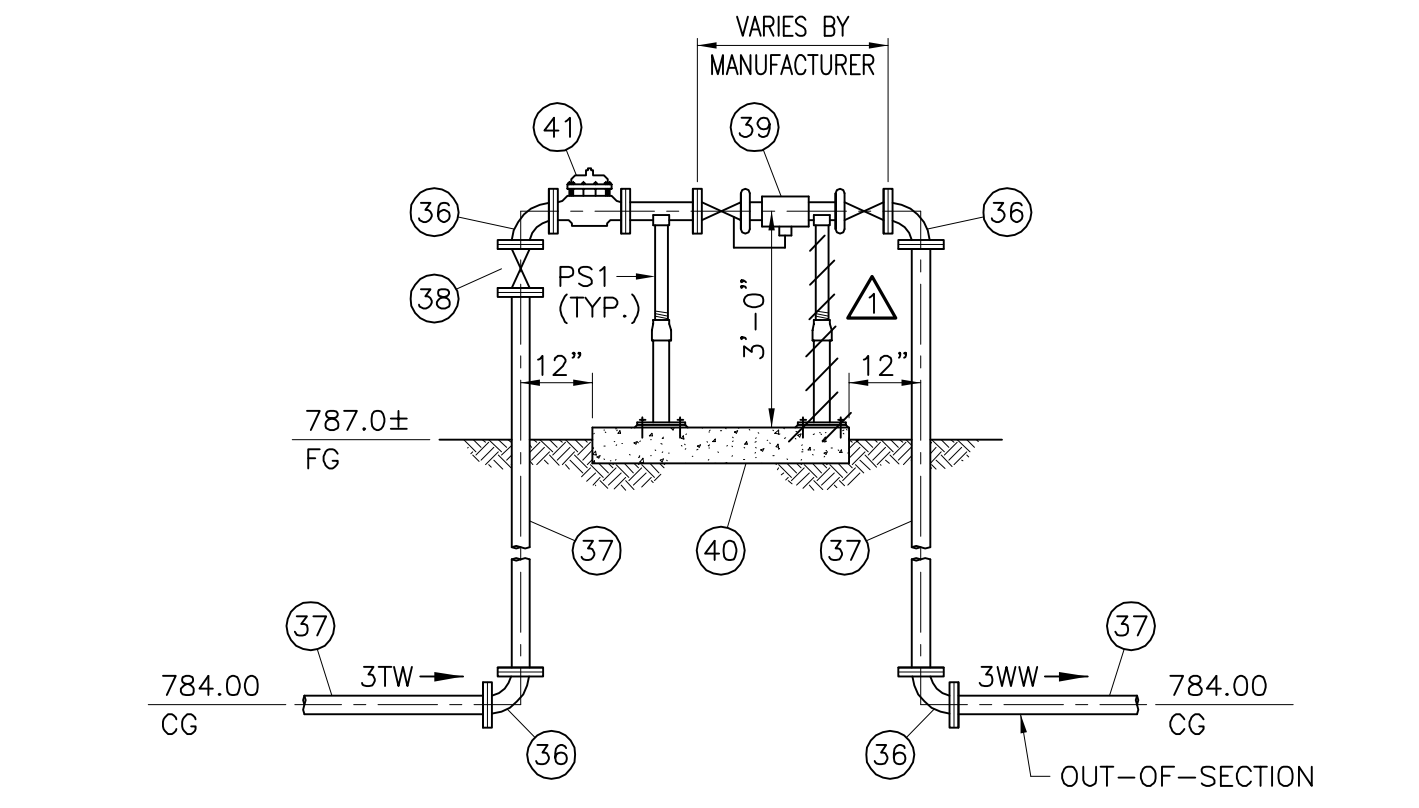
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**RCW/WF PUMP STATION PLAN**

DRAWING  
**3M-4**  
36 OF 69 SHEETS  
11746  
R.C.S.D. PLAN No.

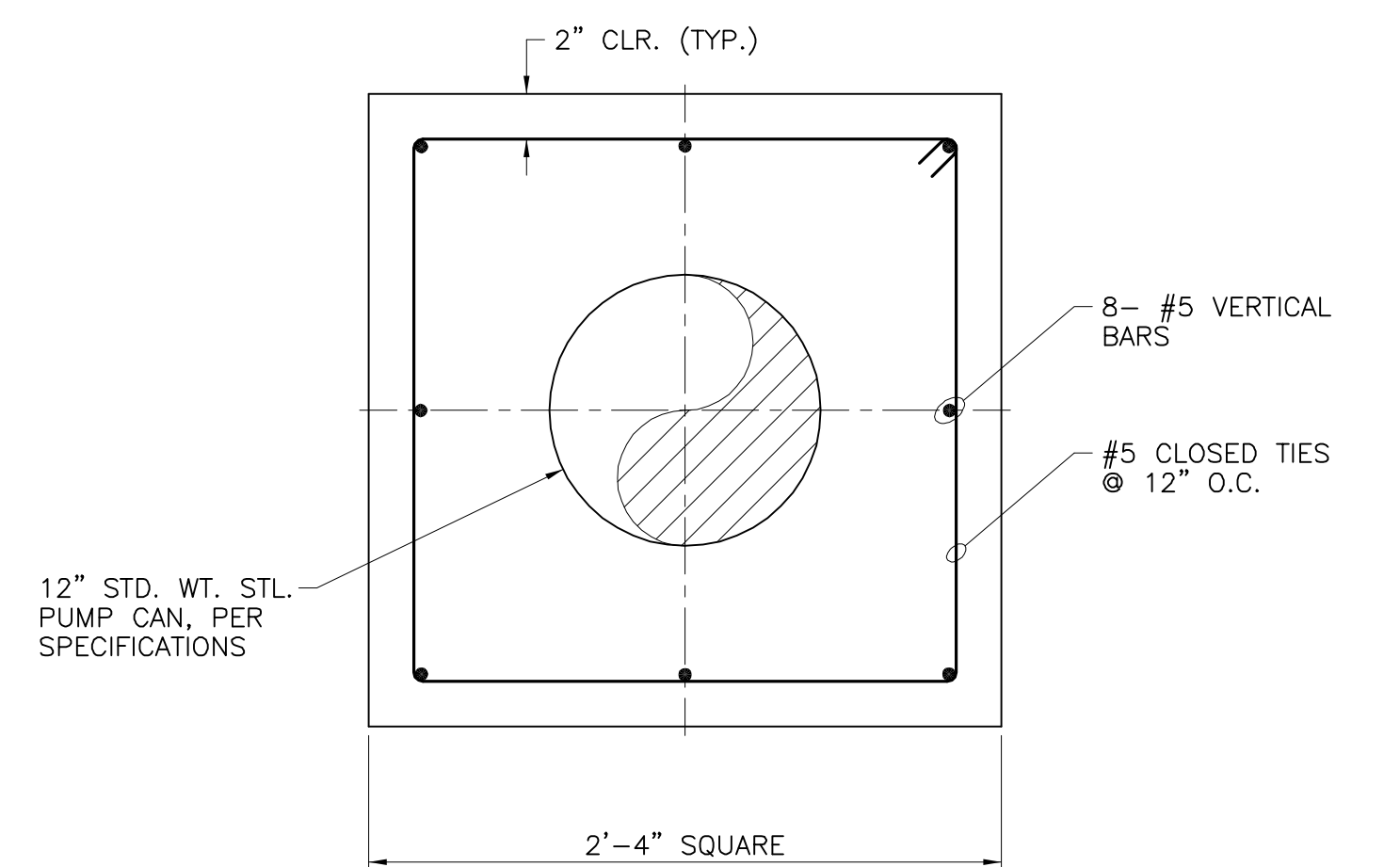
DWG. NO.: RC-80-19-54-365 FILE NO.: 587-19-54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:48AM PLOT SCALE: 1=1



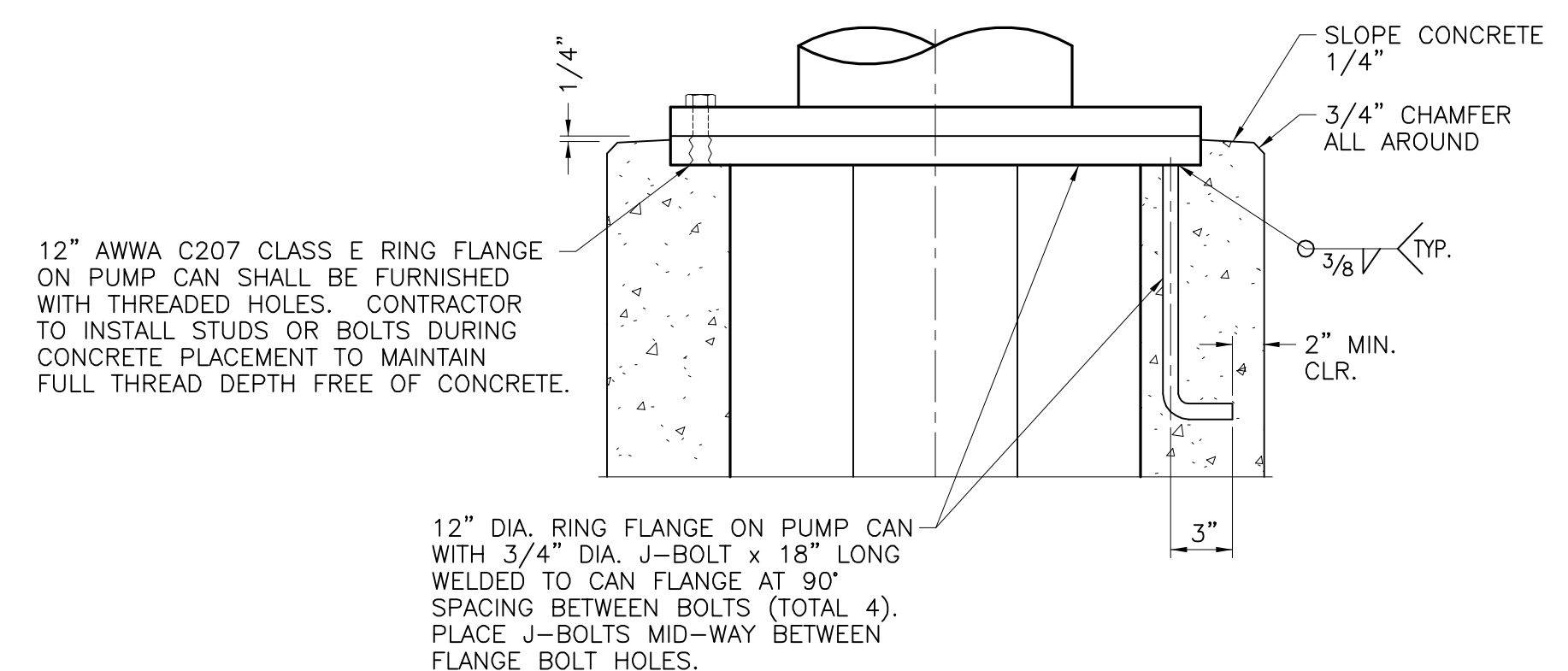
**RCW PUMP SECTION**  
SCALE: 3/8"=1'-0"  
A  
3M-4



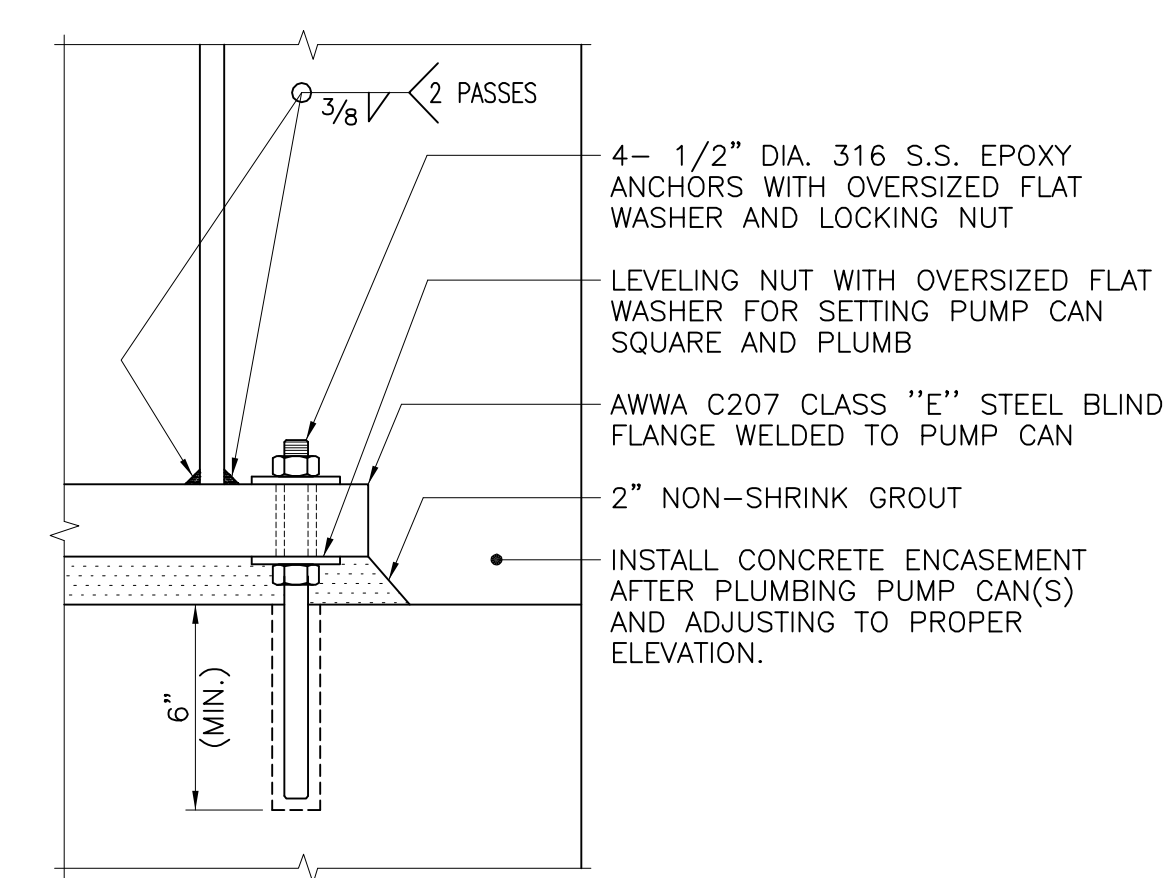
**REDUCED PRESSURE BACKFLOW DEVICE ASSEMBLY SECTION**  
SCALE: 3/8"=1'-0"  
C  
3M-1 3M-4



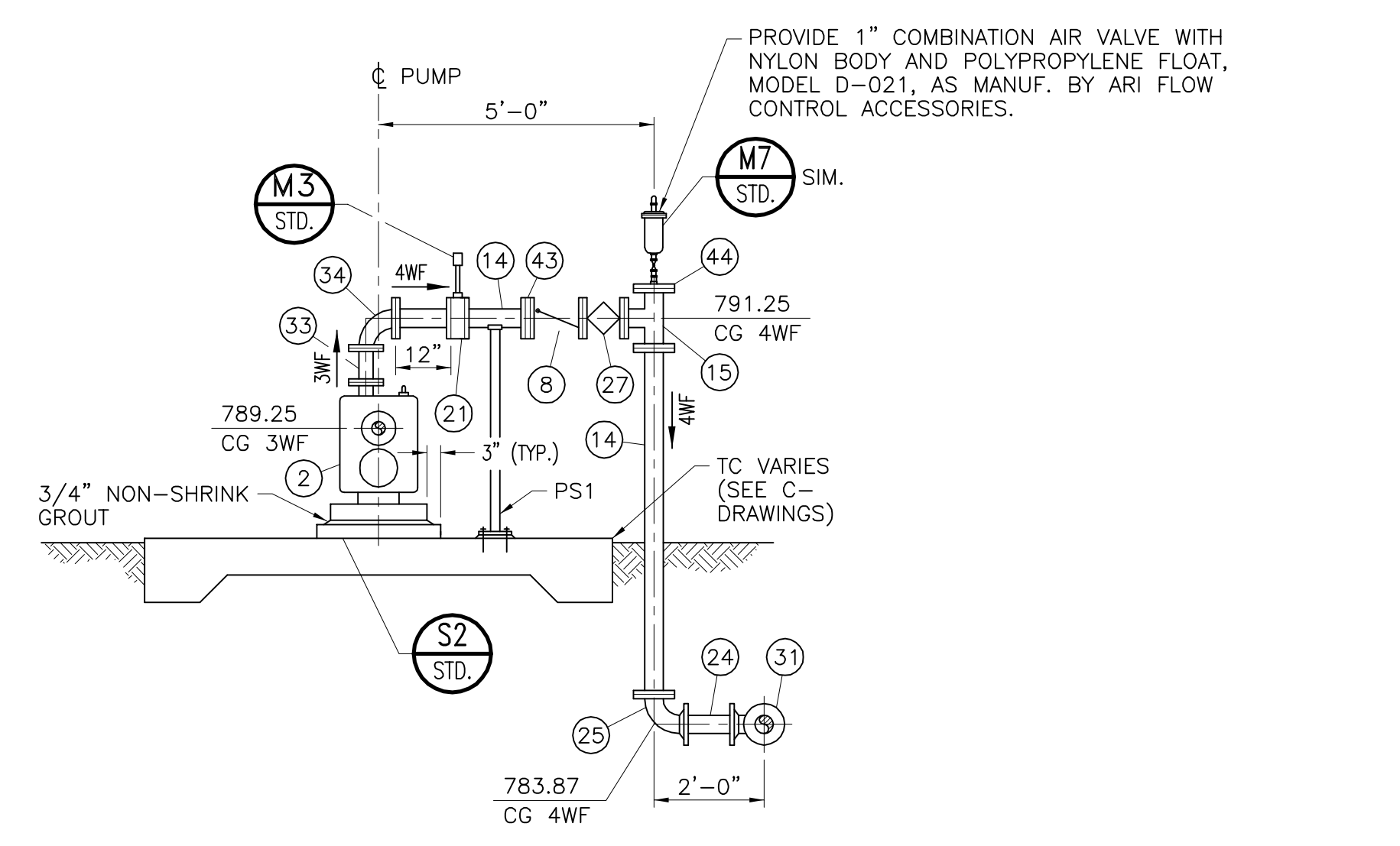
**PUMP CAN SECTION**  
SCALE: 1 1/2"=1'-0"  
D  
~



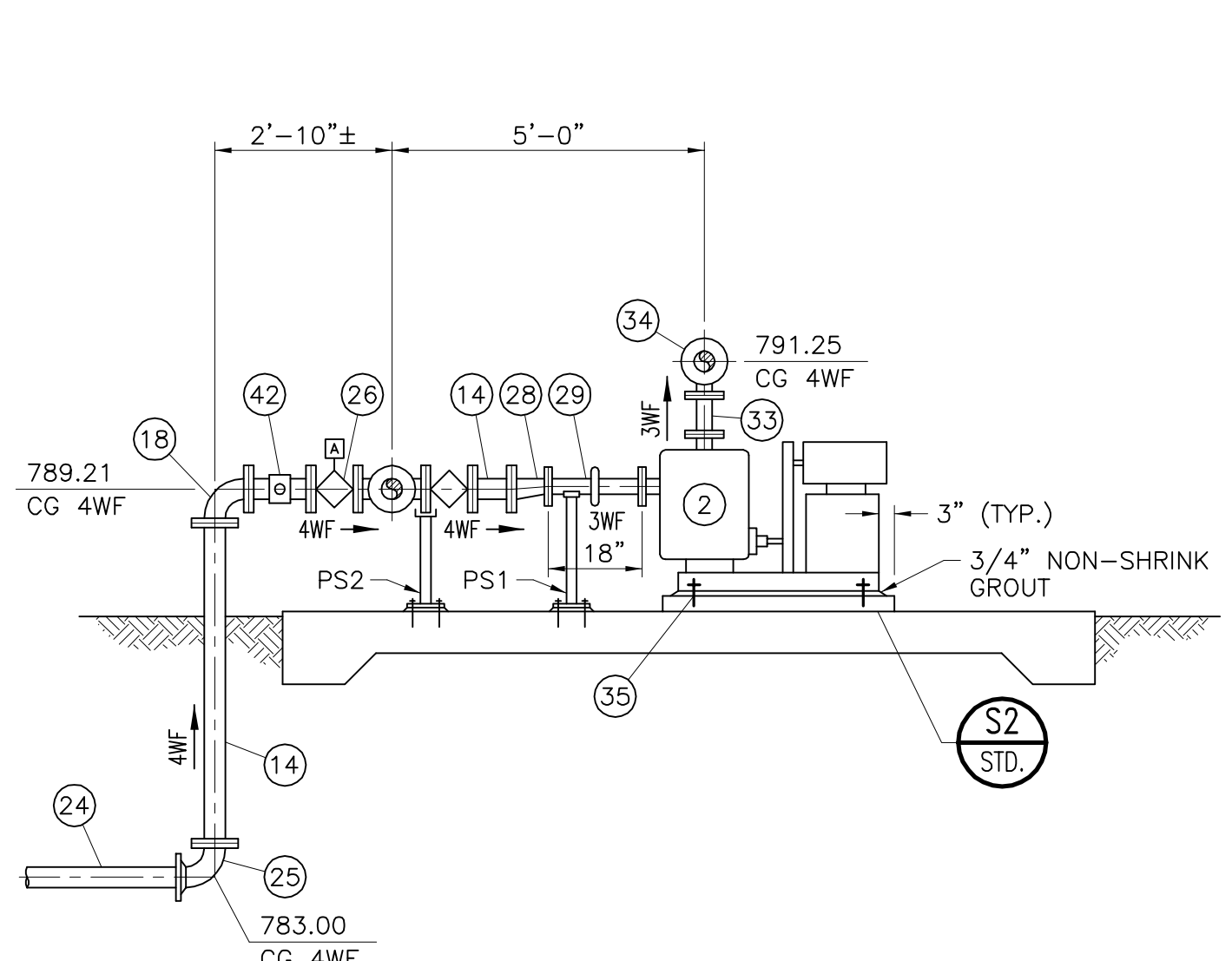
**PUMP CAN DETAIL**  
N.T.S.  
1  
~



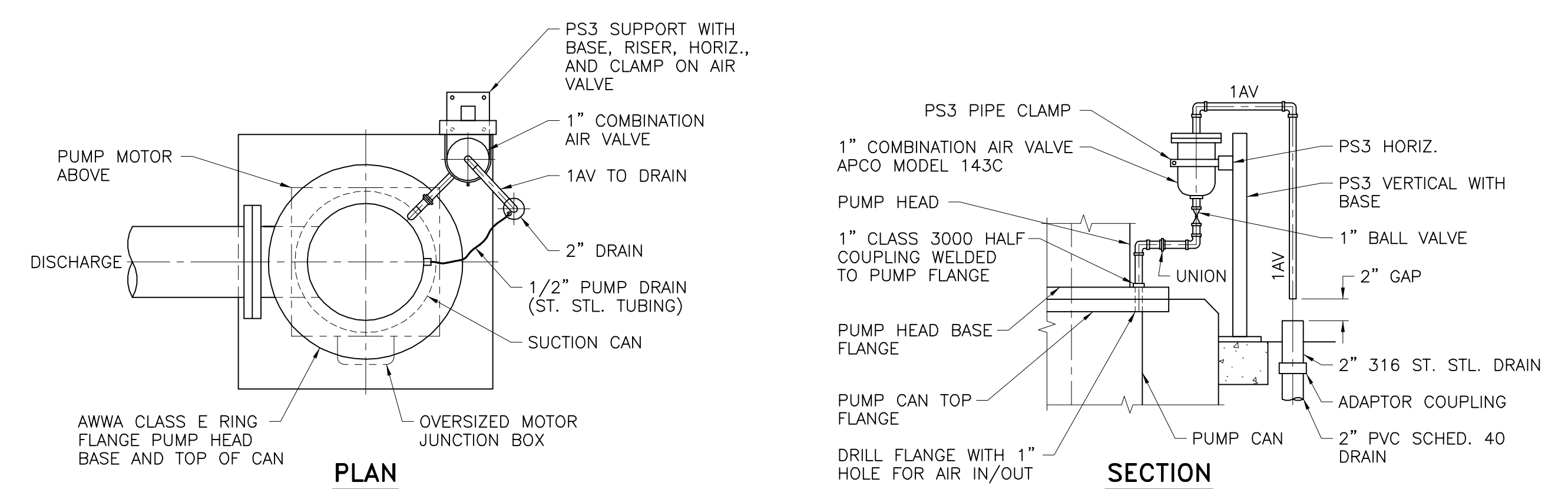
**DETAIL**  
N.T.S.  
2  
~



**SECTION**  
SCALE: 3/8"=1'-0"  
B  
3M-4



**SECTION**  
SCALE: 3/8"=1'-0"  
E  
3M-4



- NOTES:**
- UNLESS NOTED OTHERWISE, ALL PIPING AND FITTINGS SHOWN SHALL BE STD. WT. SCH. 40 RED BRASS.
  - AIR VALVE SEAT AND NEEDLE DUROMETER HARDNESS TO BE SELECTED FOR 0 TO 10 PSI OPERATING PRESSURE.
  - ALL VALVES AND FITTINGS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 150 PSI (MIN.).

**PUMP CAN AIR VALVE DETAIL**  
N.T.S.  
3  
3M-4 ~

**RECORD DRAWING**  
BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



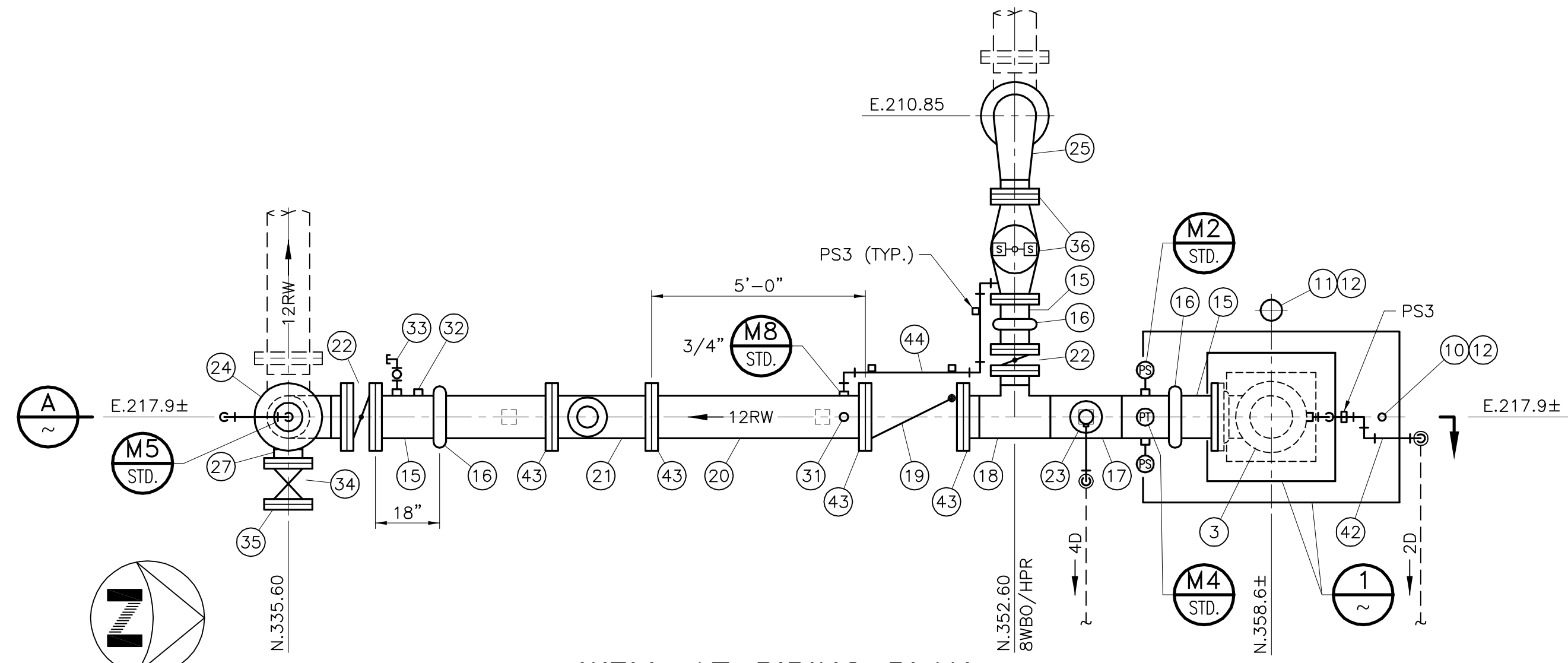
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Phillip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

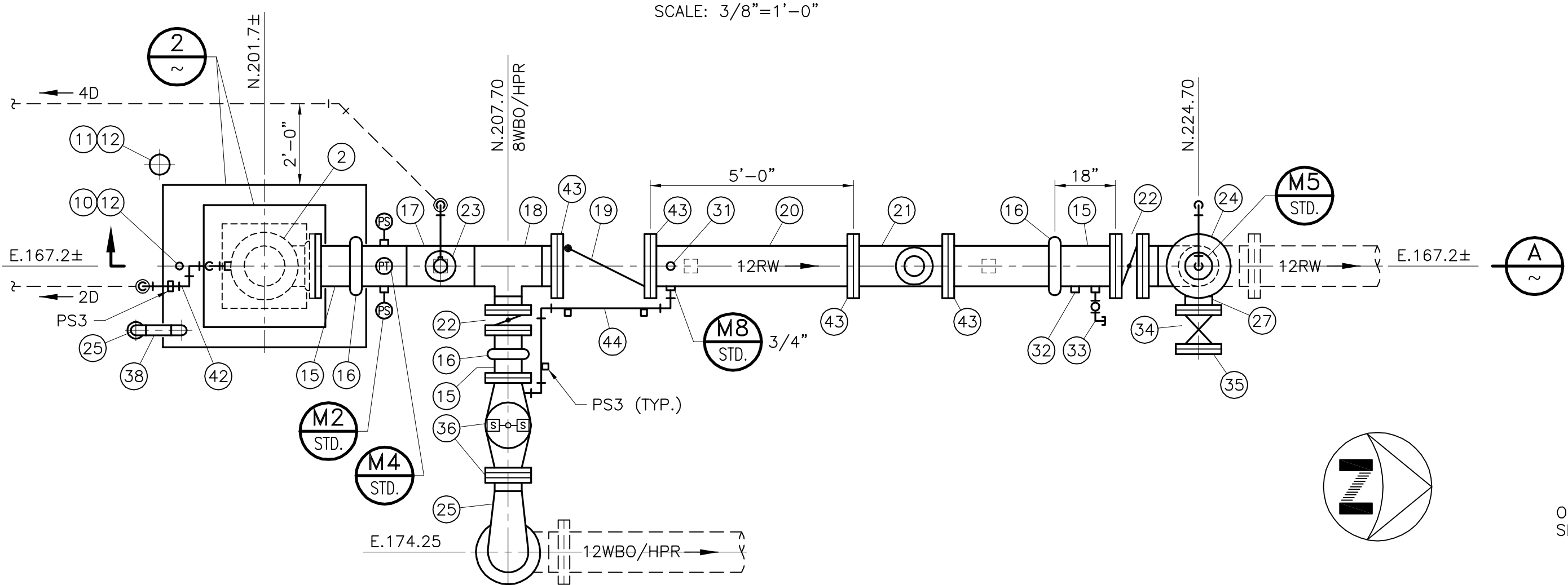
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**RCW/WF PUMP STATION SECTIONS AND DETAILS**

DRAWING  
**3M-5**  
37 OF 69 SHEETS  
11747  
R.C.S.D. PLAN No.

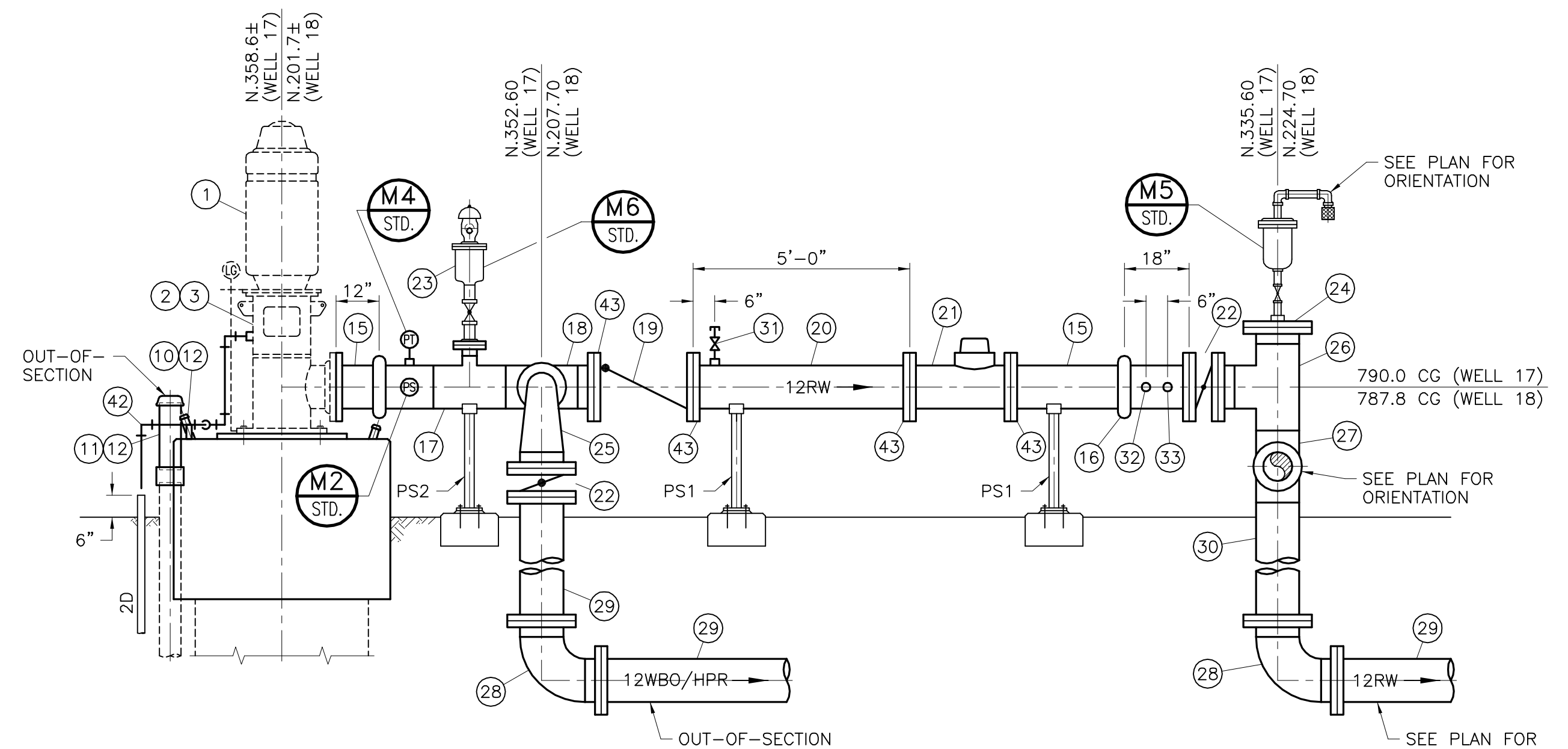
DWG. NO.: 105-90-10-54-01 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:53AM PLOT SCALE: 1"=1'



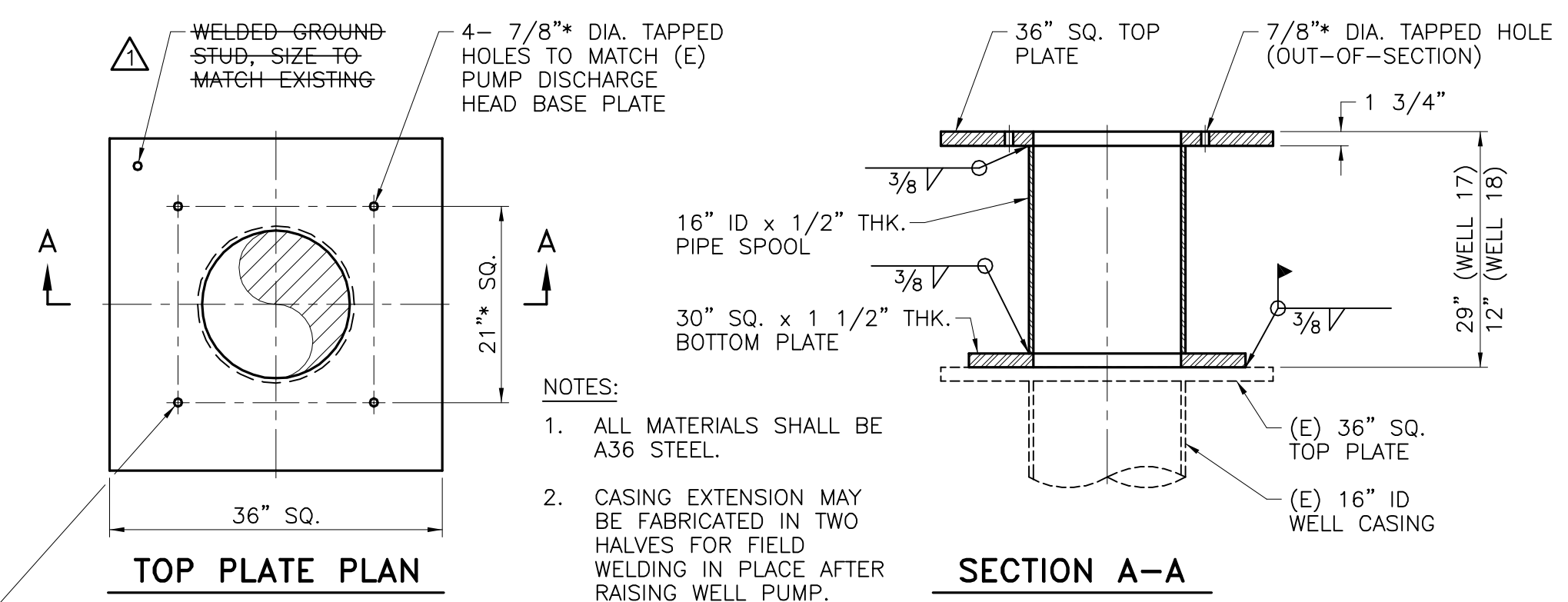
**WELL 17 PIPING PLAN**  
SCALE: 3/8"=1'-0"



**WELL 18 PIPING PLAN**  
SCALE: 3/8"=1'-0"

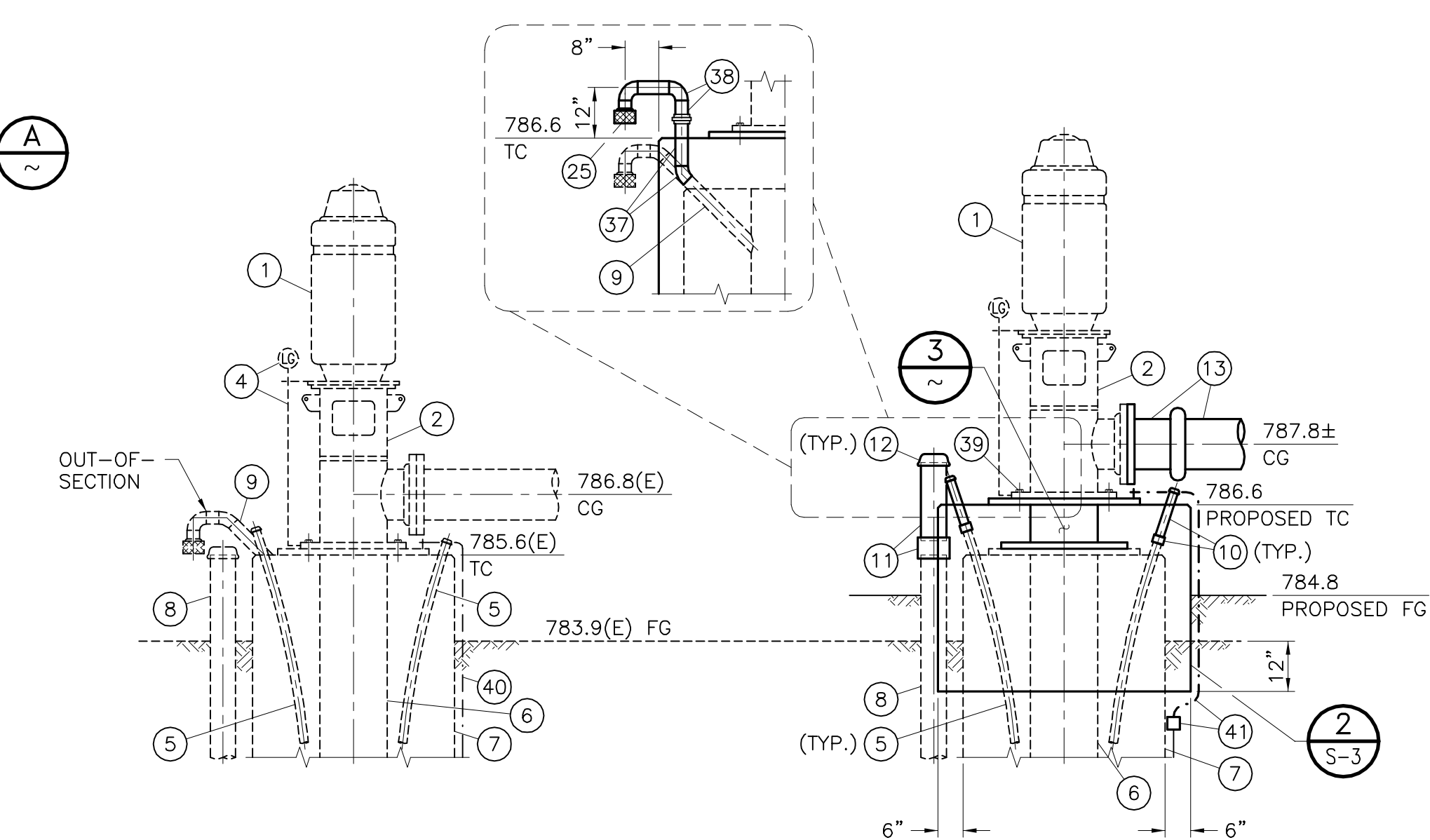


**SECTION A-A**  
SCALE: 3/8"=1'-0"

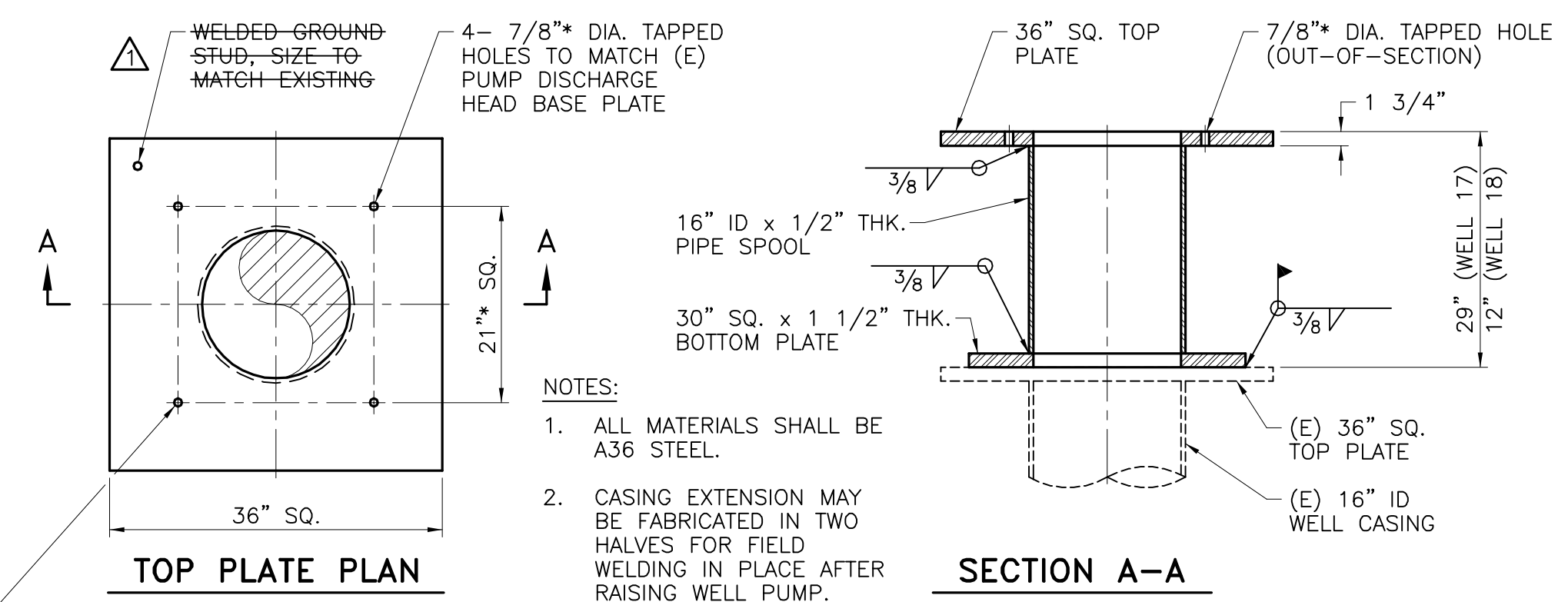


**WELL CASING EXTENSION DETAIL**  
N.T.S.

**WELL 17 PUMP PEDESTAL MODIFICATION DETAIL**  
SCALE: 3/8"=1'-0"



**WELL 18 PUMP PEDESTAL MODIFICATION DETAIL**  
SCALE: 3/8"=1'-0"



**WELL 18 PUMP PEDESTAL MODIFICATION DETAIL**  
SCALE: 3/8"=1'-0"

- MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 4M-1:**
- EXISTING 350 HP VERTICAL HOLLOWSHAFT MOTOR TO BE RELOCATED AS SHOWN. APPROXIMATE WT= 2,500 LBS.
  - EXISTING VERTICAL TURBINE PUMPING UNIT, GOULDS MODEL 14RHMC (5 STAGES) 2500 GPM AT 410' TDH, 1770 RPM, WITH FABRICATED STEEL DISCHARGE HEAD, 12" DIA. X 62 1/2" X 0.330" WALL STEEL COLUMN ASSEMBLY, 1- 15/16" DIA. 416 STAINLESS STEEL SHAFT, 10" DIA. X 5' L STEEL SUCTION PIPE, 3' L 316 STAINLESS STEEL CONE STRAINER, AND 1/4" DEKRON AIR LINE TO 62'. PUMPING UNIT AND MOTOR SHALL BE RAISED AND ROTATED AS SHOWN ON THE DRAWINGS AND PER SPECIFICATION REQUIREMENTS. APPROXIMATE WT= 7,000 LBS.
  - EXISTING VERTICAL TURBINE PUMPING UNIT, GOULDS MODEL 14RHMC (5 STAGES) 2600 GPM AT 363' TDH, 1770 RPM, WITH CAST IRON DISCHARGE HEAD, 28 1/2" SQ. X 4 1/2" H SPACER PLATE, 12" DIA. X 65 1/2" X 0.330" WALL STEEL COLUMN ASSEMBLY, 1- 15/16" DIA. 416 STAINLESS STEEL SHAFT, 10" DIA. X 5' L STEEL SUCTION PIPE, 3' L 316 STAINLESS STEEL CONE STRAINER, AND 1/4" AIR LINE. PUMPING UNIT AND MOTOR SHALL BE RAISED AND ROTATED 90± AS SHOWN ON THE DRAWINGS AND PER SPECIFICATION REQUIREMENTS. APPROXIMATE WT= 7,000 LBS.
  - EXISTING WATER LEVEL GAUGE AND 1/4" STAINLESS STEEL AIR TUBING. PROTECT IN PLACE, OR REMOVE AND RELOCATE.
  - EXISTING 2" STD. WT. STEEL SAMPLING AND SOUNDING TUBE RISER (2 TOTAL). EXTEND RISERS AS SHOWN.
  - EXISTING 16" ID X 0.25 WALL STEEL WELL CASING.
  - EXISTING 4'-0"± SQUARE CONCRETE PUMP PEDESTAL.
  - EXISTING 6" STD. WT. STEEL GRAVEL TUBE. EXTEND TUBE AS SHOWN.
  - EXISTING 3" STD. WT. STEEL AIR VENT. EXTEND AIR VENT AS SHOWN.
  - 2" STD. WT. STEEL THREADED PIPE NIPPLE AND COUPLING. EXTEND 2" PIPE TO PROVIDE 3" FROM TOP OF CONCRETE TO TOP OF PIPE FOR RISER BENEATH PUMP 12" DISCHARGE, AND PROVIDE 6" FROM TOP OF CONCRETE TO TOP OF PIPE FOR RISER BEHIND PUMP.
  - 6" STD. WT. STEEL THREADED PIPE NIPPLE AND COUPLING. EXTEND 6" PIPE TO 6" ABOVE TOP OF CONCRETE.
  - STD. WT. STEEL THREADED CAP.
  - REPLACE EXISTING DISCHARGE PIPING, VALVES, AND APPURTENANCES WITH NEW PIPING, VALVES, AND APPURTENANCES PER PLANS AND SECTION SHOWN HEREON. NEW PIPING SHALL BE INSTALLED LEVEL WITH THE DISCHARGE OUTLET OF THE RELOCATED PUMP DISCHARGE HEAD.
  - 3" STD. WTL. STEEL ELBOW. CUT EXISTING 3" STEEL PIPE AND WELD ELBOW FOR NEW VERTICAL RISER PIPE.
  - FLANGED X GROOVED END SPOOL, LENGTH AS REQUIRED. UNLESS SHOWN OTHERWISE, PROVIDE EQUAL LENGTH SPOOLS ON EACH SIDE OF GROOVED COUPLING.
  - GROOVED COUPLING, VICTAULIC STYLE 77, OR EQUAL.
  - 12"x12"x4" REDUCING TEE (PE x PE x FLG).
  - 12"x12"x8" REDUCING TEE (PE x FLG x FLG).
  - 12" SWING CHECK VALVE, SPRING AND LEVER OPERATED WITH DI BODY AND DISC WITH STAINLESS STEEL FACING AND CLASS 250 FLANGES, APCO OR EQUAL.
  - 12" FLANGED END SPOOL, LENGTH AS REQUIRED.
  - 12" FLANGED PROPELLER METER WITH LOCAL INDICATOR-TOTALIZER, 4-20 MA TRANSMITTER FOR FLOW RATE, PULSE OUTPUT FOR FLOW TOTALIZATION, 300 LB. AWMA CLASS 1 FLANGES, STRAIGHTENING VANES, AND COATED INTERNALLY/EXTERNALLY WITH 12-15 MILS FUSION BONDED EPOXY. INDICATE IN GPM, TOTALIZE IN HCF.
  - FLANGED BUTTERFLY VALVE WITH WORM GEAR OPERATOR AND HANDWHEEL.
  - 3" DEEP WELL AIR/VACUUM VALVE WITH 3" THREADED INLET AND OUTLET, STAINLESS STEEL FLOAT AND TRIM, BUENA-N SEAT, AND RATED FOR A WORKING PRESSURE OF 300 PSI (MINIMUM).
  - 12" CLASS 150 STEEL REDUCING FLANGE WITH 2" THREADED OUTLET.
  - 12"x8" 90° REDUCING ELBOW (FLG x FLG).
  - 12"x12"x12" TEE (FLG x PE x FLG).
  - 12"x12"x8" REDUCING TEE (PE x PE x FLG).
  - SHORT RADIUS 90° ELBOW (FLG x FLG).
  - FLANGED END SPOOL, LENGTH AS REQUIRED PLUS 6" CUT-TO-FIT. SHIP ONE FLANGED LOOSE AND FIELD WELD TO REQUIRED LENGTH.
  - FLANGED X PLAIN END SPOOL, LENGTH AS REQUIRED.
  - 1" HALF COUPLING PER STANDARD DETAIL M8 AND 1" THREADED CORP STOP WITH END PLUG. PIPE NIPPLE AND END PLUG SHALL BE SCH. 40 TYPE 316 STAINLESS STEEL.
  - 1" HALF COUPLING PER STANDARD DETAIL M8 AND THREADED PLUG.
  - 1" HALF COUPLING PER STANDARD DETAIL M8 WITH 1"x3/4" REDUCING BUSHING, 3/4" CLOSE COUPLED NIPPLE, 3/4" THREADED BALL VALVE, 3/4"x1/2" REDUCING BUSHING, 1/2" CLOSE COUPLED NIPPLE, 1/2" 90° ELBOW, 1/2"x2" LONG NIPPLE, AND END CAP. ALL PIPE AND FITTINGS SHALL BE THREADED. ALL MATERIALS SHALL BE CONSTRUCTED OF TYPE 316 ST. STL.
  - 8" FLANGED RESILIENT SEATED GATE VALVE WITH 2" SQ. NUT.
  - 8" BLIND FLANGE.
  - 8" DEEP WELL PUMP CONTROL VALVE WITH ORIFICE PLATE ASSEMBLY AND PRESSURE SUSTAINING AND HIGH PRESSURE RELIEF FEATURES PER SPECIFICATIONS, RATED FOR 250 PSI (MIN.) WORKING PRESSURE AND PROVIDED WITH 150 LB. ANSI FLANGES. PROVIDE SHUTTLE VALVE AND ST. STL. TUBING. CONNECT TUBING TO DOWNSTREAM OF SWING CHECK VALVE AS SHOWN.
  - 3" 45° ELBOW AND STD. WT. STL. PIPE (PE X THREADED). CUT EXISTING 3" PIPE AND WELD ELBOW AS SHOWN.
  - 3" THREADED HDG STD. WT. STEEL PIPE, FITTINGS, AND UNION.
  - PROVIDE FOUR (4) 7/8" DIA. A325 BOLTS FOR CONNECTING EXISTING PUMP DISCHARGE HEAD TO NEW WELL CASING TOP PLATE. FIELD VERIFY BOLT SIZE AND THREAD PITCH PRIOR TO ORDERING.
  - EXISTING #2/0 COPPER GROUND SHALL BE REMOVED AND REPLACED WITH NEW #3/0 BC GROUND CONNECTED TO THREADED STUD ON WELL CASING EXTENSION TOP PLATE.
  - PROVIDE NEW #3/0 BC GROUND FROM NEW GROUND SYSTEM, REFER TO DWG. 4E-1.
  - 3/4" CPVC SCH. 40 DRAIN PIPING FROM PUMP DISCHARGE HEAD TO 2" DRAIN LINE.
  - CLASS 300 STEEL PIPE FLANGE, FULLY WELDED.
  - PILOT SYSTEM ST. STL. TUBING TO PUMP CONTROL VALVE. PROVIDE ST. STL. ISOLATION BALL VALVE AT EACH END.

**RECORD DRAWING**  
BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

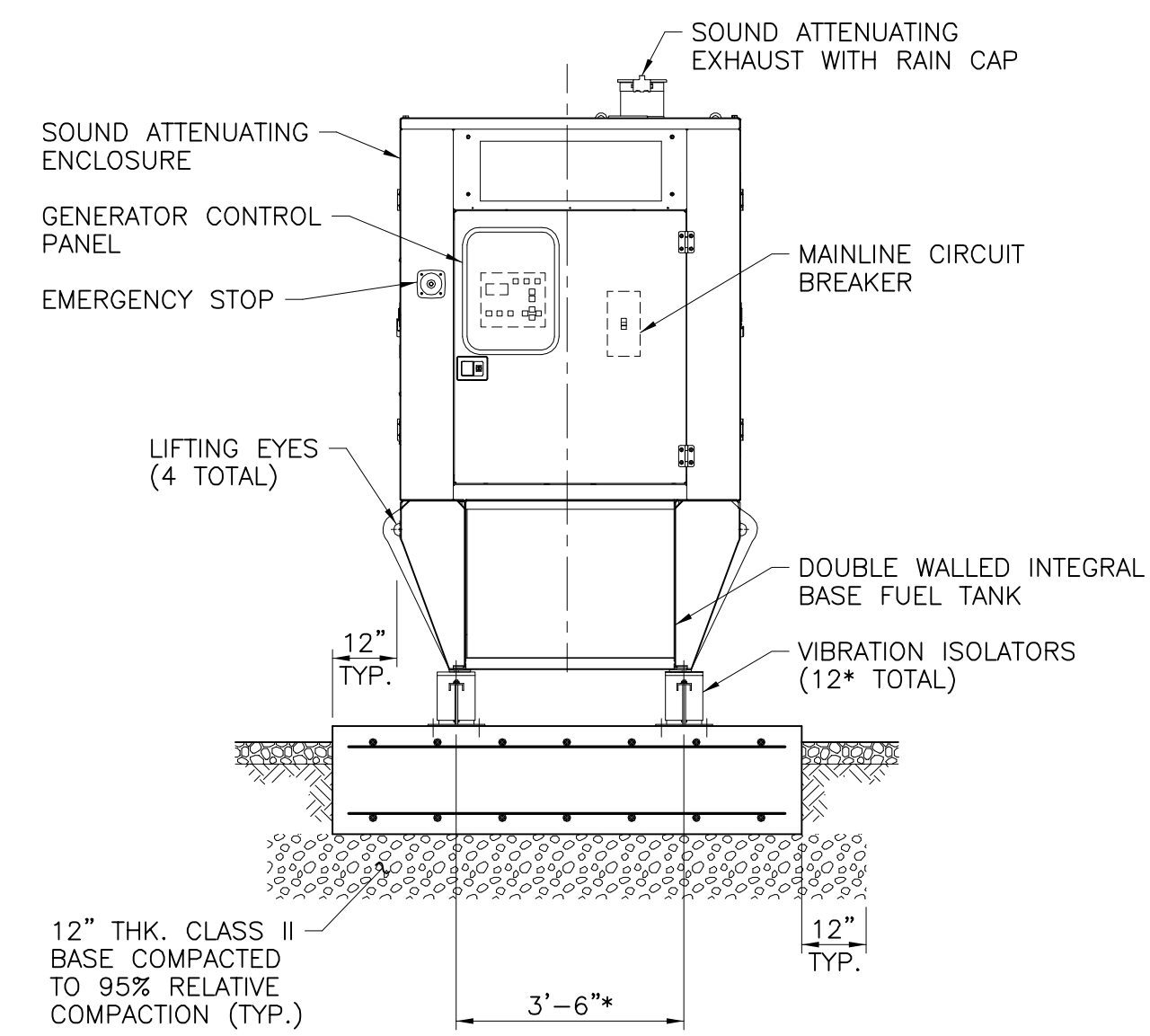
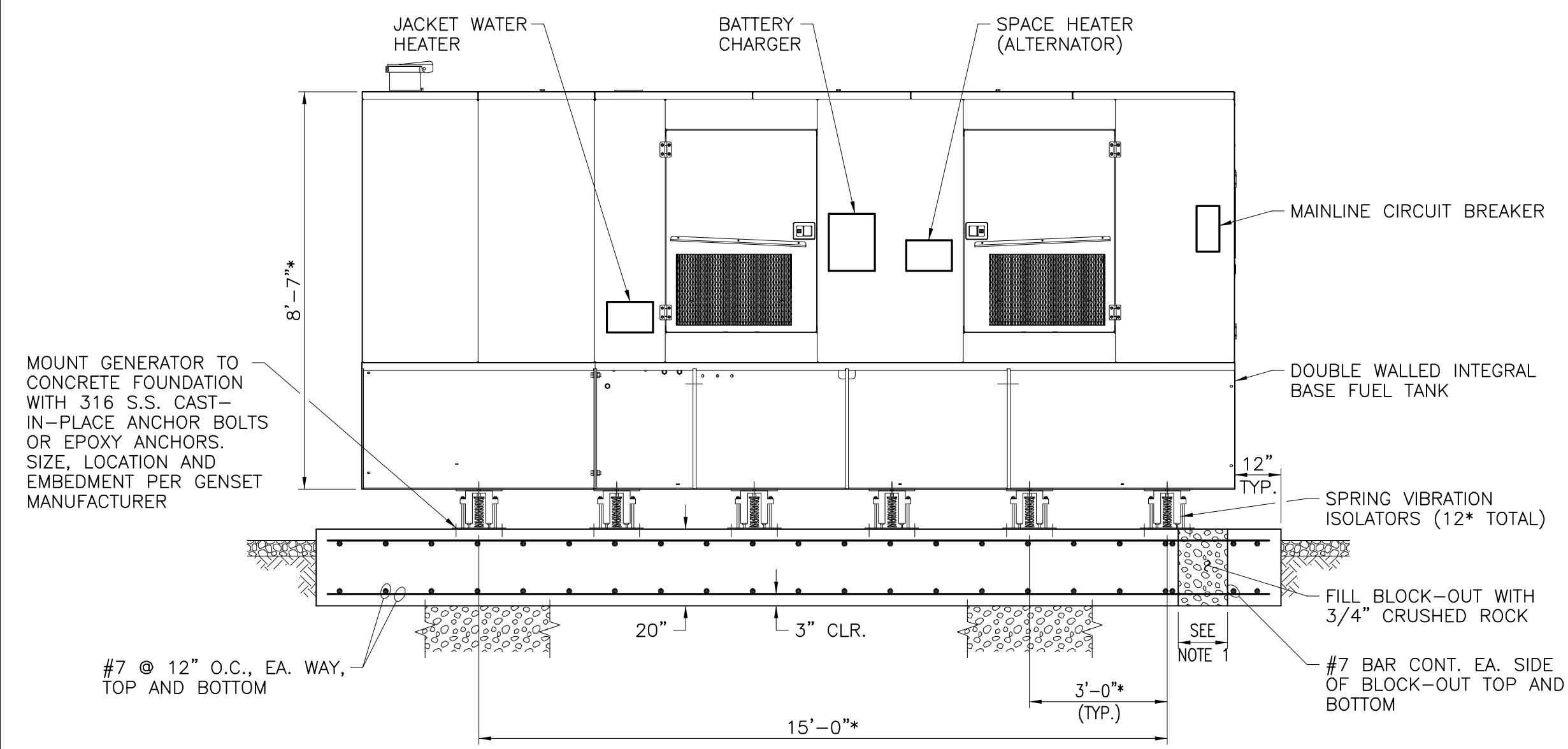
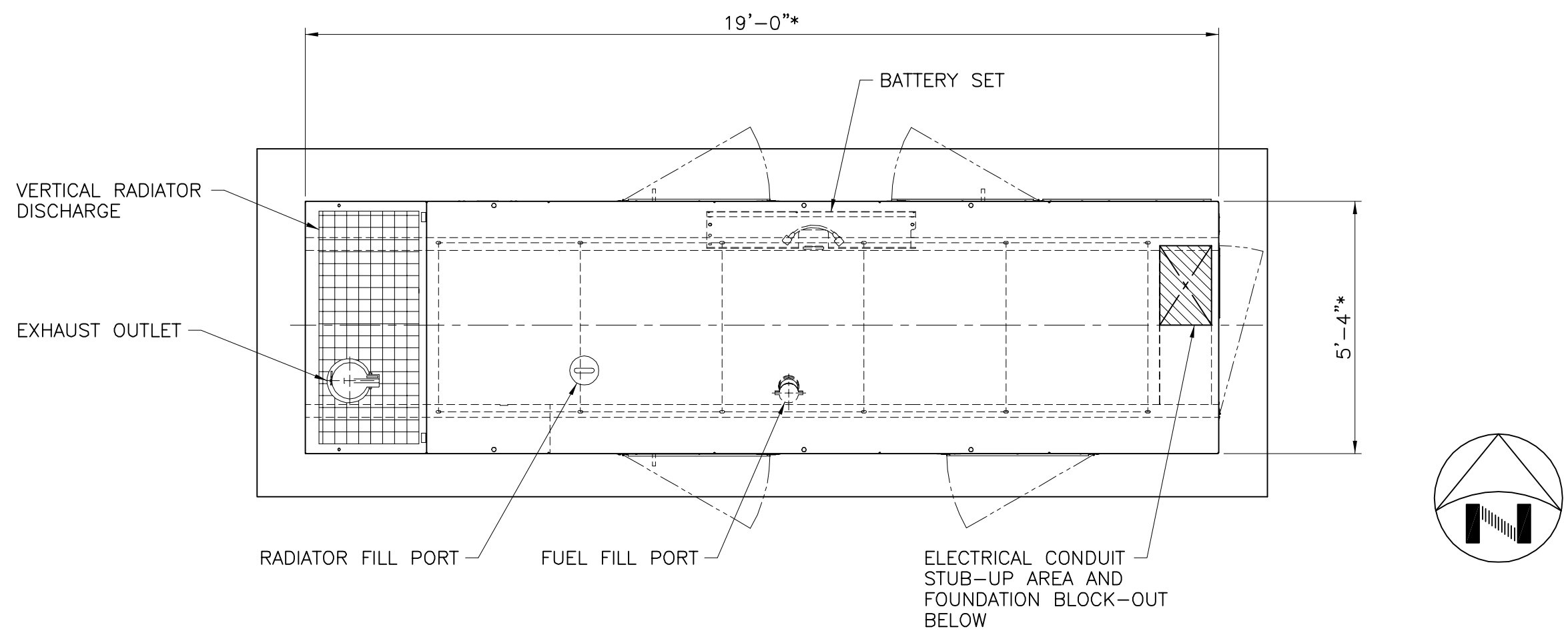
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EXISTING WELL MODIFICATION PLANS, SECTION, AND DETAILS**

**DRAWING 4M-1**  
38 OF 69 SHEETS  
11748  
R.C.S.D. PLAN NO.



DWG. NO.: 19C-80-19.54-402 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 10:59AM PLOT SCALE: 1=1



- NOTES:
- FOUNDATION BLOCK-OUT FOR ELECTRICAL CONDUIT. SIZE AND LOCATION PER STANDBY GENERATOR MANUFACTURER. PRIOR TO CONCRETE PLACEMENT, GENERATOR SHOP DRAWINGS SHOWING THE SIZE AND LOCATION OF THE CONDUIT BLOCK-OUT AREA SHALL BE SUBMITTED AND APPROVED BY THE DISTRICT.
  - SEE E-DWGS FOR REQUIRED CONDUIT AND CONDUCTORS.
  - ALL STANDBY GENERATOR FACILITIES AND COMPONENTS SHALL BE FACTORY PRE-WIRED TO JUNCTION BOXES LOCATED WITHIN THE SOUND ATTENUATING ENCLOSURE AND AT THE ELECTRICAL CONDUIT STUB-UP AREA.

**EMERGENCY STANDBY GENERATOR DETAIL** 1  
 SCALE: 3/8"=1'-0" C-3

**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY



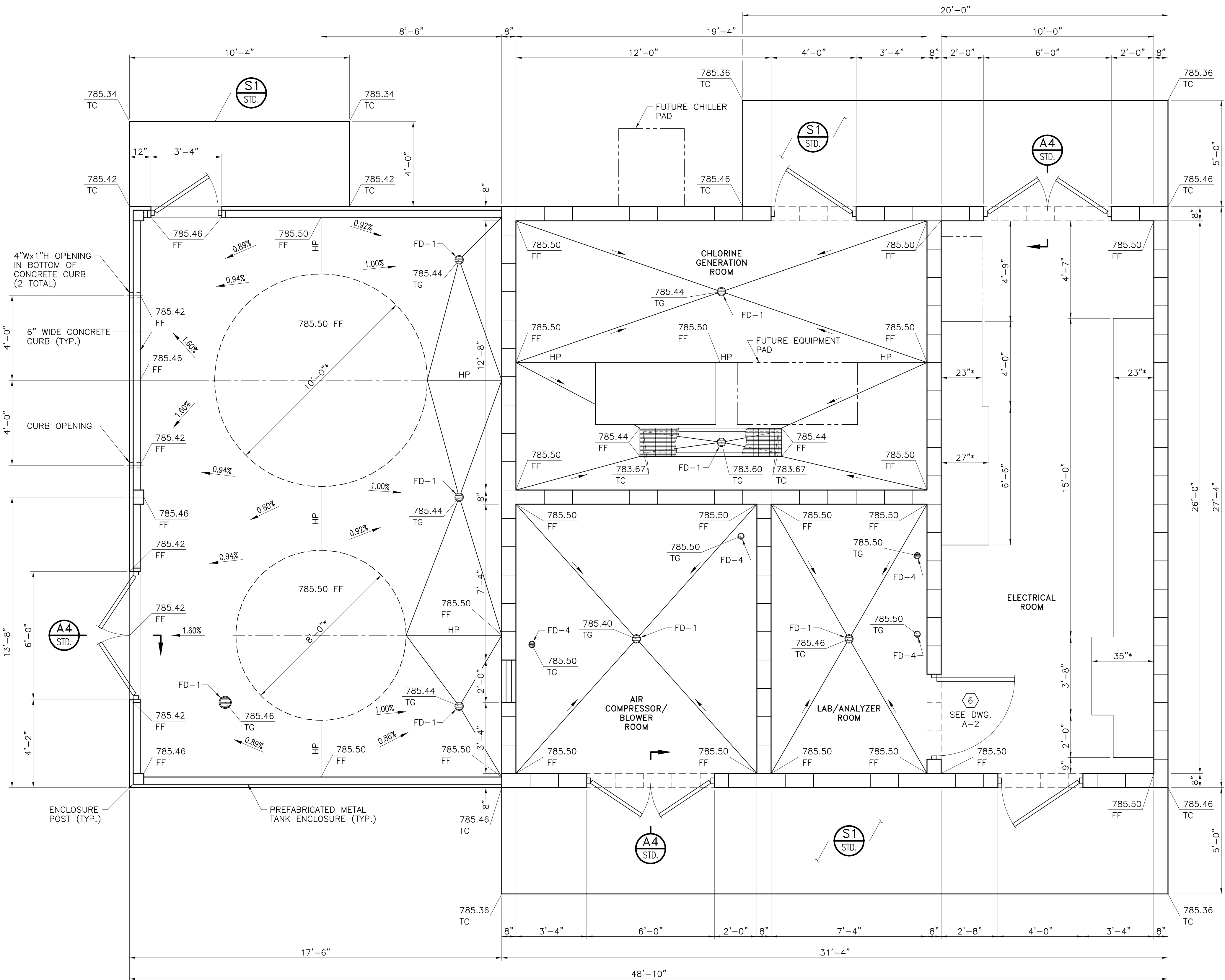
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Philip L. Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

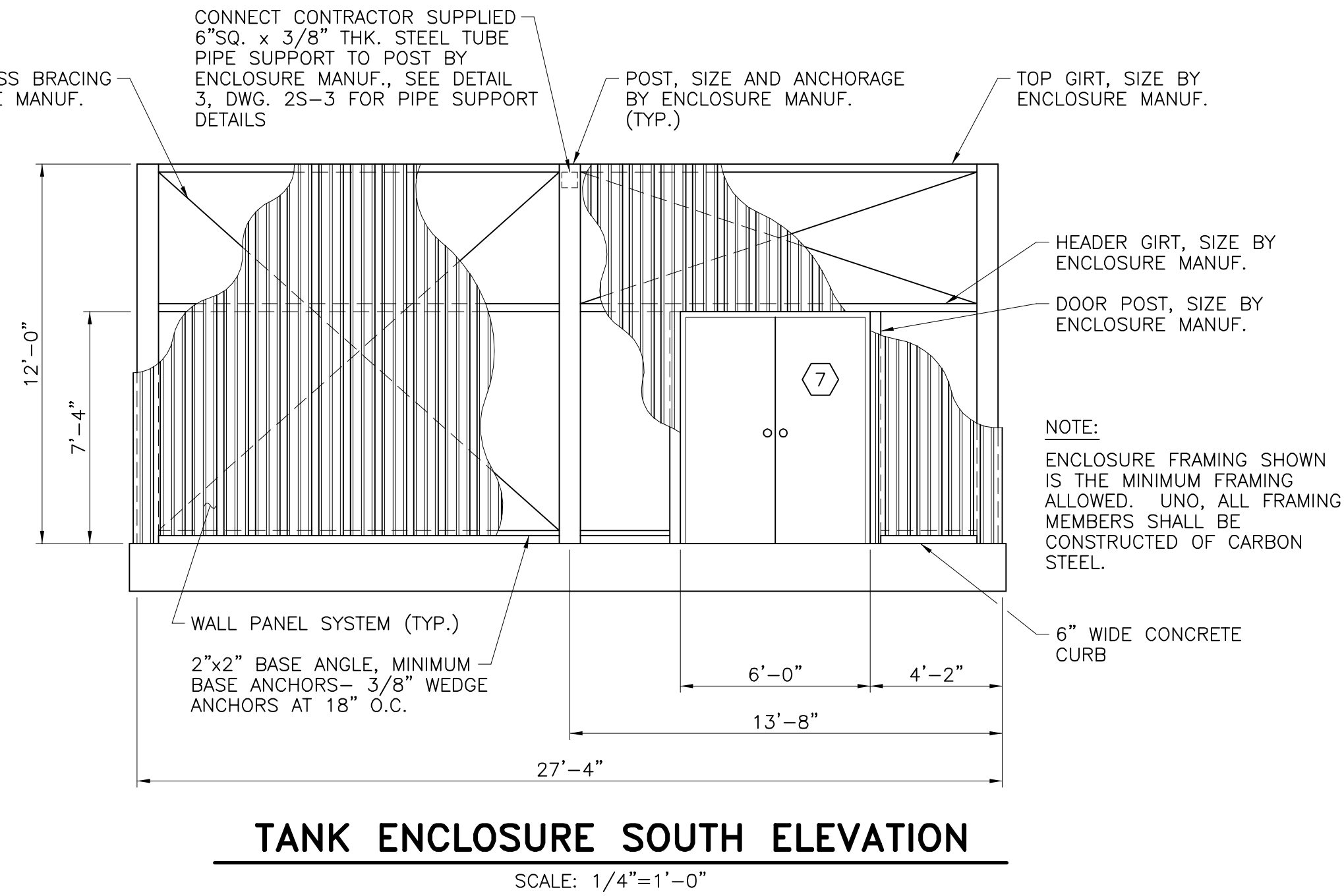
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**EMERGENCY STANDBY GENERATOR**

DRAWING  
4M-2  
 39 OF 69 SHEETS  
 11749  
 R.C.S.D. PLAN No.

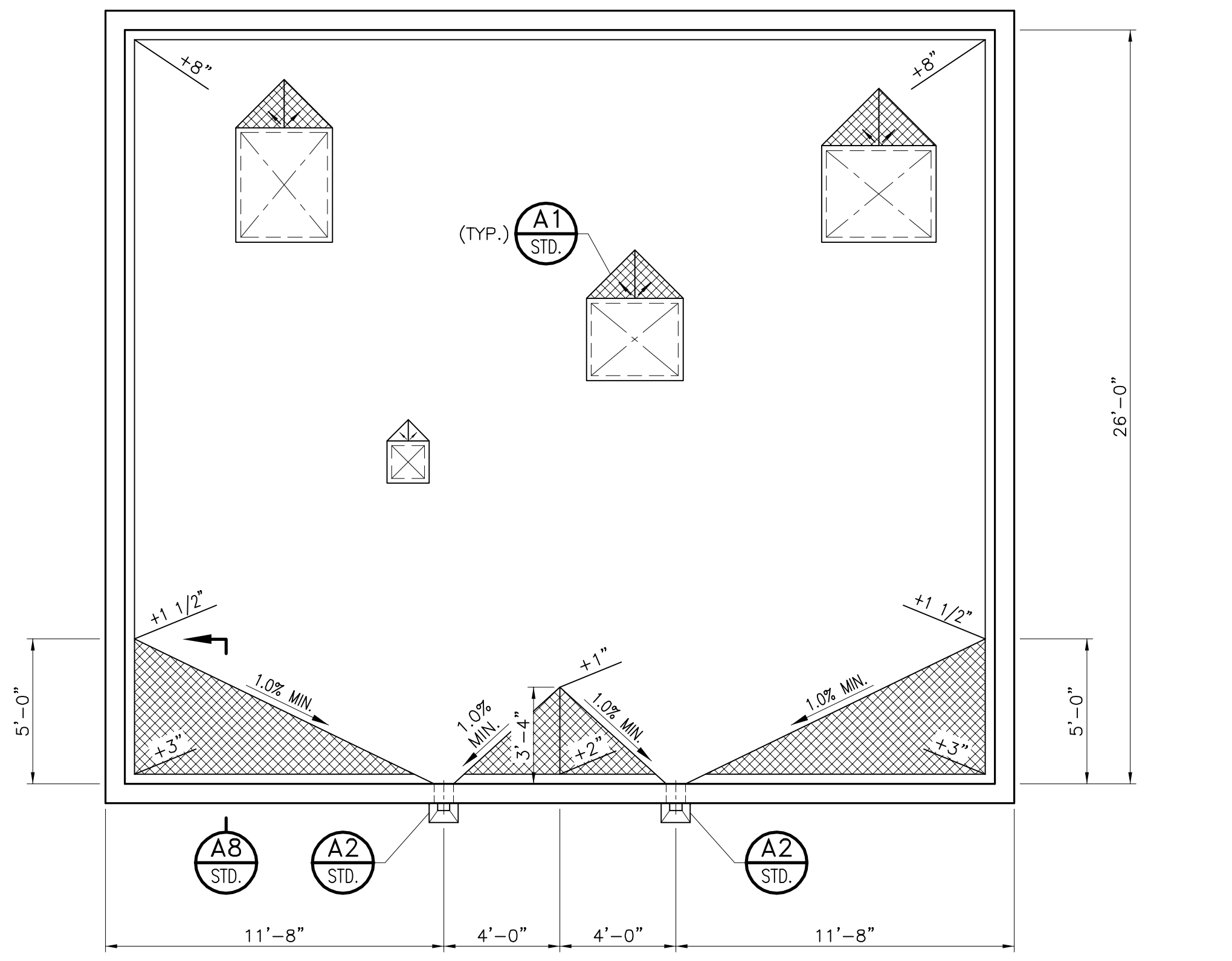
DWG. NO.: 587-19.54-01 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:01AM PLOT SCALE: 1=1



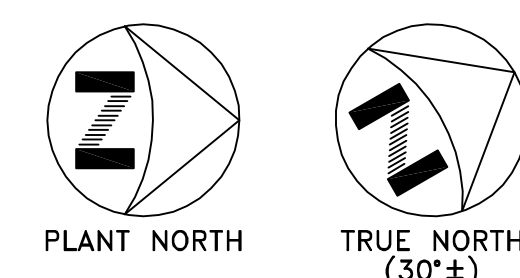
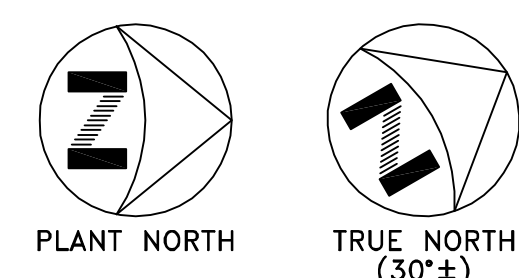
**FLOOR PLAN**  
SCALE: 3/8"=1'-0"



**TANK ENCLOSURE SOUTH ELEVATION**  
SCALE: 1/4"=1'-0"



**ROOF DRAINAGE PLAN**  
SCALE: 1/4"=1'-0"



**RECORD DRAWING**

BY: *R. C. Williams* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

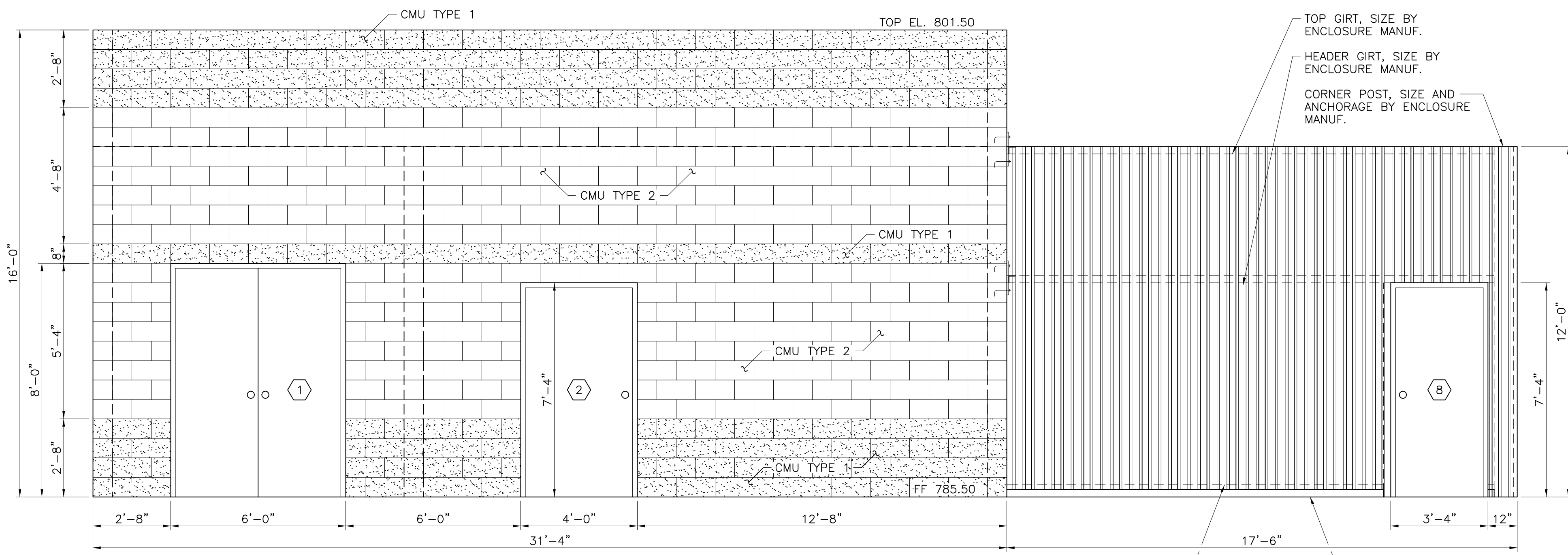
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING**  
FLOOR/ROOF PLANS AND  
TANK ENCLOSURE SOUTH ELEVATION

DRAWING  
**A-1**  
40 OF 69 SHEETS  
11750  
R.C.S.D. PLAN No.

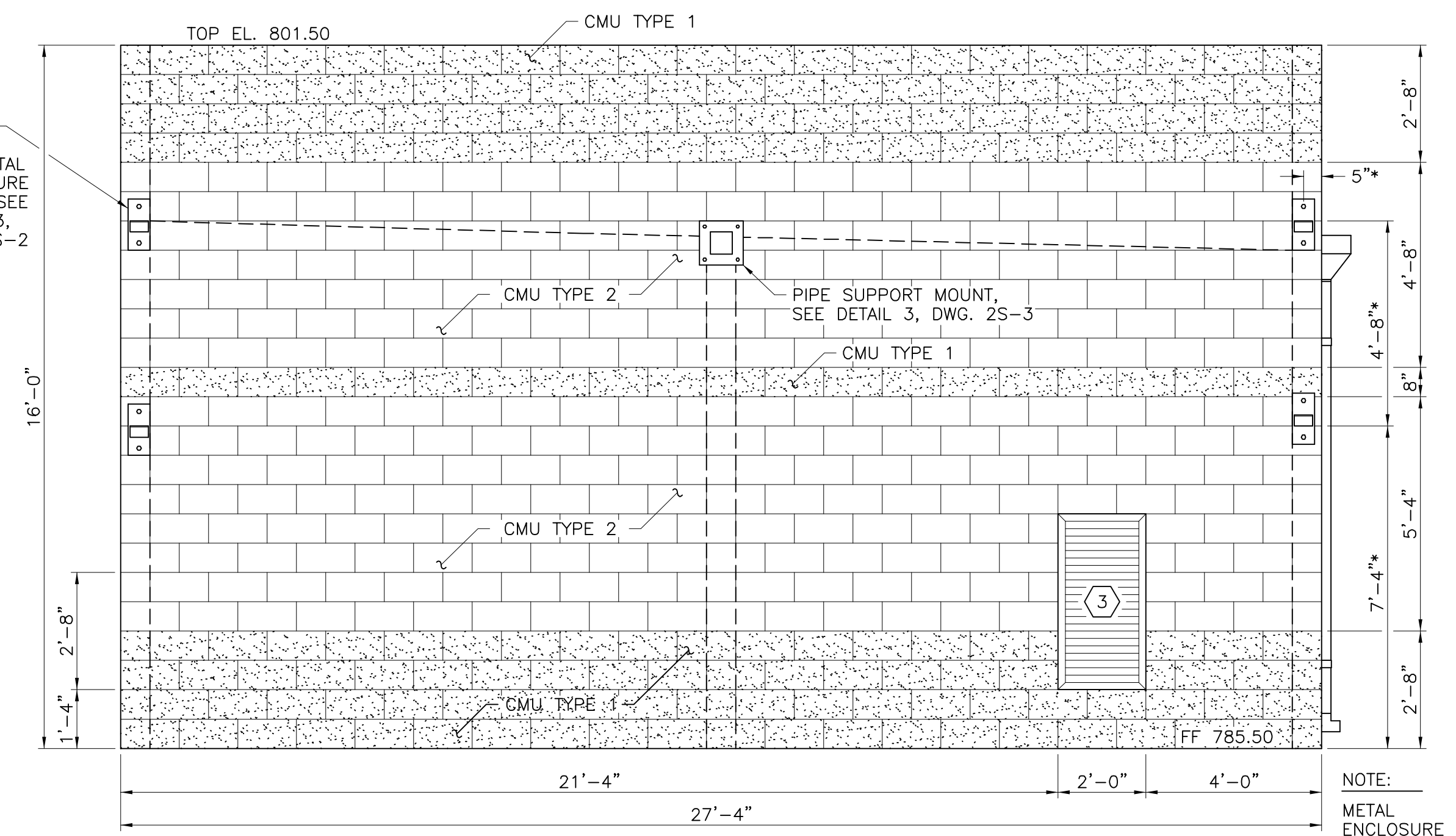


DWG. NO.: 16-987-19.54-03 FILE NO.: 16-987-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:01AM PLOT SCALE: 1=1



**WEST ELEVATION**

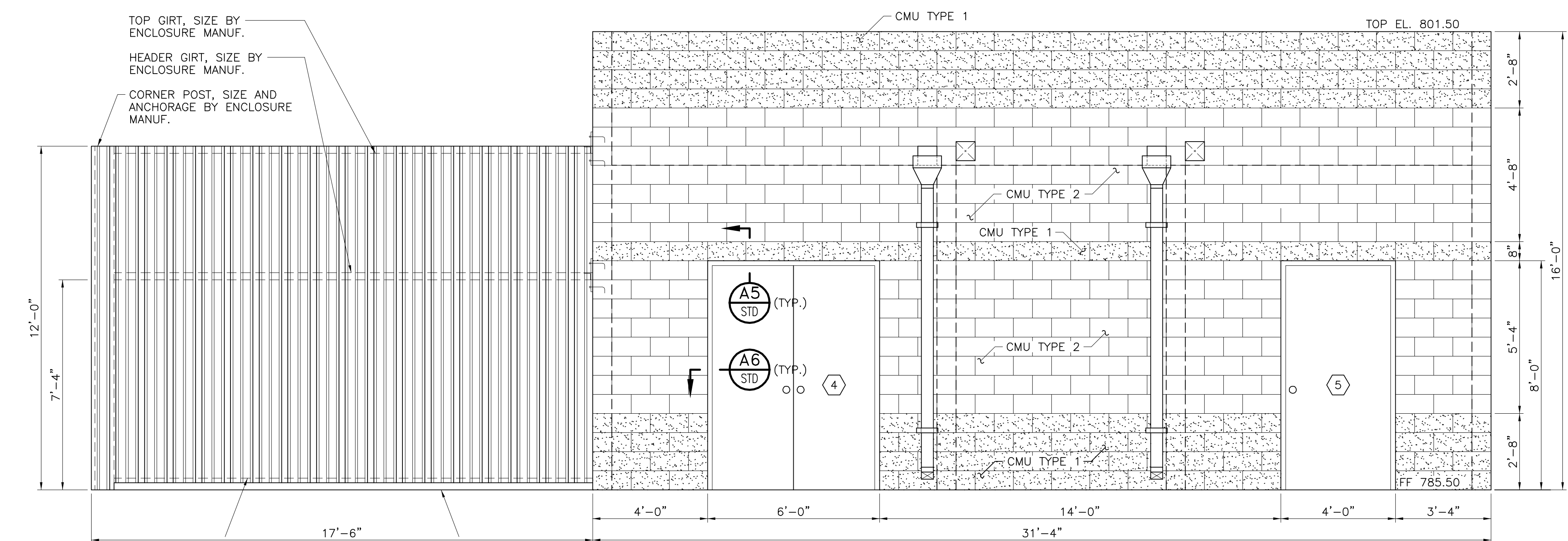
SCALE: 3/8"=1'-0"



**SOUTH ELEVATION**

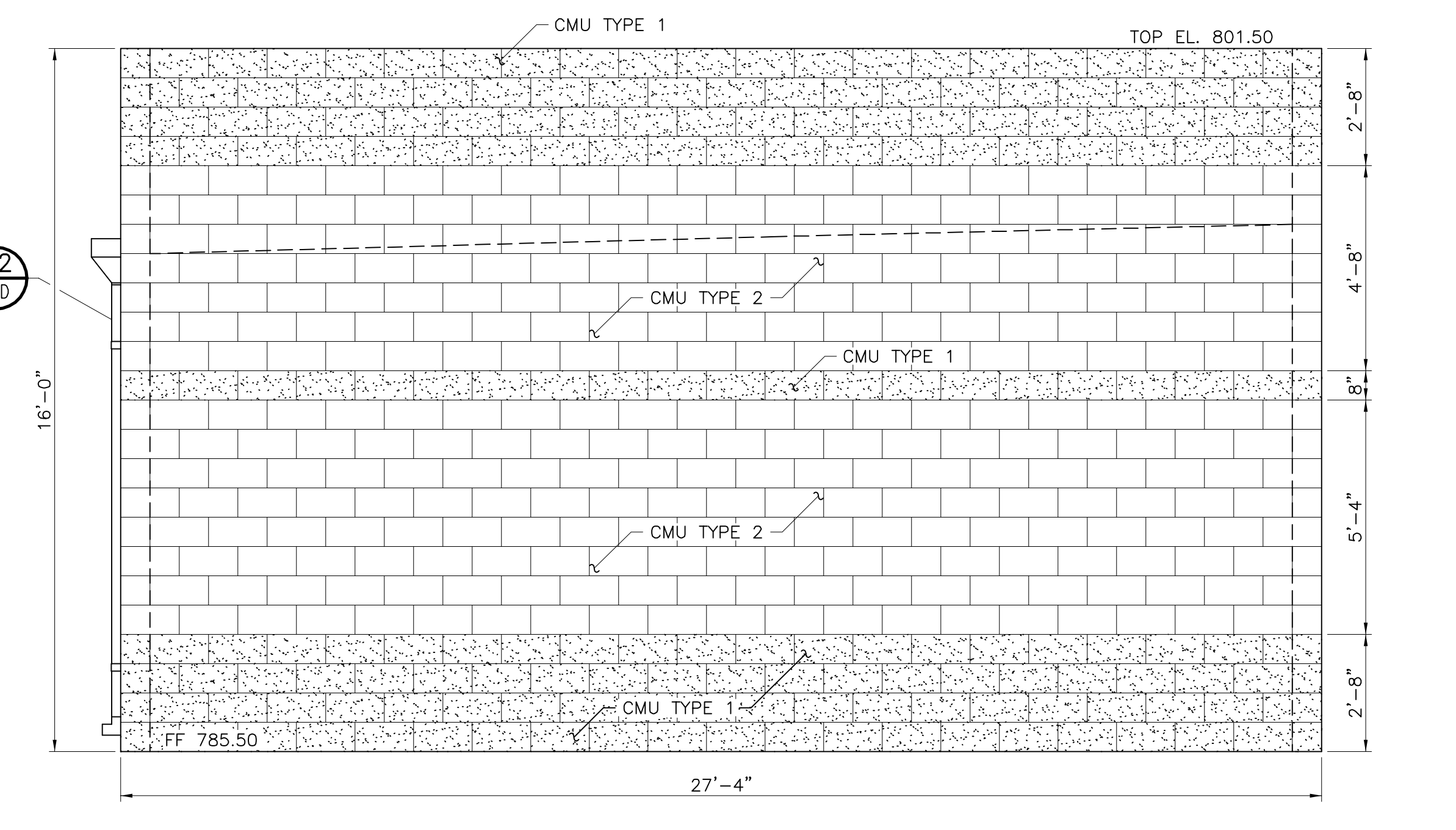
SCALE: 3/8"=1'-0"

NOTE:  
METAL ENCLOSURE NOT SHOWN



**EAST ELEVATION**

SCALE: 3/8"=1'-0"



**NORTH ELEVATION**

SCALE: 3/8"=1'-0"

**WALL OPENING SCHEDULE**

No.	OPENING TYPE	OPENING SIZE (1)		DOOR (2)		HARDWARE TYPE	REMARKS
		WIDTH (4)	HEIGHT	WIDTH	HEIGHT		
1	DOUBLE DOOR	6'-0"	8'-0"	2'-10"	7'-10"	HW-2	THRESHOLD PER STD. DETAIL A-4
2	SINGLE DOOR	4'-0"	7'-4"	3'-8"	7'-2"	HW-1	THRESHOLD PER STD. DETAIL A-4
3	INTAKE LOUVER	2'-0"	4'-0"	-	-	-	ACOUSTICAL WALL LOUVER, SEE STD. DETAIL A7 AND SPEC. 15700
4	DOUBLE DOOR	6'-0"	8'-0"	2@ 2'-10"	7'-10"	HW-2	STEEL SOUND CONTROL DOOR PER SPEC. SECTION 08120 THRESHOLD PER STD. DETAIL A-4
5	SINGLE DOOR	4'-0"	8'-0"	3'-8"	7'-10"	HW-1	THRESHOLD PER STD. DETAIL A-4
6	SINGLE DOOR	3'-4"	7'-4"	3'-0"	7'-2"	HW-3	INTERIOR DOOR, SEE DWG. A-1 WITH 18"(W) x 12"(H) METAL LOUVER
7	DOUBLE DOOR	6'-0"	7'-4"	2@ 2'-10"	7'-2"	HW-2	THRESHOLD PER STD. DETAIL A-4
8	SINGLE DOOR	3'-4"	7'-4"	3'-0"	7'-2"	HW-1	THRESHOLD PER STD. DETAIL A-4

- NOTES:
- SIZE OF MASONRY OPENING.
  - UNO, ALL DOORS SHALL BE HOLLOW METAL PER SPECIFICATION SECTION 08100. FIXED METAL LOUVERS IN DOORS SHALL BE MOUNTED 1'-0" FROM THE BOTTOM OF THE DOOR AND SHALL BE CENTERED SIDE TO SIDE.
  - DOORS, FRAMES, AND LOUVERS SHALL BE COATED PER SYSTEM B OF SPECIFICATION SECTION 09900.
  - PROVIDE U-LINTEL BLOCK AT TOP OF DOOR OPENINGS AND LOUVER OPENINGS.

**RECORD DRAWING**

BY: *B. C. Williams* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

**48 hours BEFORE excavation**  
**1-800-227-2600**  
CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Phillip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	JGS
CHECKED	JCR

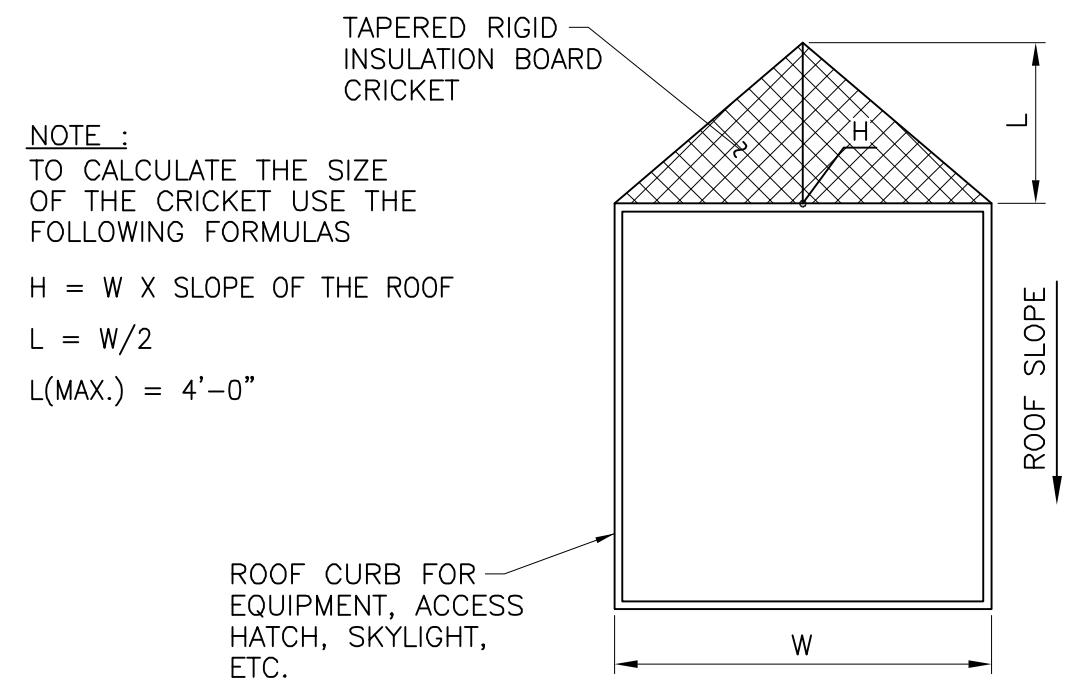
**FINISH SCHEDULE**

ITEM	DESCRIPTION	COLOR	NOTE
CMU TYPE 1	DESERT BLOCK CO., INC.-SPLITFACE	SANDSTONE (1)	USE WITH MORTAR COLOR 1
CMU TYPE 2	DESERT BLOCK CO., INC.-PRECISION	SANDSTONE (1)	USE WITH MORTAR COLOR 1
MORTAR COLOR 1	DAVIS COLORS	MEDIUM TAN (1)	
SCUPPER	PAINTED METAL	AS SELECTED BY OWNER	
METAL DOOR AND FRAME	PAINTED METAL	AS SELECTED BY OWNER	
METAL DOOR LOUVER	PAINTED METAL	AS SELECTED BY OWNER	
METAL WALL LOUVER	PAINTED METAL	AS SELECTED BY OWNER	
METAL ENCLOSURE	PAINTED METAL	AS SELECTED BY OWNER	FACTORY APPLIED COATING PER SPEC.

NOTES:  
1. CONTRACTOR SHALL SUBMIT COLOR SAMPLES FOR SELECTION BY OWNER.

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING**  
**ELEVATIONS AND SCHEDULES**

DRAWING  
**A-2**  
41 OF 69 SHEETS  
11751  
R.C.S.D. PLAN No.

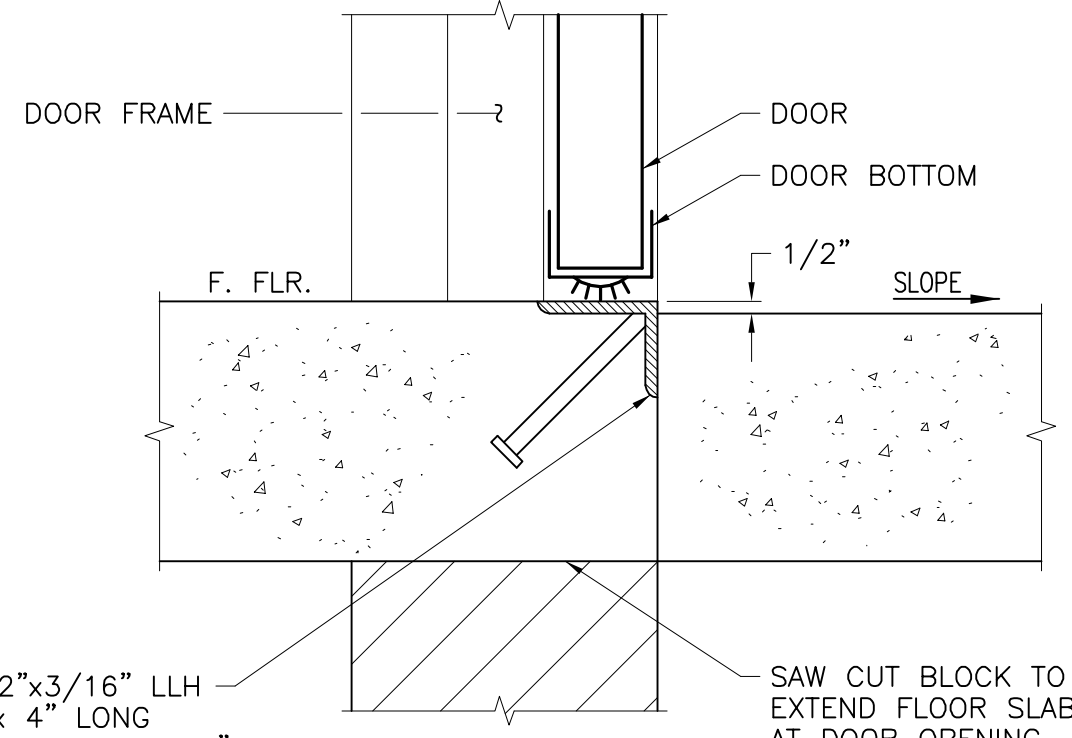


NOTE:  
FOR ROOF FRAMING SEE STRUCTURAL DWGS.

**ROOF CURB CRICKET**

SCALE: 1"=1'-0"

**A1**  
STD.

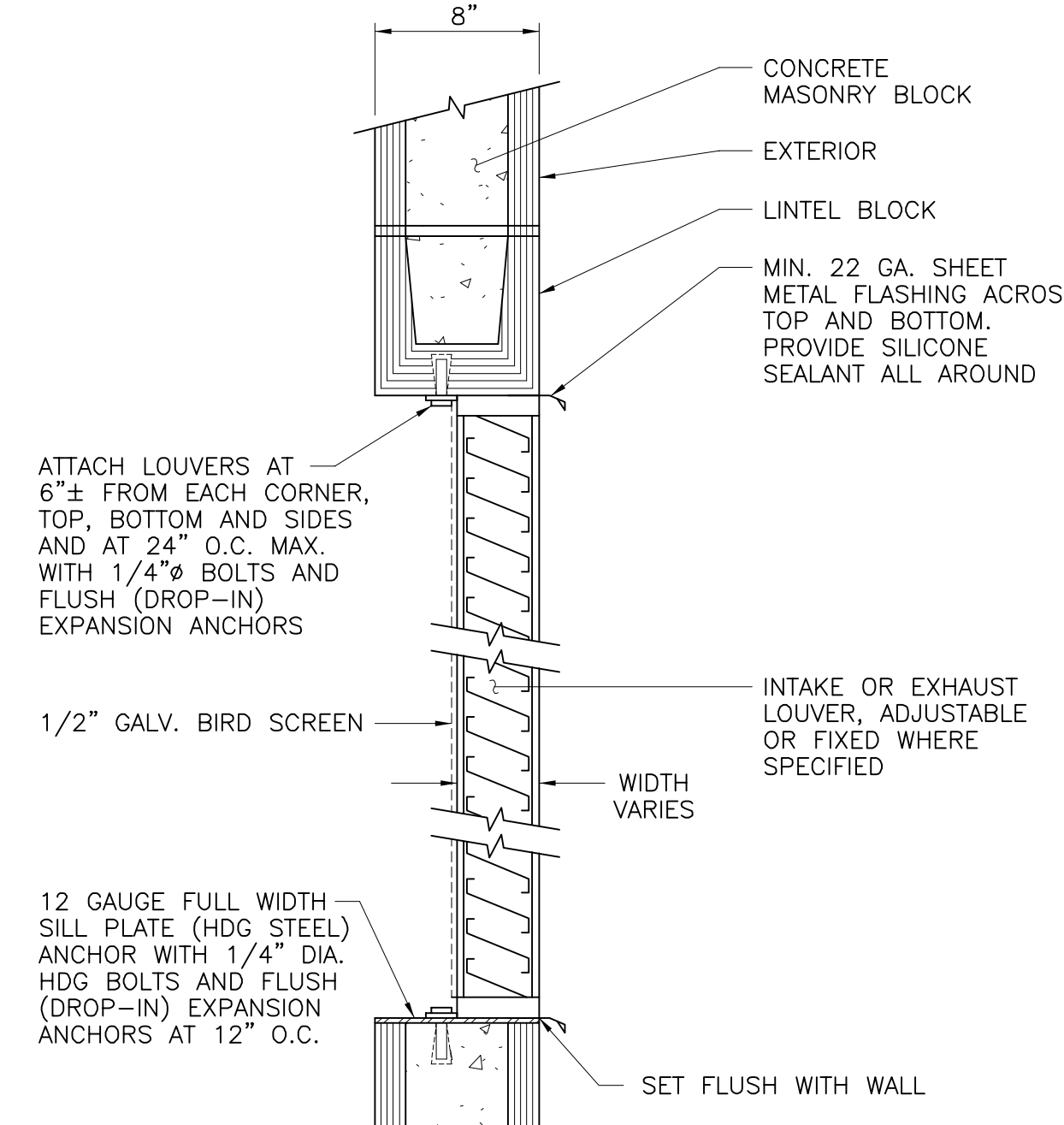


ANGLE 2 1/2"x2"x3/16" LLH WITH 3/8" DIA. x 4" LONG NELSON HEADED STUDS @ 18" O.C. (6" FROM EACH END, 3 MIN. PER THRESHOLD). HOT DIP GALVANIZE AFTER FABRICATION

**STEEL ANGLE THRESHOLD DETAIL**

N.T.S.

**A4**  
STD.



ATTACH LOUVERS AT 6"± FROM EACH CORNER, TOP, BOTTOM AND SIDES AND AT 24" O.C. MAX. WITH 1/4" DIA. BOLTS AND FLUSH (DROP-IN) EXPANSION ANCHORS

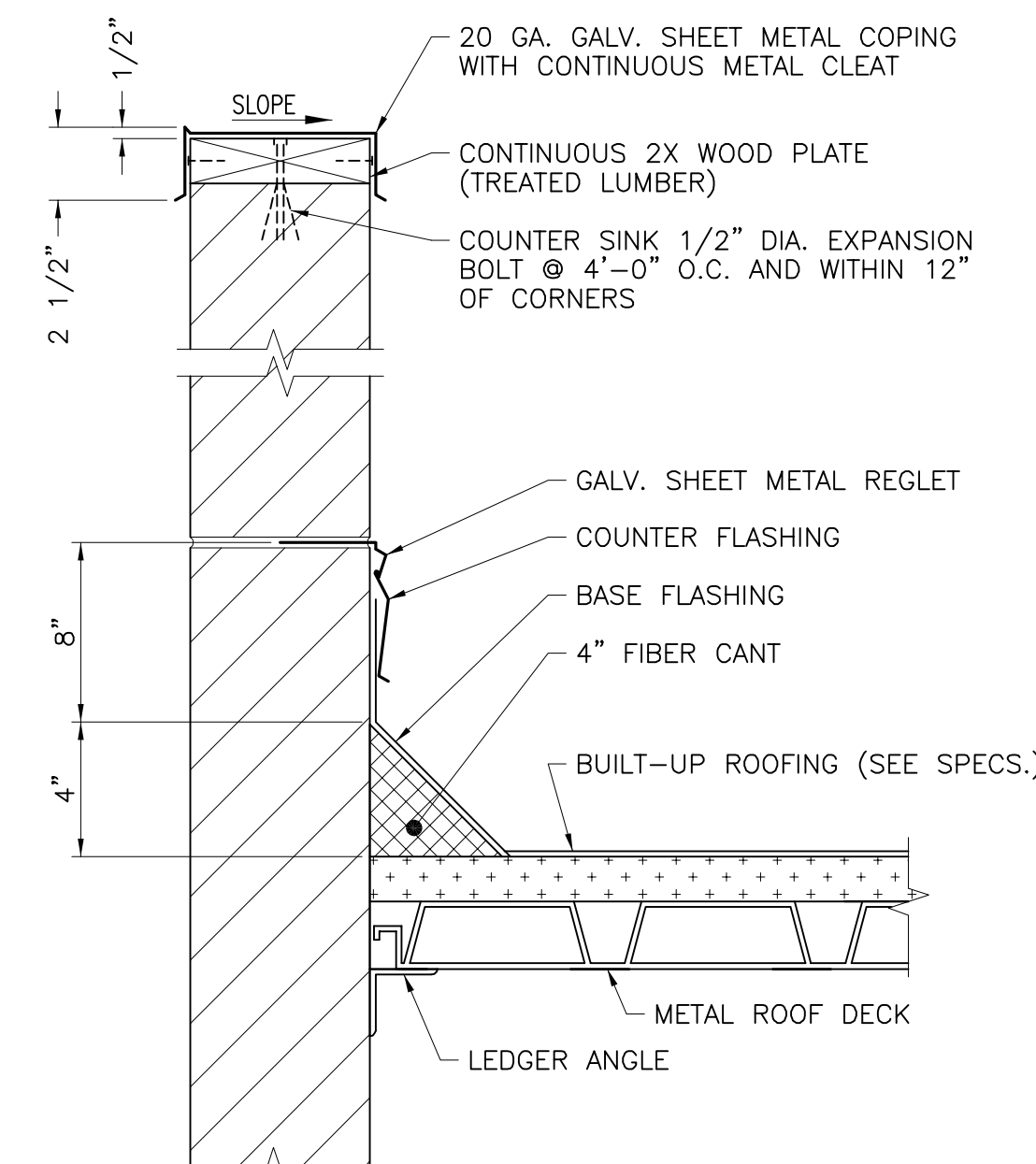
1/2" GALV. BIRD SCREEN

12 GAUGE FULL WIDTH SILL PLATE (HDG STEEL) ANCHOR WITH 1/4" DIA. HDG BOLTS AND FLUSH (DROP-IN) EXPANSION ANCHORS AT 12" O.C.

**TYPICAL WALL LOUVER DETAIL**

SCALE 1 1/2"=1'-0"

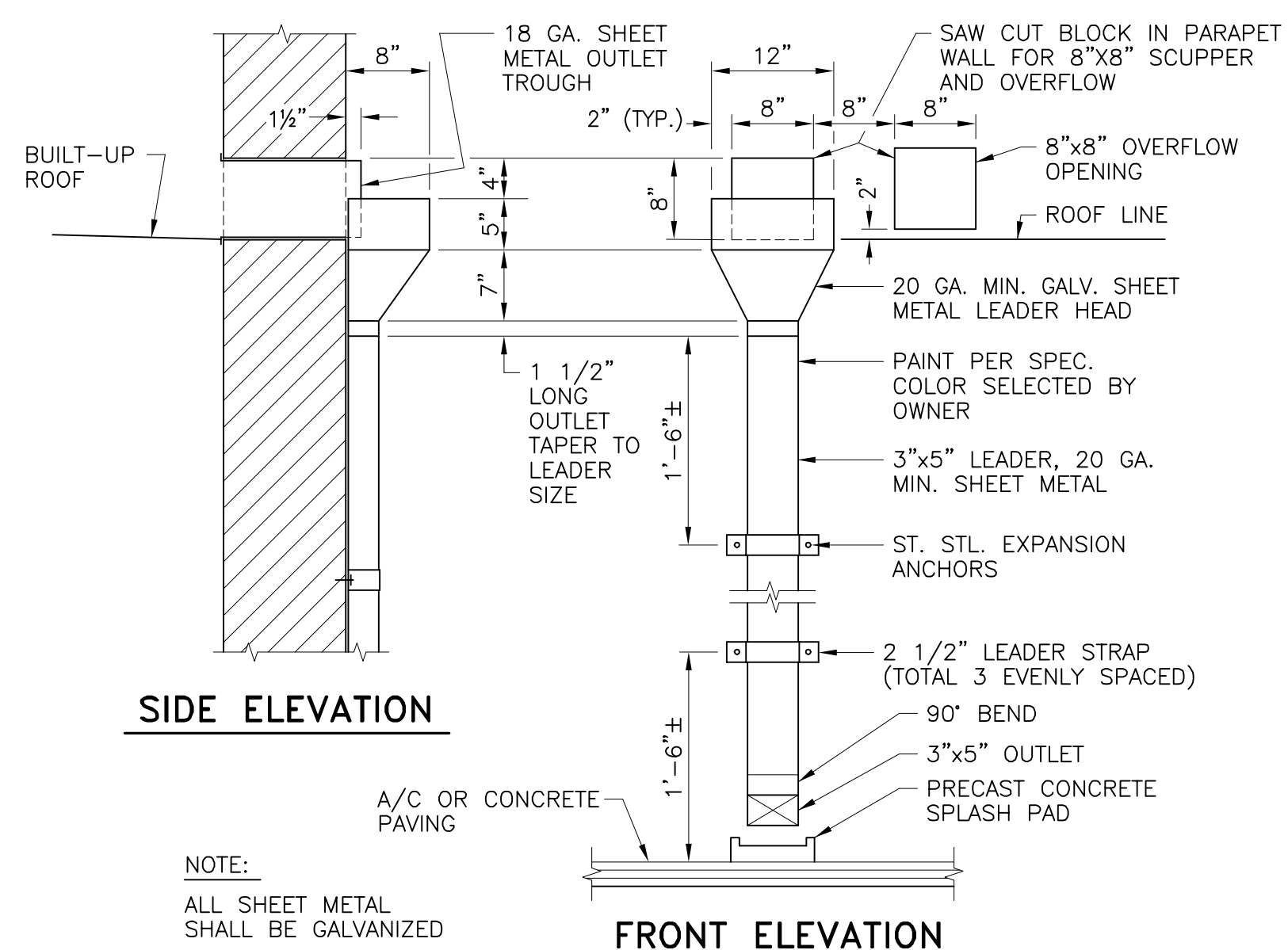
**A7**  
STD.



**PARAPET FLASHING DETAIL**

SCALE: 1 1/2"=1'-0"

**A9**  
STD.



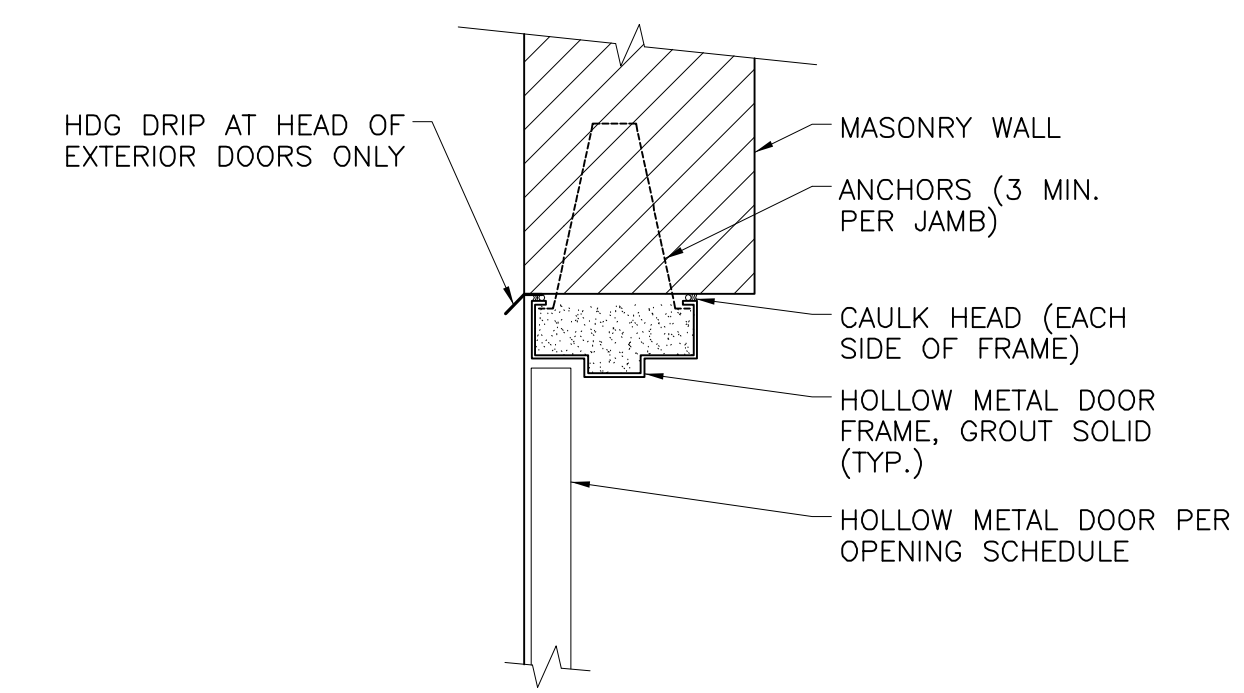
**SIDE ELEVATION**

**FRONT ELEVATION**

**ROOF SCUPPER DETAIL**

N.T.S.

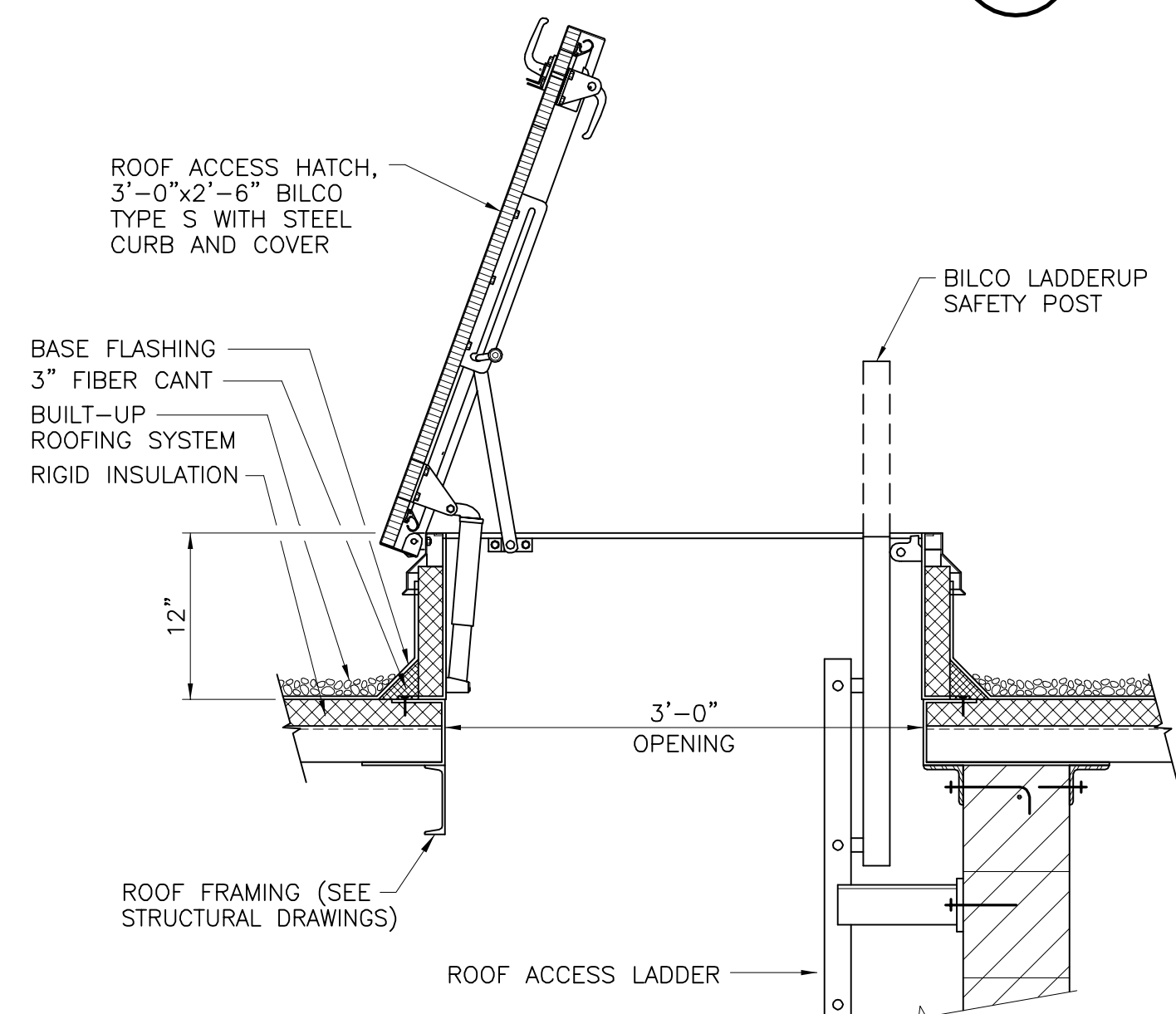
**A2**  
STD.



**DOOR HEAD AT MASONRY WALL**

N.T.S.

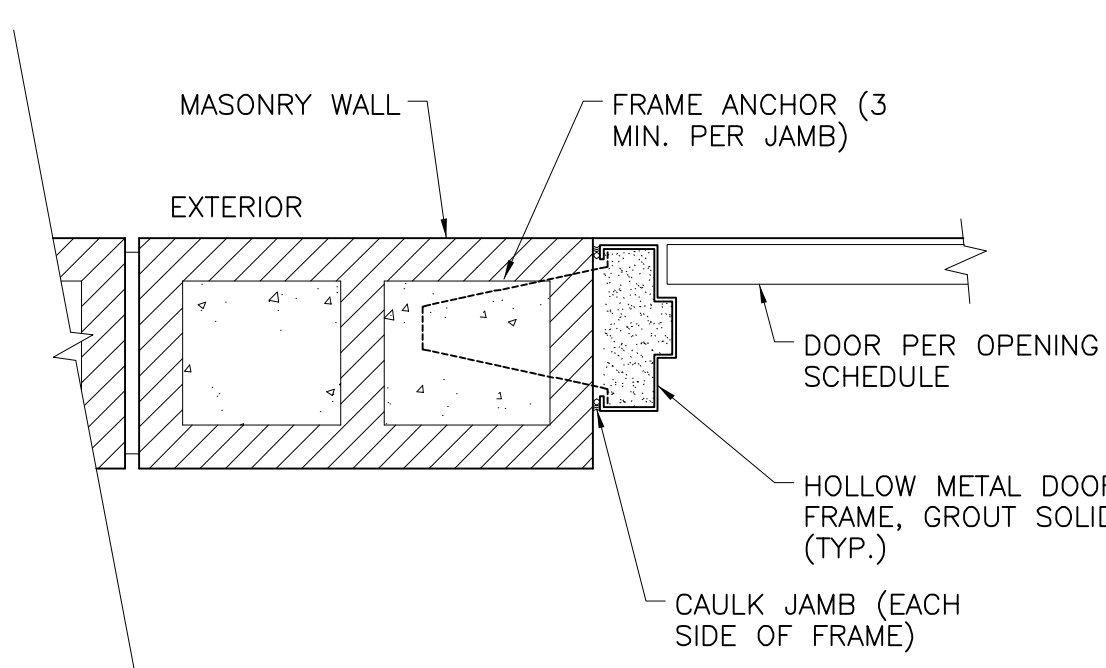
**A5**  
STD.



**ROOF ACCESS HATCH DETAIL**

N.T.S.

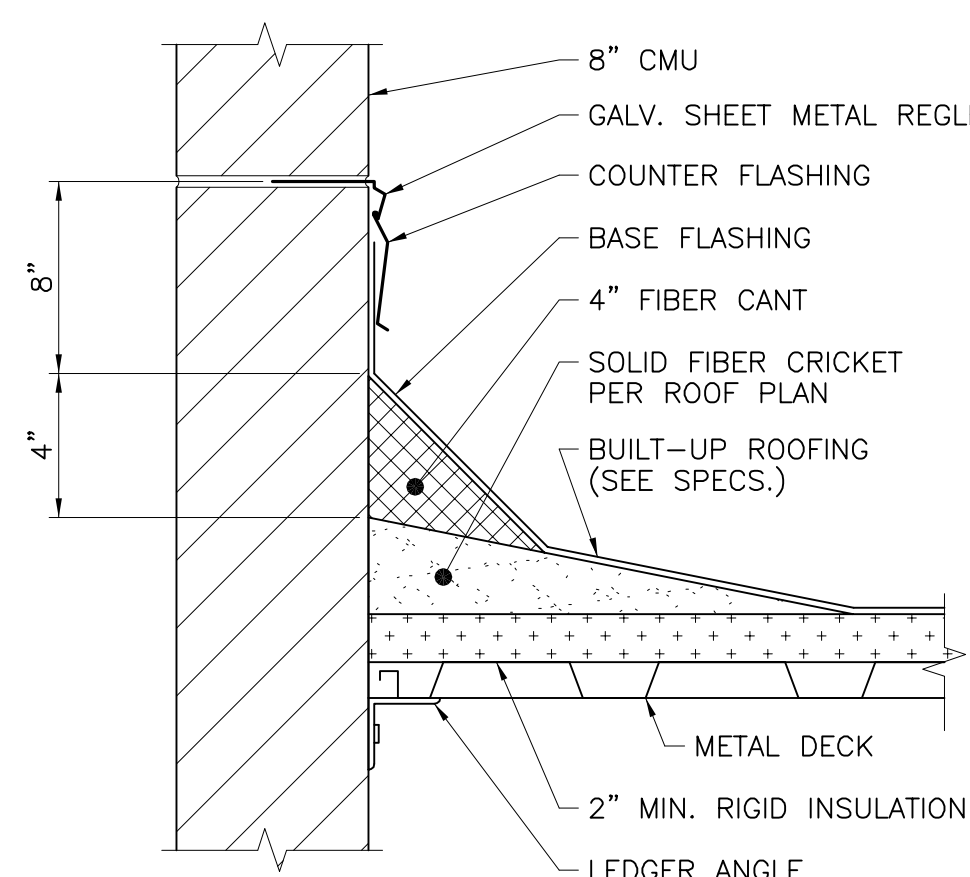
**A3**  
STD.



**DOOR JAMB AT MASONRY WALL**

N.T.S.

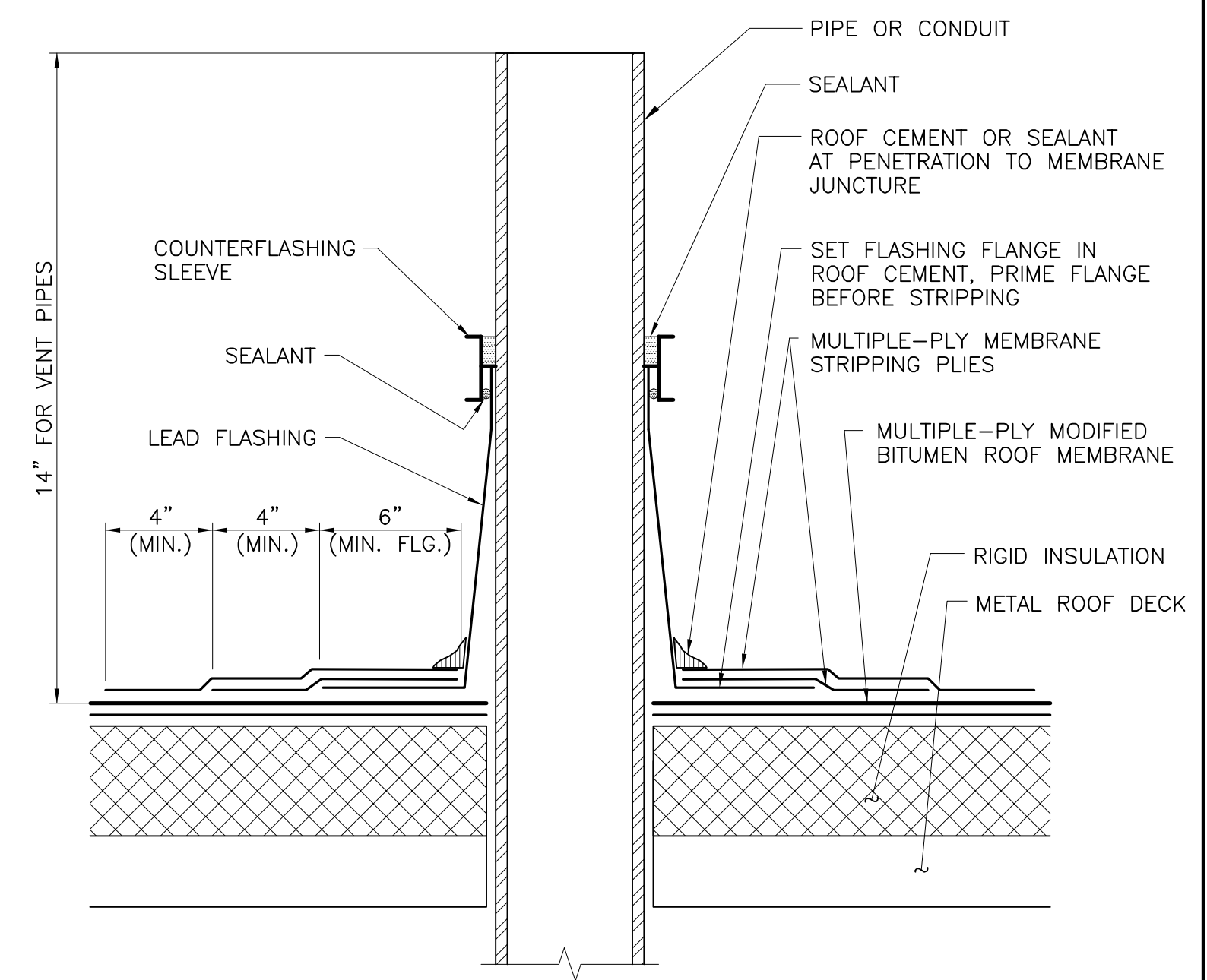
**A6**  
STD.



**PARAPET AND CRICKET FLASHING DETAIL**

SCALE: 1 1/2"=1'-0"

**A8**  
STD.



**ROOF PIPE/CONDUIT PENETRATION DETAIL**

N.T.S.

**A10**  
STD.

- NOTES:
- LEAD FLASHING MINIMUM OF 2 1/2 LB. PER SQUARE FOOT.
  - VENT STACKS AND OTHER PIPES SHALL HAVE A MINIMUM OF 12 INCHES OF CLEARANCE ON ALL SIDES FROM WALLS, CURBS, AND OTHER PROJECTIONS TO FACILITATE PROPER FLASHING.
  - TOP STRIPPING PLIES SHALL BE A HEAVY-WEIGHT BITUMEN SHEET.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Phillip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

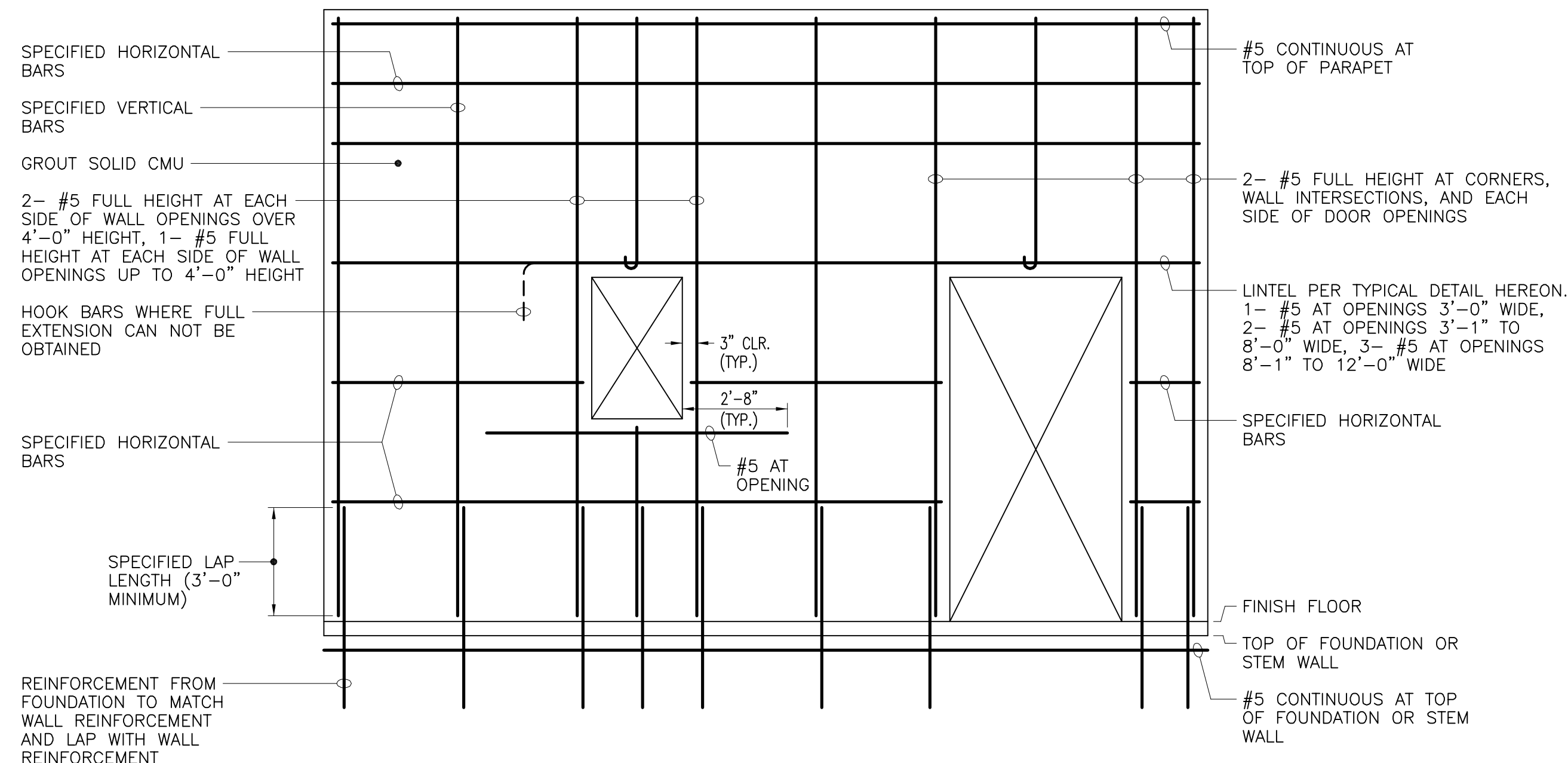
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**STANDARD ARCHITECTURAL DETAILS**

DRAWING  
**A-3**  
42 OF 69 SHEETS  
11752  
R.C.S.D. PLAN No.

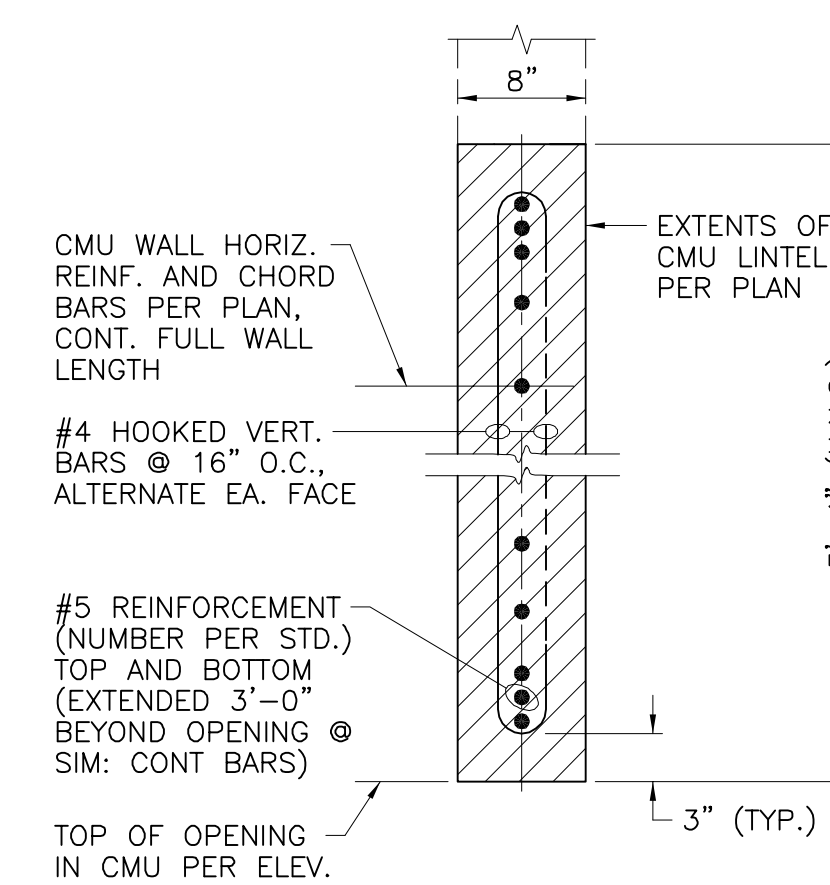
DWG. NO.: re-987-19.54-03 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:03AM PLOT SCALE: 1"=1'

DWG. NO.: REC-98-19-54-1 FILE NO.: REC-98-19-54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:04AM PLOT SCALE: 1=1



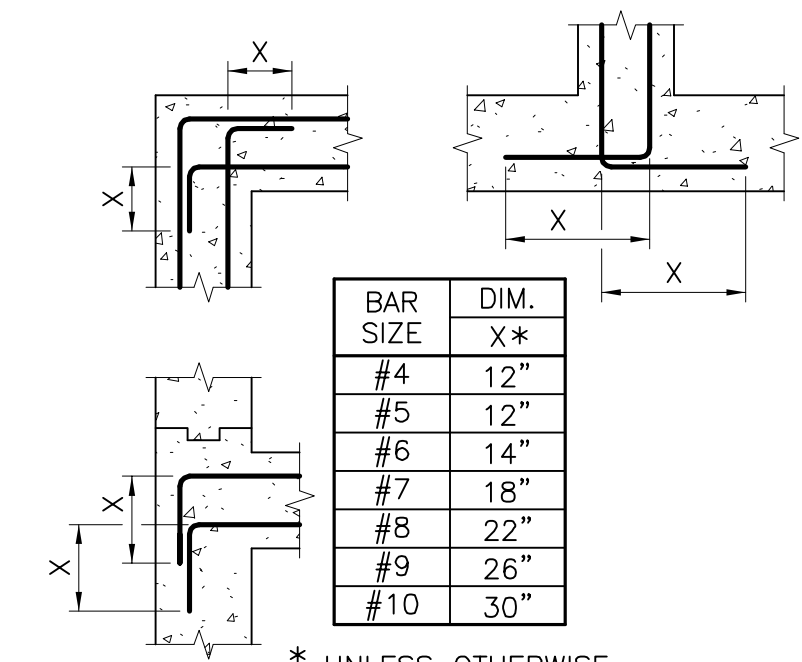
**TYPICAL MASONRY WALL REINFORCING (U.N.O.)**

N.T.S.



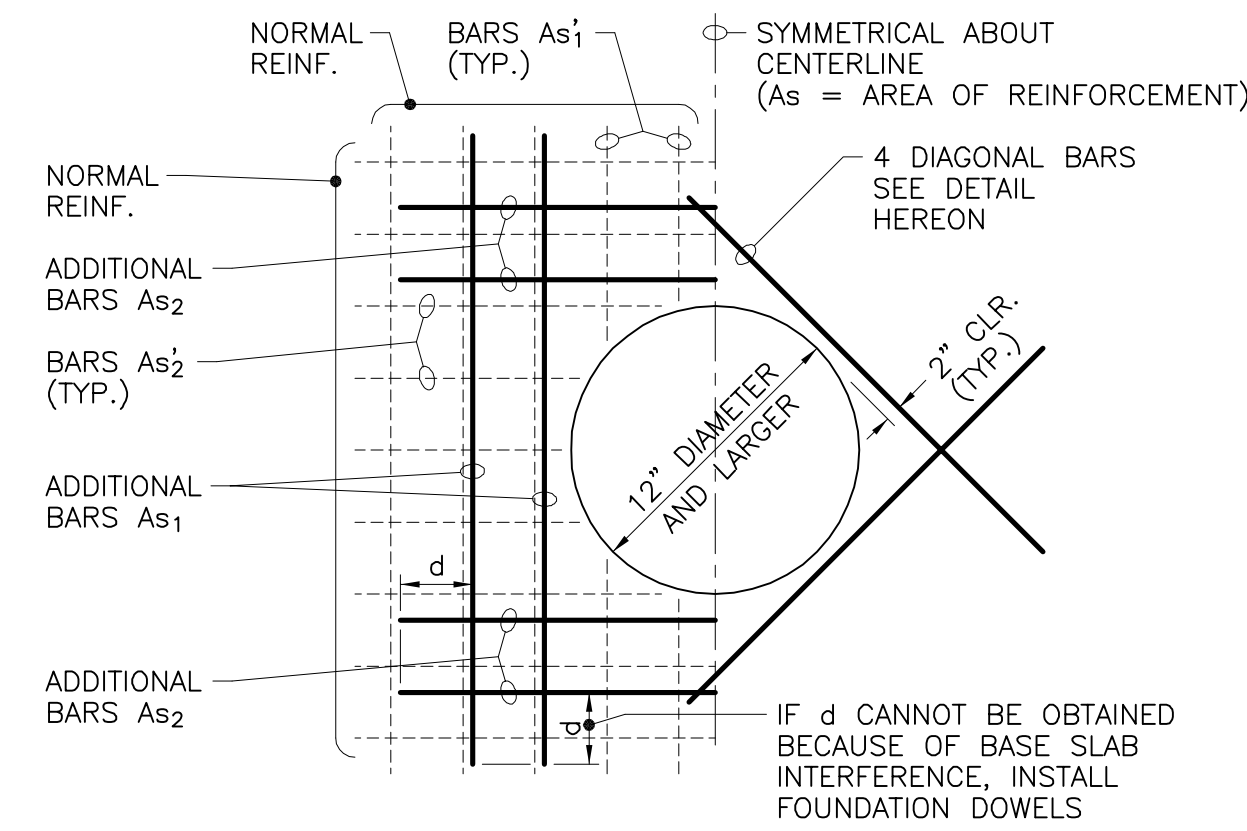
**TYPICAL LINTEL DETAIL**

N.T.S.



**REINFORCEMENT HOOK CHART**

N.T.S.



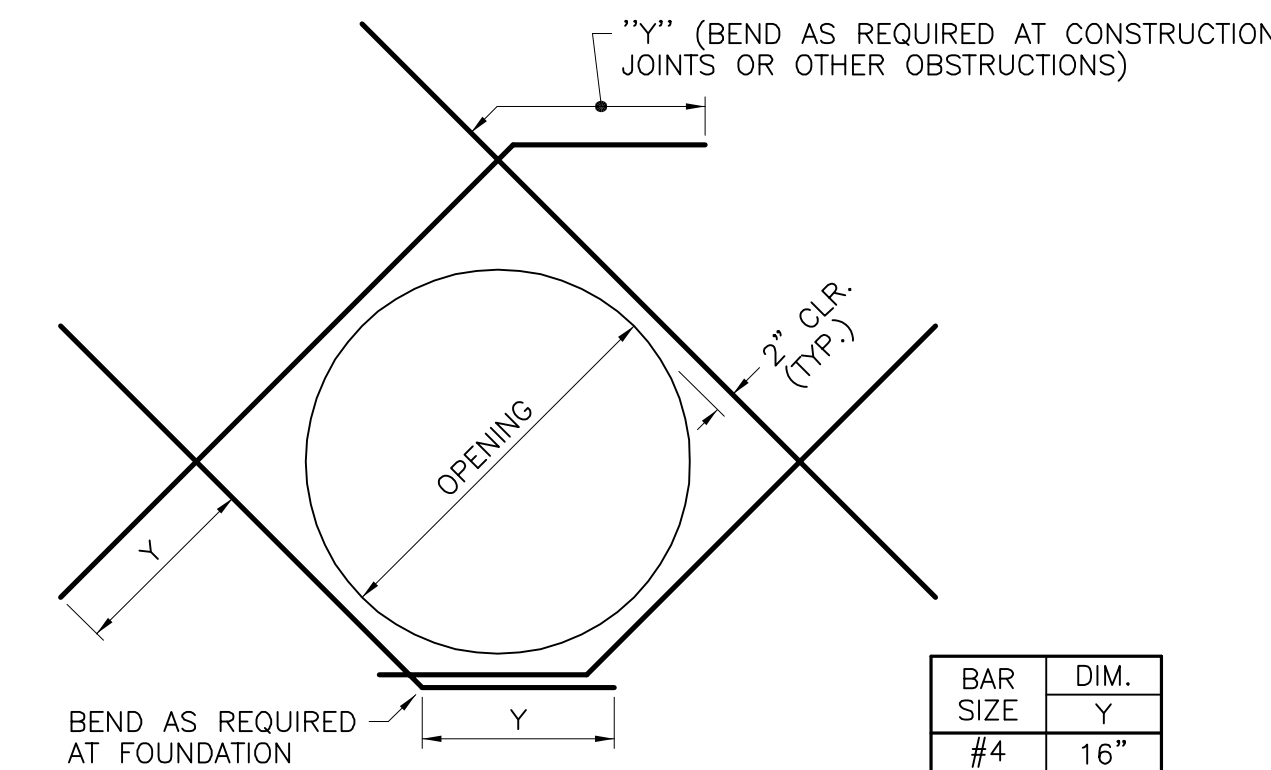
**ADDITIONAL REINFORCEMENT AROUND CIRCULAR OPENINGS**

N.T.S.

**NOTES:**

- CUT NORMAL REINF. AT OPENINGS:  
As<sub>1</sub> AND As<sub>2</sub> = As<sub>1</sub> OR As<sub>2</sub>, 1/2 AREA OF CUT BARS TO BE ADDED ON EACH SIDE OF OPENINGS.
- ADDITIONAL BARS As<sub>1</sub> AND As<sub>2</sub> TO BE PLACED:  
A. AT  $\phi$  OF WALL OR SLAB WHERE ONE LAYER OF REINF. IS PROVIDED.  
B. AT EACH FACE OF WALL OR SLAB WHERE TWO LAYERS OF REINF. ARE PROVIDED.
- WHERE PIPE INSTALLED THROUGH A BLOCKOUT PROVIDE A 2"x4" KEY AND SANDBLAST KEY AND PIPE. COAT WITH ACRYL 60 FOR BOND TO CONCRETE. PLACE CONCRETE OR INSTALL SAND/CEMENT AND ACRYL 60 MIXTURE. 2"x4" KEY SHALL INCLUDE 6" WATERSTOP WHEN SUBMERGED.
- THIS DETAIL TO BE USED ONLY WHEN NO OTHER DETAIL IS INDICATED ON THE DRAWINGS.

BAR SIZE	DIM. d
#4	22"
#5	27"
#6	32"
#7	38"
#8	45"
#9	57"
#10	73"



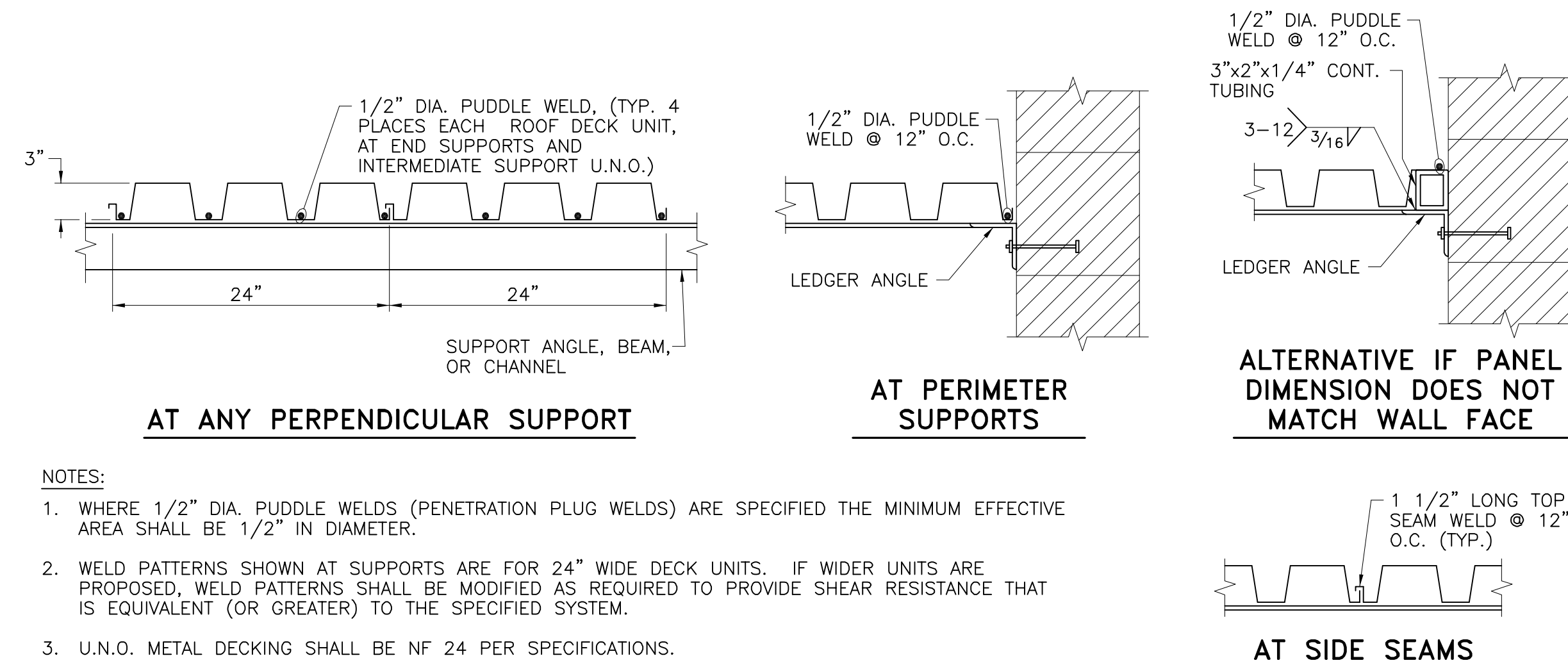
**DIAGONAL REINFORCEMENT AT CIRCULAR OPENINGS**

N.T.S.

**NOTES:**

- CUT NORMAL REINFORCEMENT CLEAR OF OPENING.
- DIAGONAL BARS TO BE PLACED:  
A. AT  $\phi$  OF WALL OR SLAB WHERE ONE LAYER OF REINFORCEMENT IS PROVIDED.  
B. AT EACH FACE OF WALL OR SLAB WHERE TWO LAYERS OF REINFORCEMENT ARE PROVIDED.
- UNLESS OTHERWISE NOTED, SIZE OF DIAGONAL BARS SHALL BE THE SIZE OF THE LARGEST NORMAL REINFORCEMENT BAR CUT. IF NO BAR CUT, THEN USE #4.
- THIS DETAIL TO BE USED WHEN NO OTHER DETAIL IS SPECIFIED.

BAR SIZE	DIM. Y
#4	16"
#5	16"
#6	18"
#7	24"
#8	30"

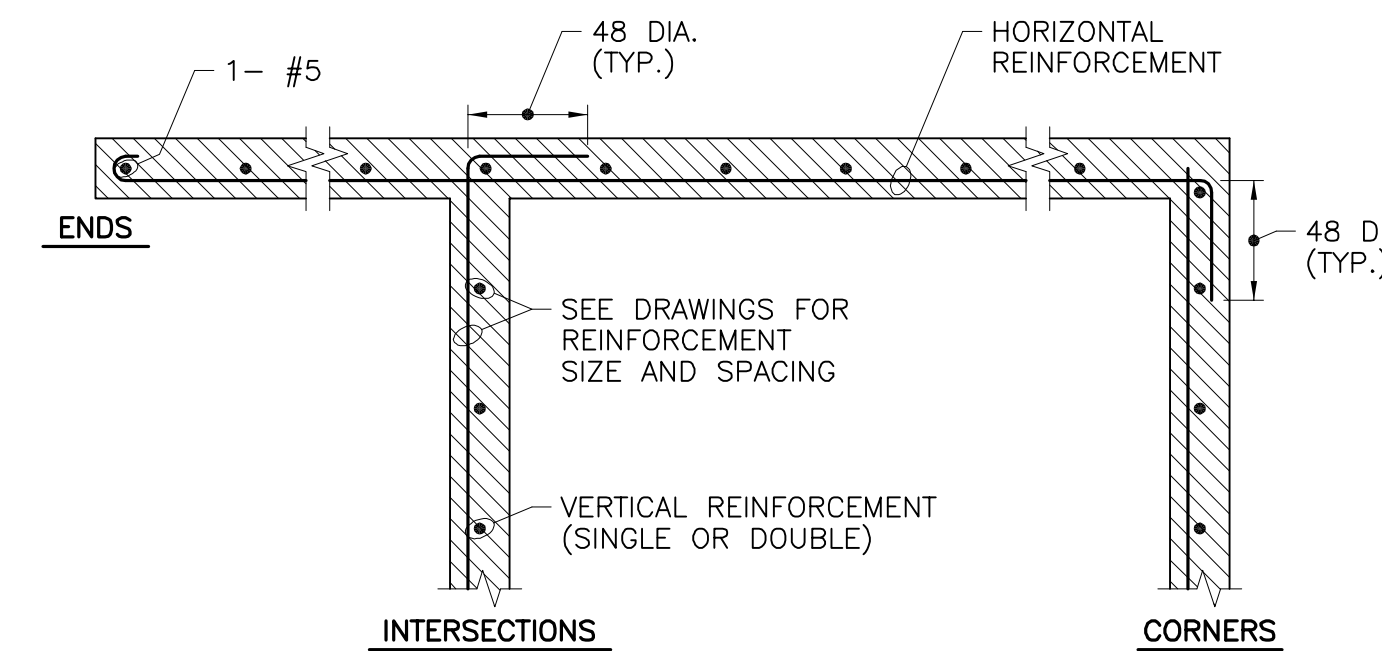


**TYPICAL METAL DECK WELDING**

N.T.S.

**NOTES:**

- WHERE 1/2" DIA. PUDDLE WELDS (PENETRATION PLUG WELDS) ARE SPECIFIED THE MINIMUM EFFECTIVE AREA SHALL BE 1/2" IN DIAMETER.
- WELD PATTERNS SHOWN AT SUPPORTS ARE FOR 24" WIDE DECK UNITS. IF WIDER UNITS ARE PROPOSED, WELD PATTERNS SHALL BE MODIFIED AS REQUIRED TO PROVIDE SHEAR RESISTANCE THAT IS EQUIVALENT (OR GREATER) TO THE SPECIFIED SYSTEM.
- U.N.O. METAL DECKING SHALL BE NF 24 PER SPECIFICATIONS.

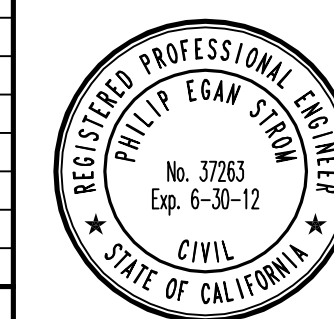


**TYPICAL MASONRY WALL SECTIONS**

N.T.S.

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Philip L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**TYPICAL STRUCTURAL DETAILS**

**DRAWING**

**S-1**

43 OF 69 SHEETS

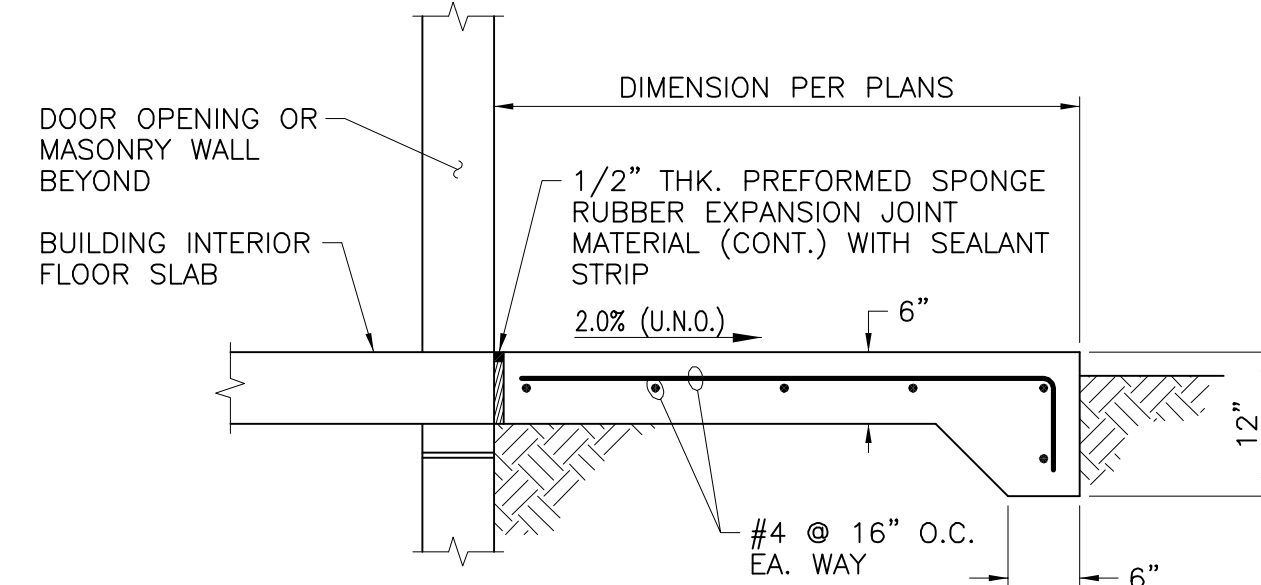
11753

R.C.S.D. PLAN No.

587-19.54



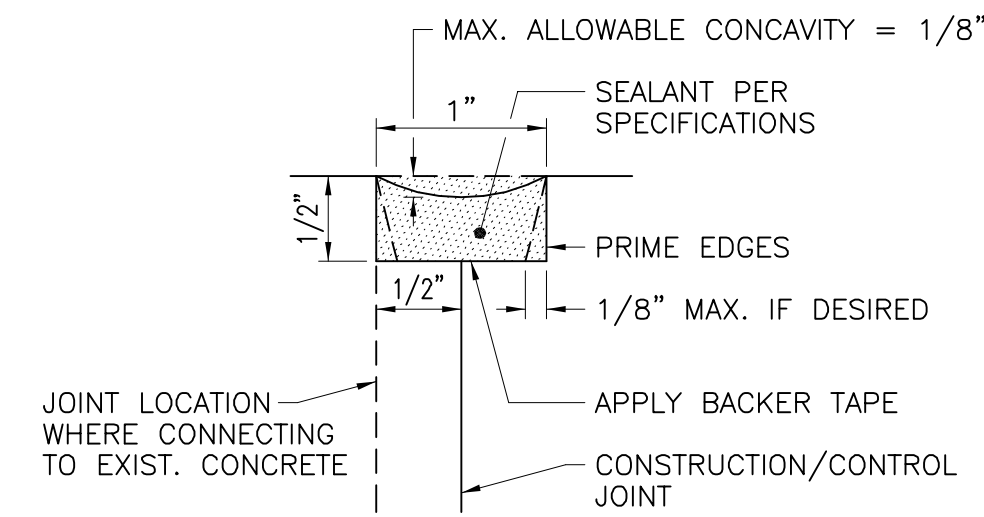
DWG. NO.: 16-587-19.54-2 FILE NO.: 16-587-19.54\_UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:05AM PLOT SCALE: 1=1



- NOTES:
- DIMENSIONS AND SLOPE ARE TYPICAL UNLESS SHOWN OTHERWISE ON CONSTRUCTION DRAWINGS.
  - PLACE CONTROL JOINTS AT 8'-0" O.C. MAXIMUM.

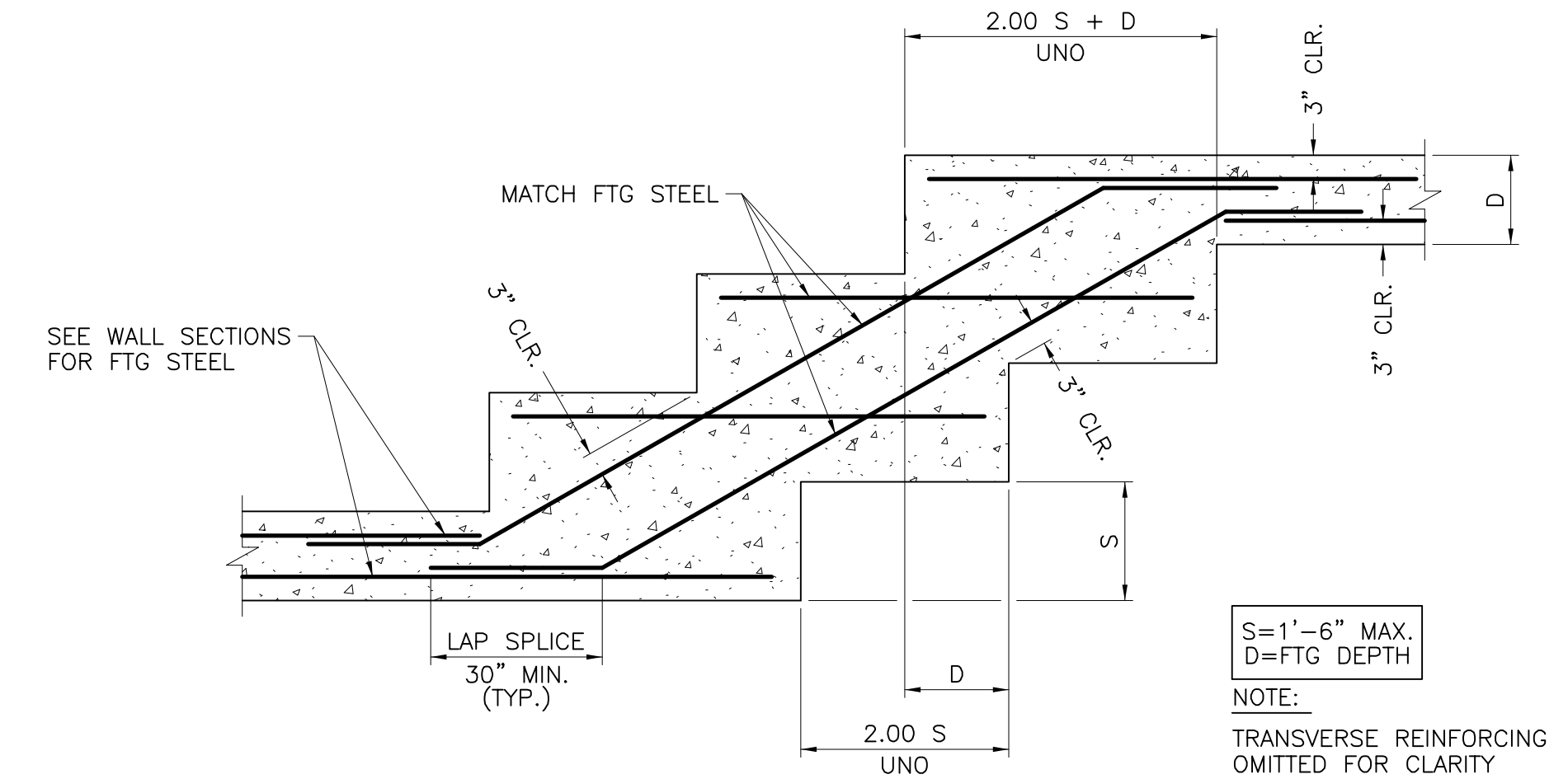
**BUILDING DOOR STOOP AND WALKWAYS**

N.T.S.



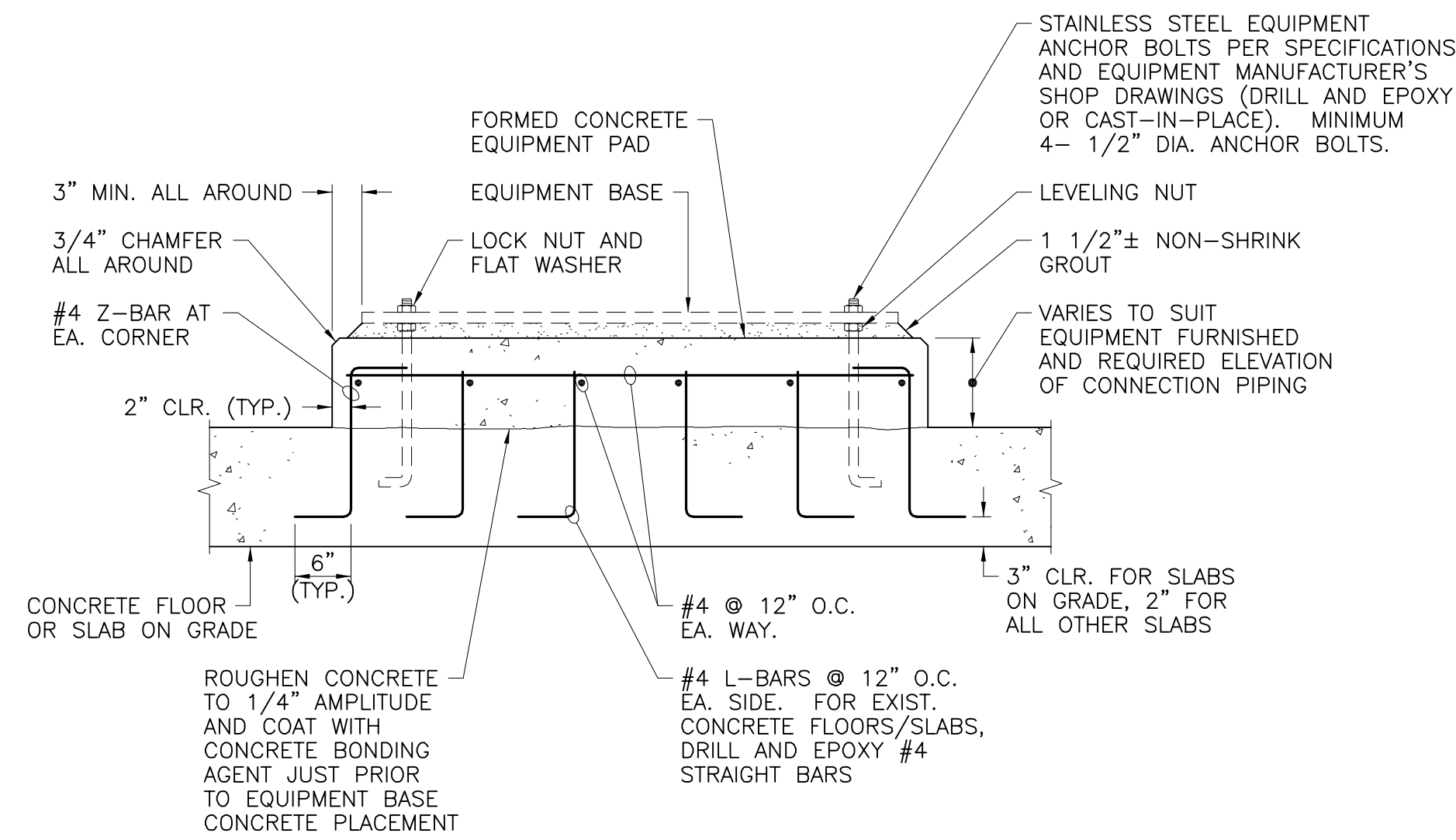
**TYPICAL JOINT SEALANT DETAIL**

N.T.S.



**STEPPED FOOTING**

N.T.S.



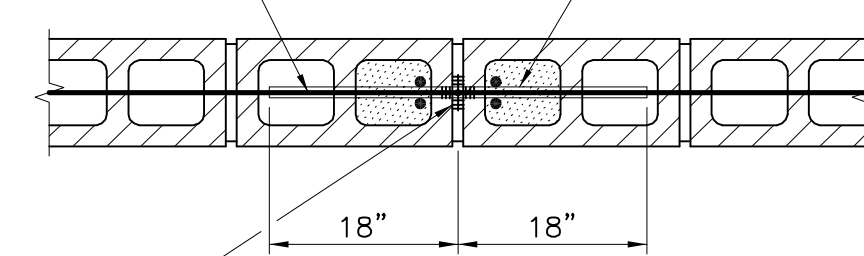
- NOTE:
- PRIOR TO CONCRETE PLACEMENT, CONTRACTOR SHALL VERIFY PAD SIZE ACCORDING TO APPROVED EQUIPMENT SHOP DRAWINGS.
  - FOR EQUIPMENT PAD HEIGHTS GREATER THAN 8" PROVIDE #4 @ 12" O.C. EACH WAY, TOP AND BOTTOM.

**TYPICAL EQUIPMENT BASE**

N.T.S.



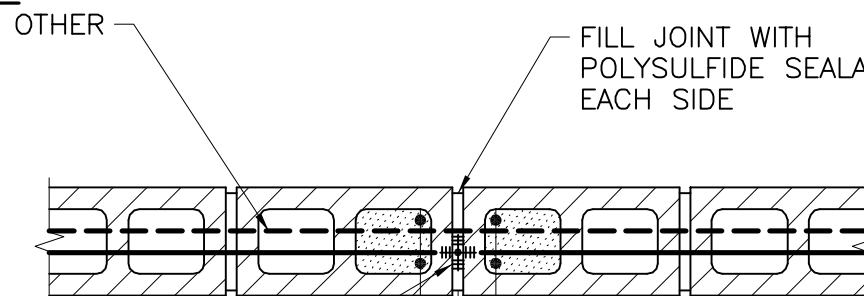
CHORD STEEL AS NOTED ON PLAN OR DETAIL SHALL BE CONTINUOUS THRU JOINT



**CHORD STEEL**

DURO-WALL REGULAR D/A 2001 RAPID CONTROL JOINT OR APPROVED EQUAL (TYP.)

AT MARK A ONLY:

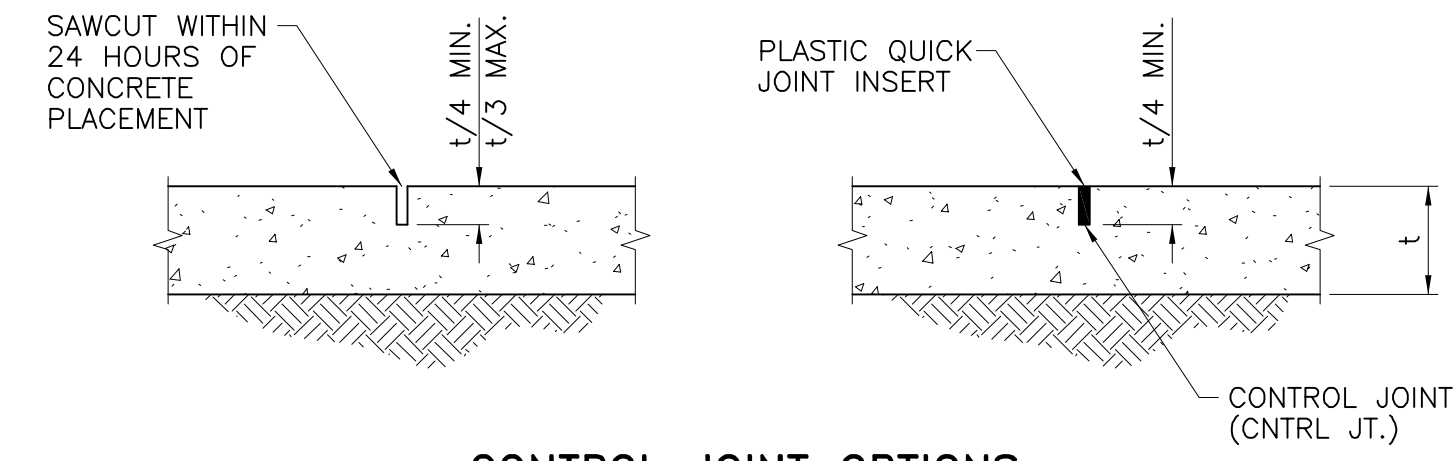


DURO-WALL REGULAR D/A 2001 RAPID CONTROL JOINT OR APPROVED EQUAL (TYP.)

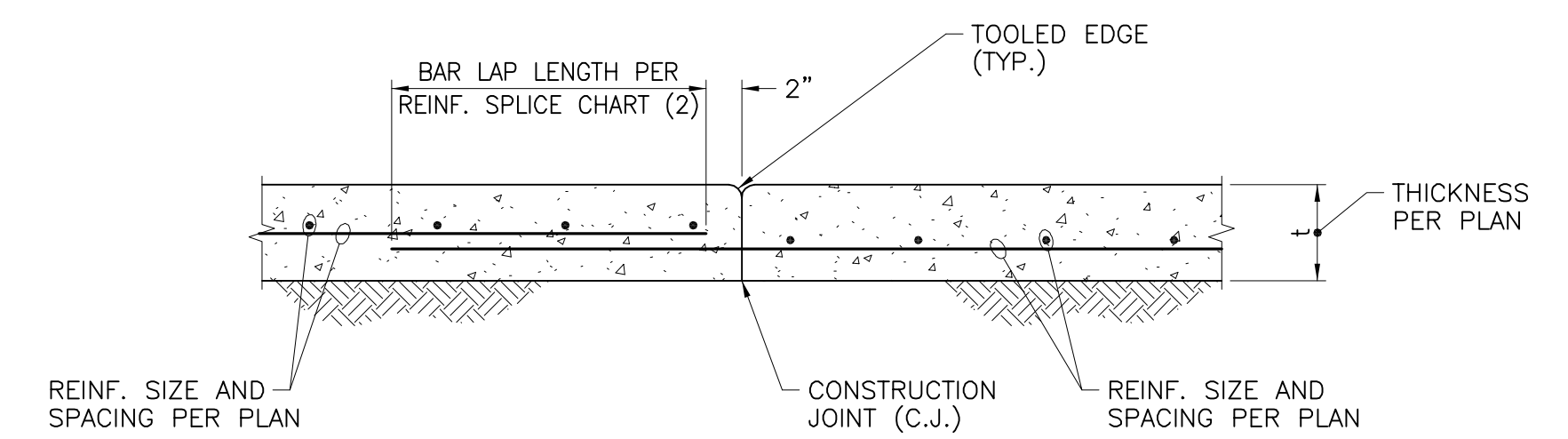
- NOTE:
- NOT FOR USE ON SUBTERRANEAN WALLS.
  - NOT FOR USE WHEN MAIN REINFORCING STEEL SPANS HORIZONTALLY.
  - UNLESS NOTED OTHERWISE PROVIDE JOINTS AT 30'-0" MAX. SPACING.

**CMU WALL CONTROL JOINT**

N.T.S.



**CONTROL JOINT OPTIONS**



**CONSTRUCTION JOINT**

- NOTE:
- ADJACENT SLAB SECTIONS SHALL BE PLACED A MINIMUM OF 7 DAYS APART.
  - WHERE SPLICING REINFORCEMENT OF UNEQUAL BAR SIZES, PROVIDE LAP SPLICE BASED ON THE LARGER BAR SIZE.

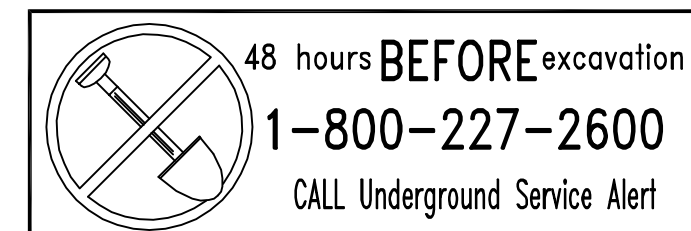
**CONCRETE SLAB ON GRADE CONTROL AND CONSTRUCTION JOINTS**

N.T.S.



**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

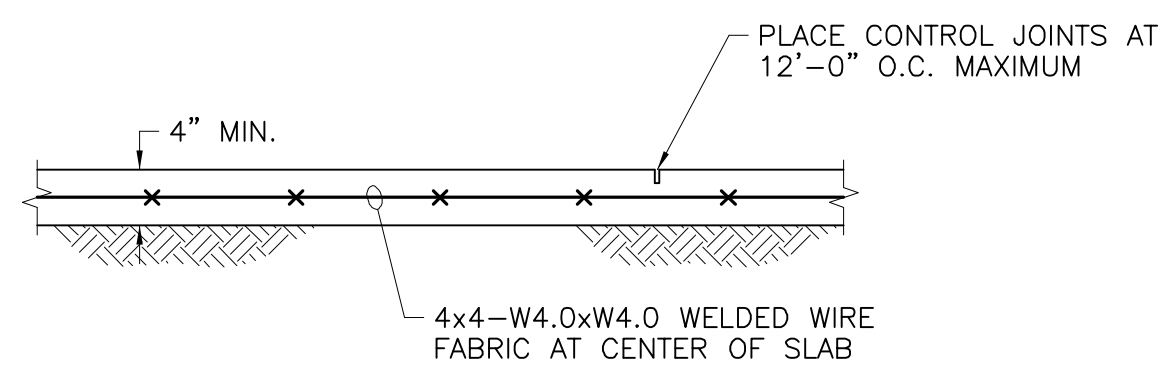
APPROVED BY: *Philip L. Green*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMM
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD STRUCTURAL DETAILS**

DRAWING  
**S-2**  
44 OF 69 SHEETS  
11754  
R.C.S.D. PLAN No.

DWG. NO.: 05-987-19.54-3 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:07AM PLOT SCALE: 1/4"=1'-0"

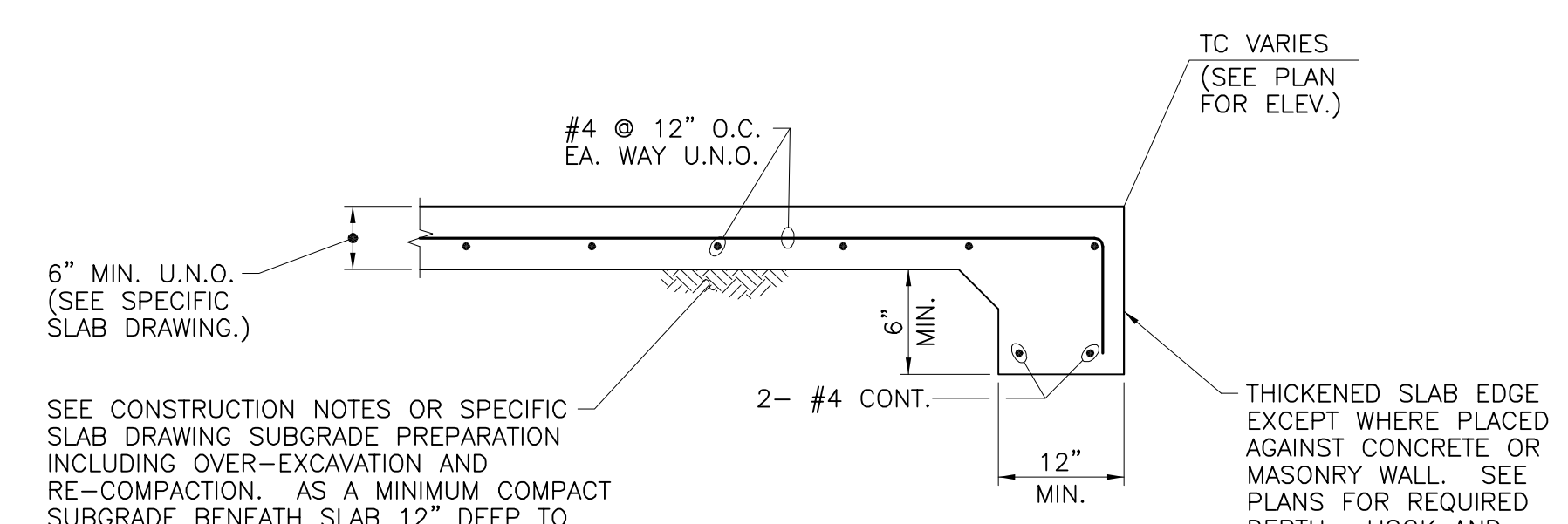


**NOTE:**  
SEE CONSTRUCTION NOTES OR SPECIFIC SLAB DRAWINGS FOR SUBGRADE PREPARATION REQUIREMENTS, INCLUDING OVER-EXCAVATION AND RE-COMPACTION. AS A MINIMUM, COMPACT SUBGRADE BENEATH SLAB 12" DEEP TO 95% (MIN.) RELATIVE COMPACTION.

**TYPICAL 4" CONCRETE WALKWAY**

N.T.S.

**S7**  
STD.



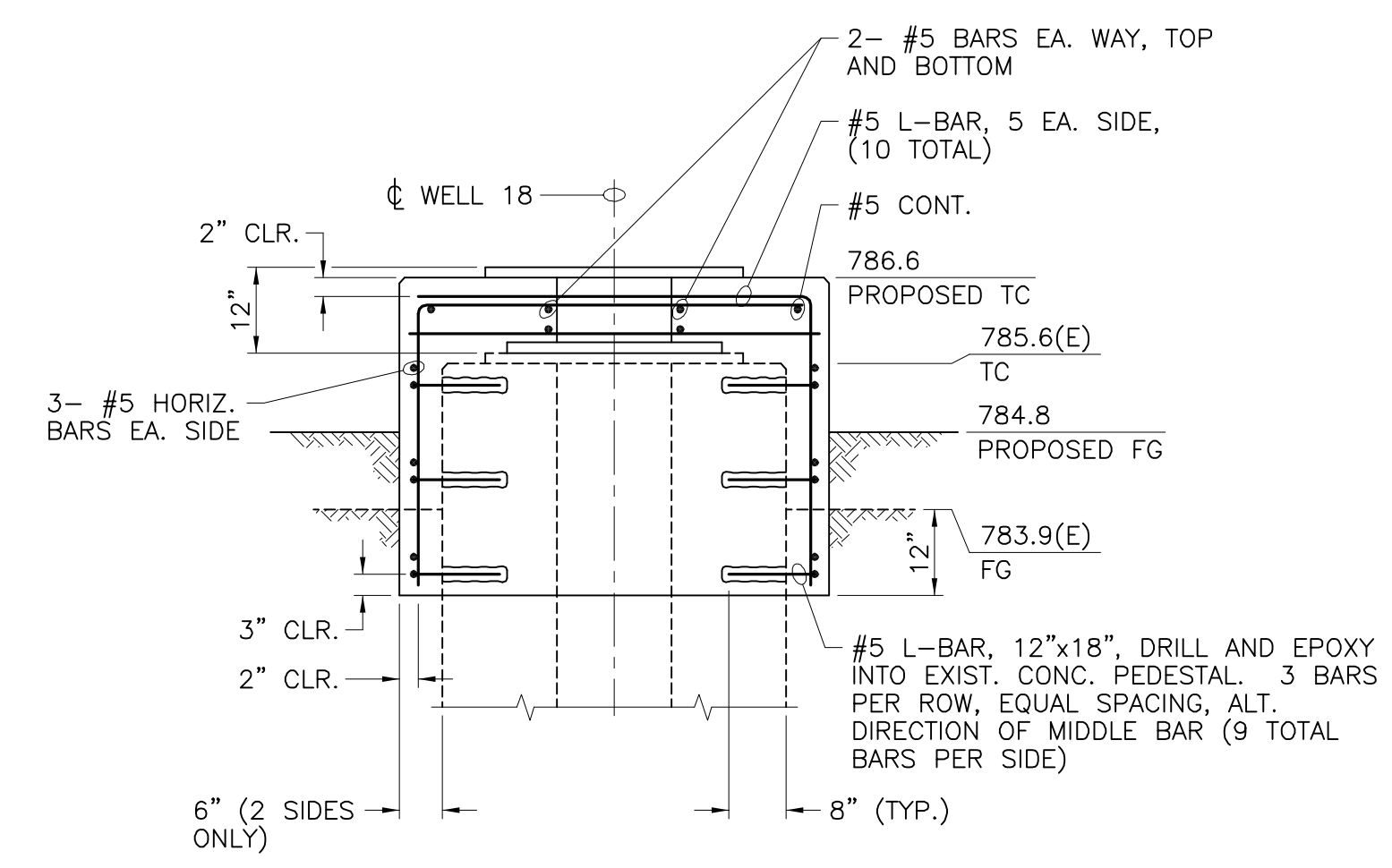
SEE CONSTRUCTION NOTES OR SPECIFIC SLAB DRAWING SUBGRADE PREPARATION INCLUDING OVER-EXCAVATION AND RE-COMPACTION. AS A MINIMUM COMPACT SUBGRADE BENEATH SLAB 12" DEEP TO 95% (MIN.) RELATIVE COMPACTION

THICKENED SLAB EDGE EXCEPT WHERE PLACED AGAINST CONCRETE OR MASONRY WALL. SEE PLANS FOR REQUIRED DEPTH. HOOK AND BOTTOM BARS REQUIRED WHERE EDGE THICKNESS IS 12" OR GREATER.

**TYPICAL EDGE OF SLAB**

N.T.S.

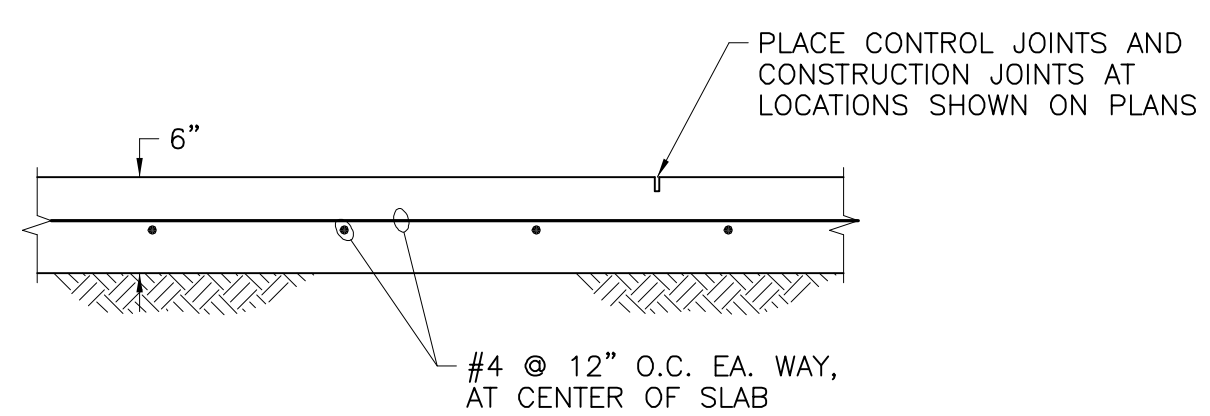
**S10**  
STD.



**WELL 18 PUMP PEDESTAL MODIFICATION DETAIL**

SCALE: 1/2"=1'-0"

**2**  
4M-1

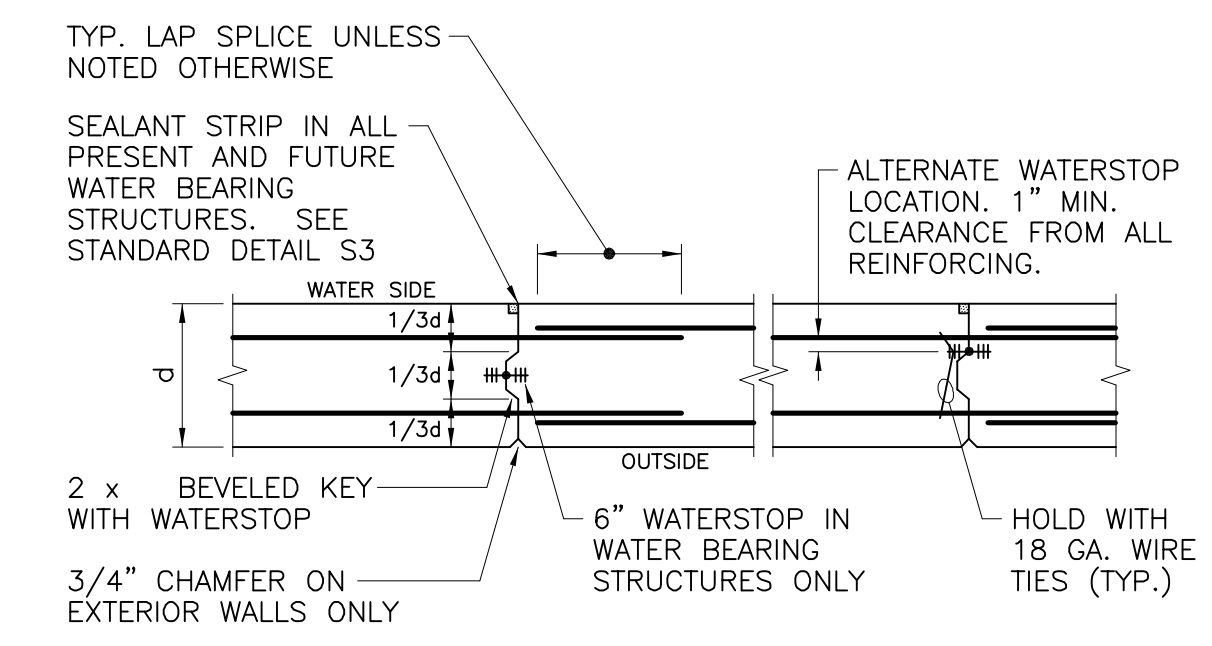


**NOTE:**  
SEE CONSTRUCTION NOTES OR SPECIFIC SLAB DRAWINGS FOR SUBGRADE PREPARATION REQUIREMENTS, INCLUDING OVER-EXCAVATION AND RE-COMPACTION. AS A MINIMUM, COMPACT SUBGRADE BENEATH SLAB 12" DEEP TO 95% (MIN.) RELATIVE COMPACTION.

**TYPICAL 6" CONCRETE SLAB**

N.T.S.

**S8**  
STD.

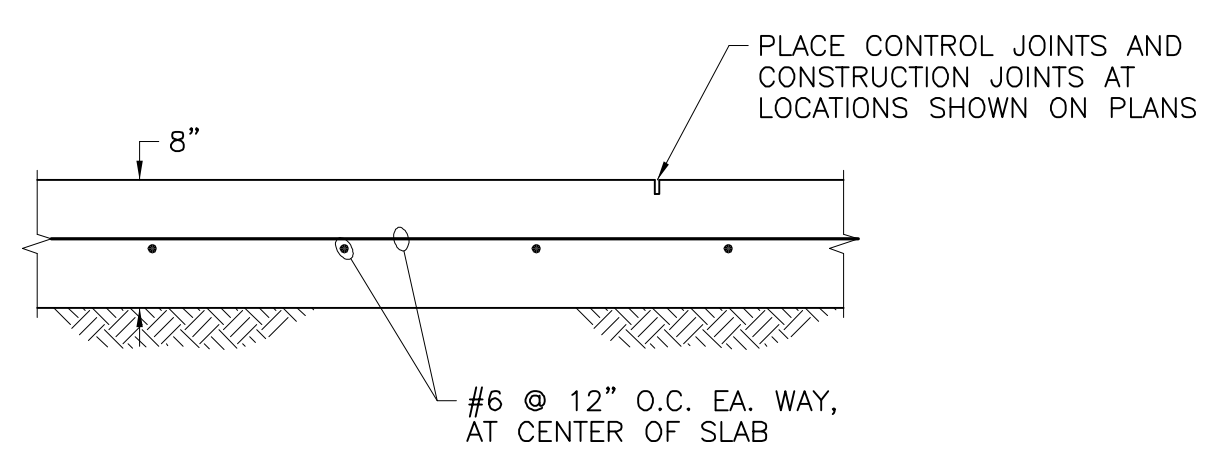


**NOTE:**  
CLEAN AND ROUGHEN CONTACT SURFACES OF JOINT BY REMOVING ENTIRE SURFACE AND EXPOSING CLEAN AGGREGATE SOLIDLY EMBEDDED IN CONCRETE. USE WATER OR SANDBLASTING FOLLOWED BY WASHING AND SCRUBBING WITH STIFF BROOM. COVER AND PROTECT WATERSTOPS FROM DAMAGE.

**TYPICAL CONSTRUCTION JOINT**

N.T.S.

**S11**  
STD.

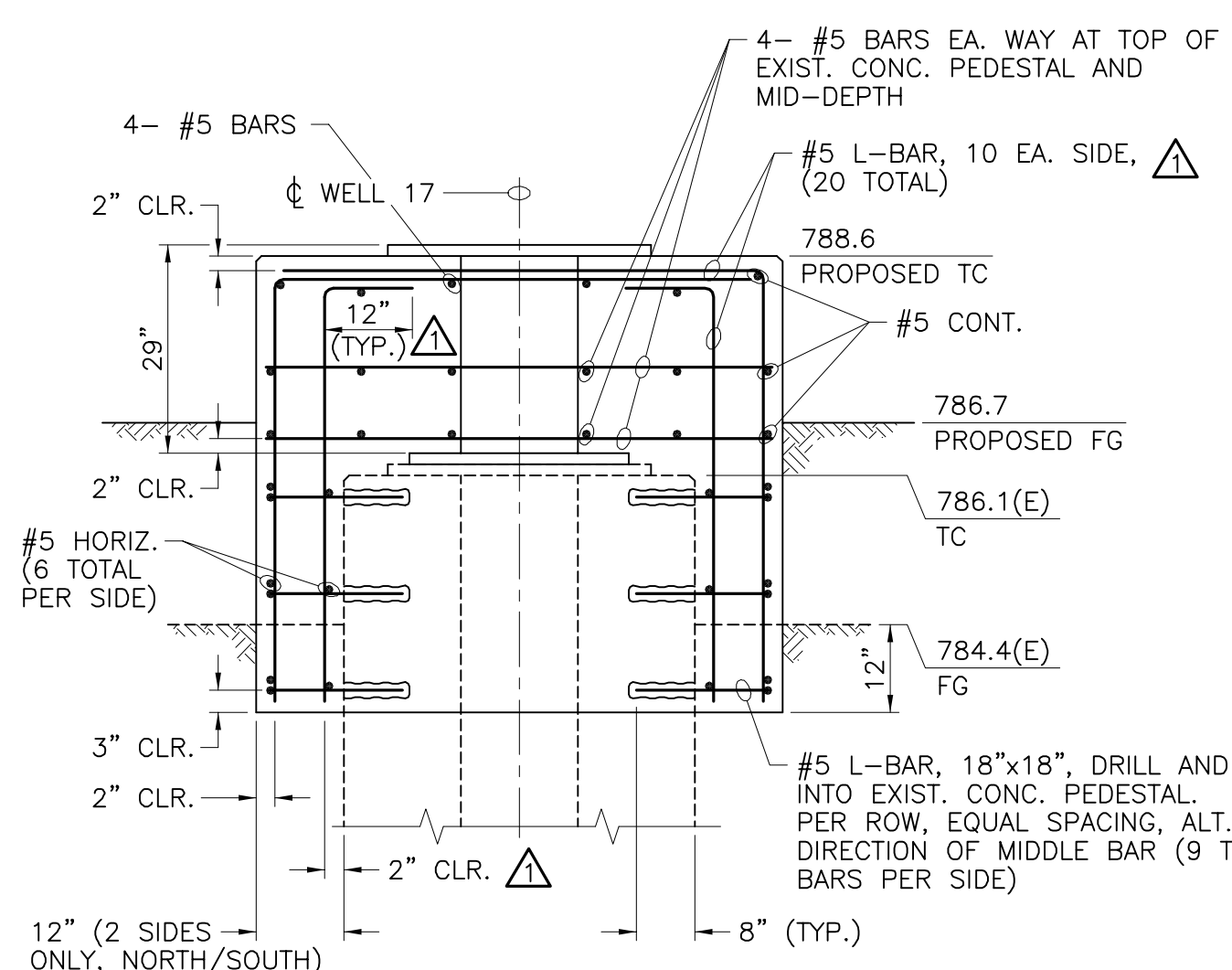


**NOTE:**  
SEE CONSTRUCTION NOTES OR SPECIFIC SLAB DRAWINGS FOR SUBGRADE PREPARATION REQUIREMENTS, INCLUDING OVER-EXCAVATION AND RE-COMPACTION. AS A MINIMUM, COMPACT SUBGRADE BENEATH SLAB 12" DEEP TO 95% (MIN.) RELATIVE COMPACTION.

**TYPICAL 8" CONCRETE SLAB**

N.T.S.

**S9**  
STD.



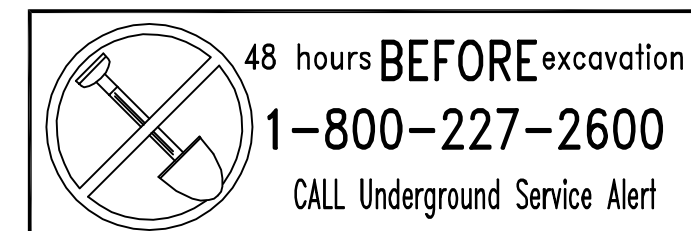
**WELL 17 PUMP PEDESTAL MODIFICATION DETAIL**

SCALE: 1/2"=1'-0"

**1**  
4M-1

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Phillip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

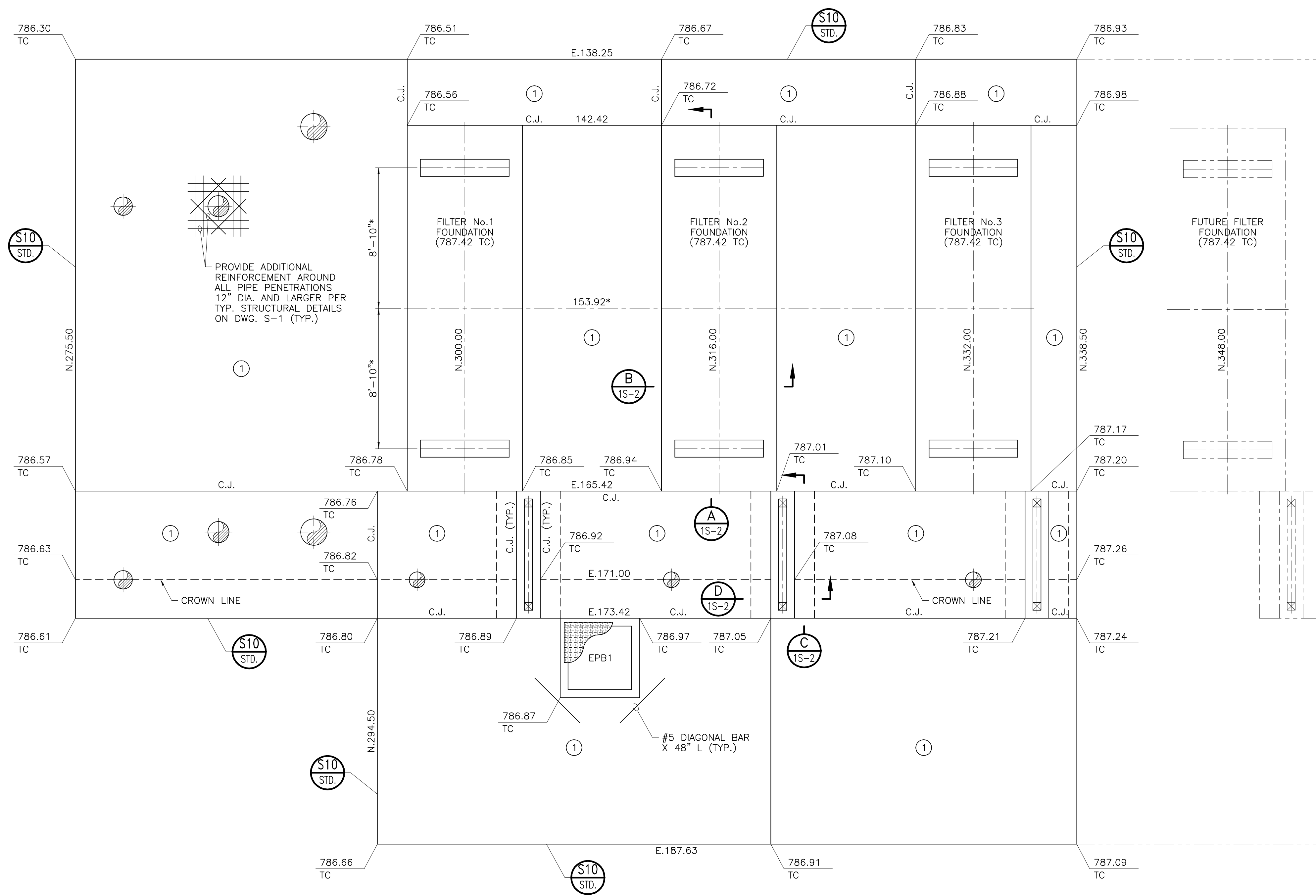
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMM
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**STANDARD AND MISCELLANEOUS STRUCTURAL DETAILS**

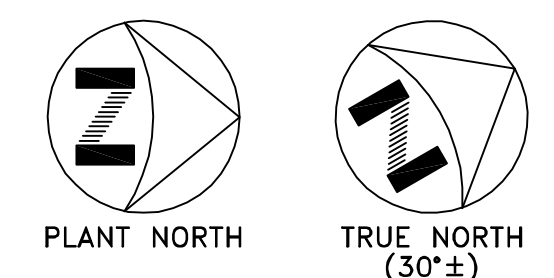
DRAWING  
**S-3**  
45 OF 69 SHEETS  
11755  
R.C.S.D. PLAN No.

① MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 1S-1:  
 1. 8" THK. CONCRETE SLAB PER STANDARD DETAIL S9.



PROVIDE ADDITIONAL REINFORCEMENT AROUND ALL PIPE PENETRATIONS 12" DIA. AND LARGER PER TYP. STRUCTURAL DETAILS ON DWG. S-1 (TYP.)

**FILTER PLAN**  
 SCALE: 1/4"=1'-0"



DWG. NO.: RE-90-18-54-11 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:08AM PLOT SCALE: 1=1

**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
 CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



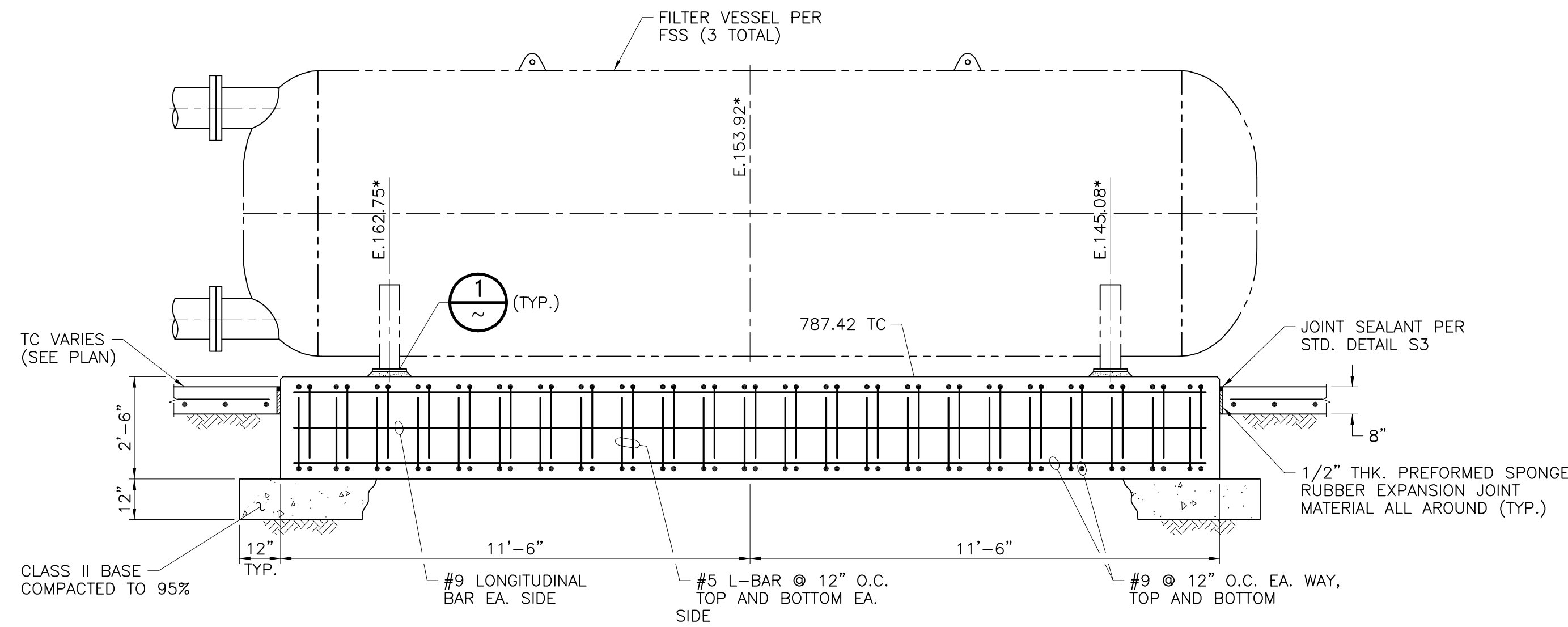
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Philip L. Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	MRN
CHECKED	JCR

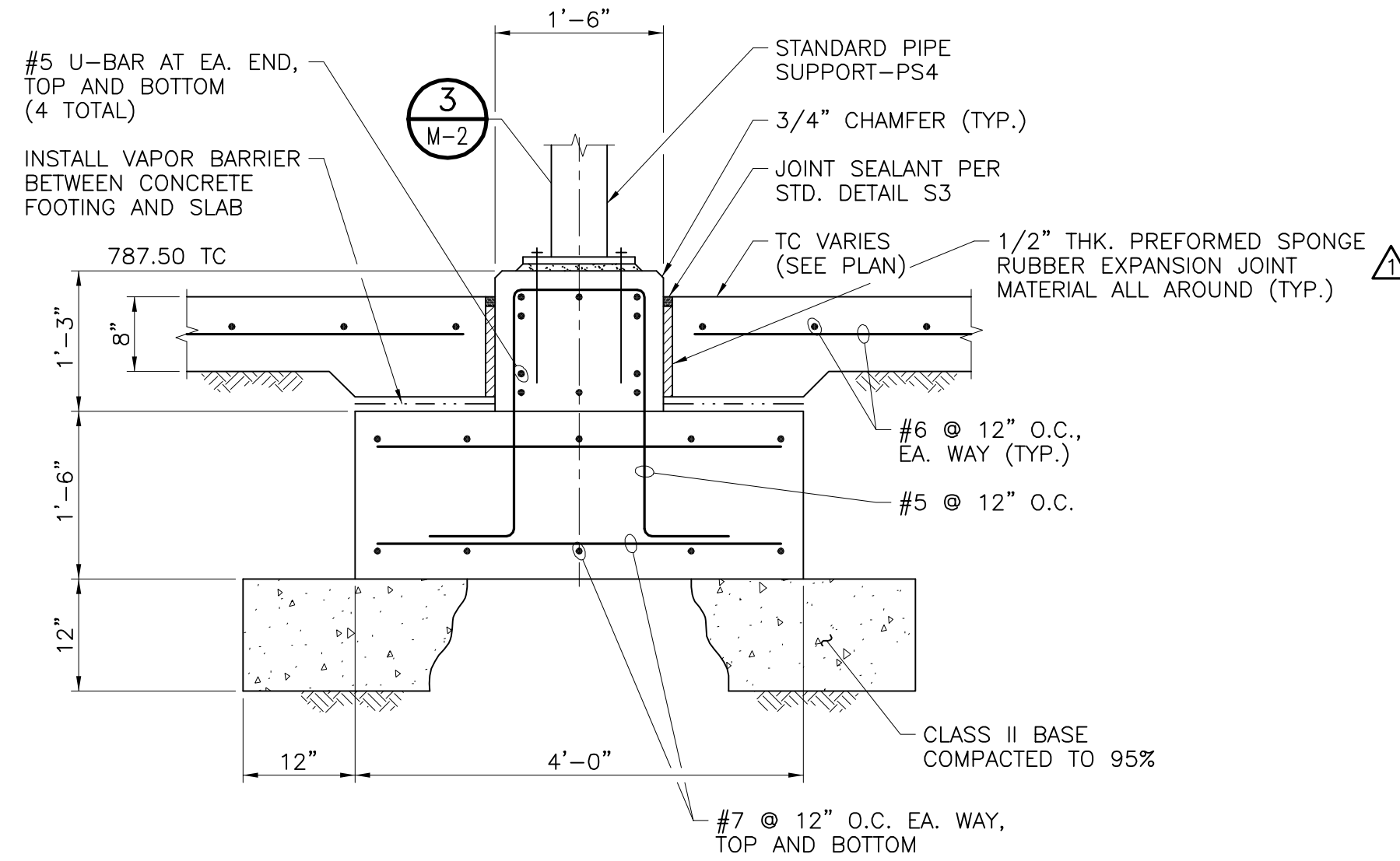
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**FILTER AREA PLAN**

DRAWING  
**1S-1**  
 46 OF 69 SHEETS  
 11756  
 R.C.S.D. PLAN No.

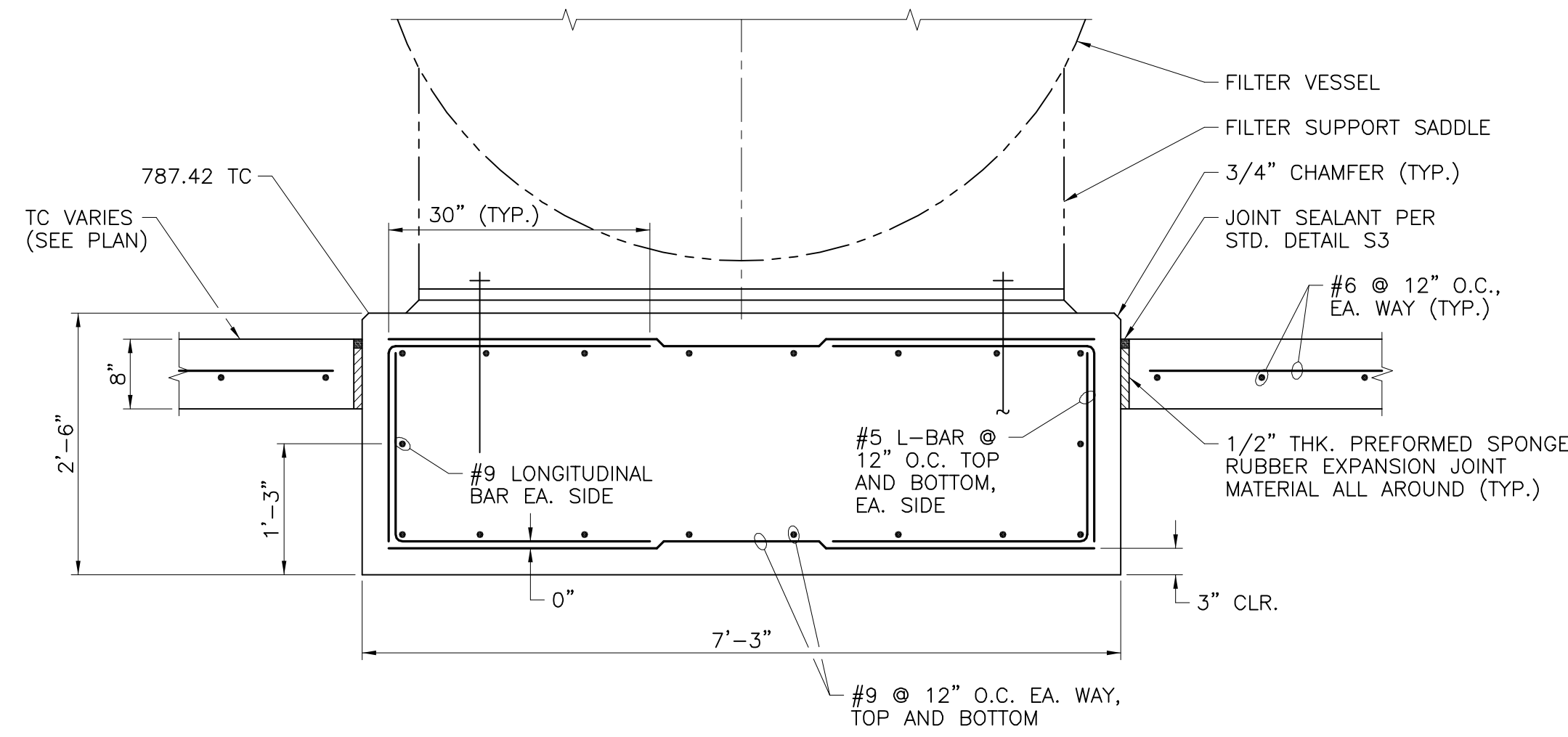
DWG. NO.: 11-09AM-19-54-12 FILE NO.: 587-19-54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:09AM PLOT SCALE: 1=1



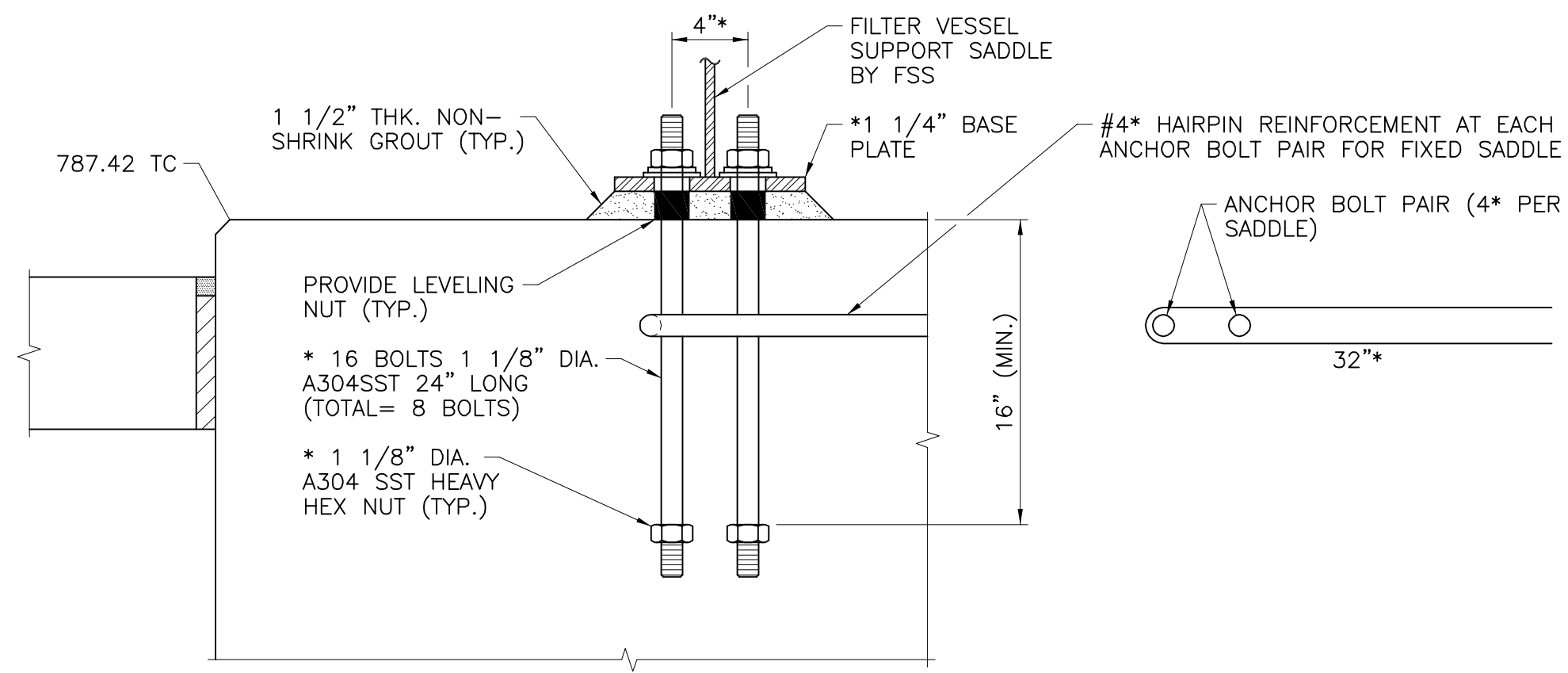
**SECTION A**  
SCALE: 3/8"=1'-0"  
1S-1



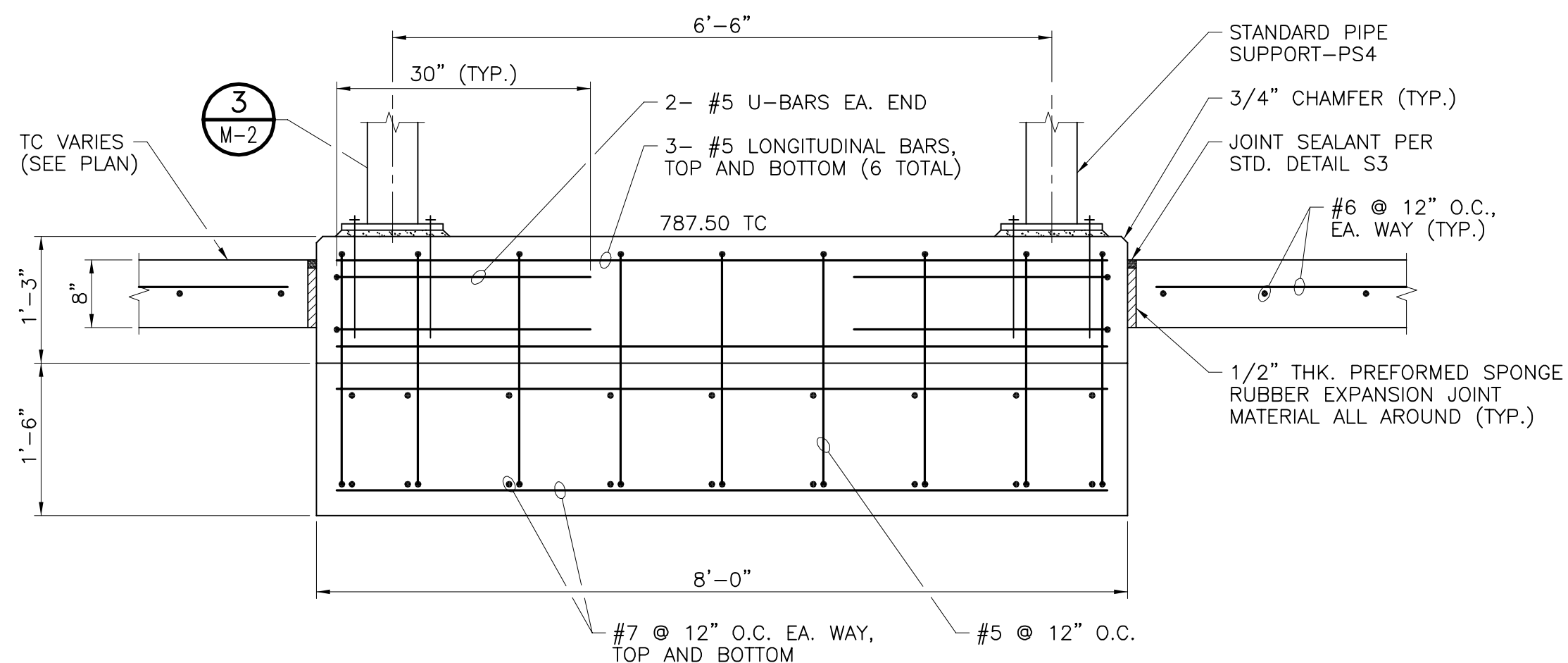
**SECTION D**  
SCALE: 3/4"=1'-0"  
1S-1



**SECTION B**  
SCALE: 3/4"=1'-0"  
1S-1



**FILTER VESSEL ANCHOR EMBEDMENT DETAIL**  
N.T.S.  
1



**SECTION C**  
SCALE: 3/4"=1'-0"  
1S-1

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
△	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

APPROVED BY: *Phillip Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	TMW
CHECKED	JCR

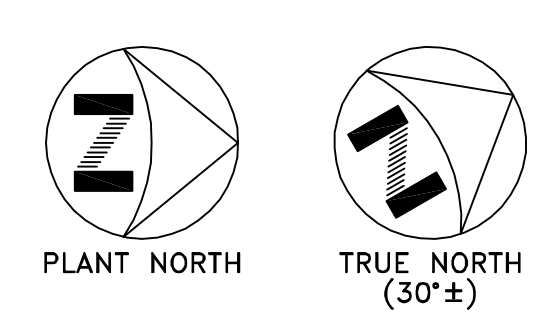
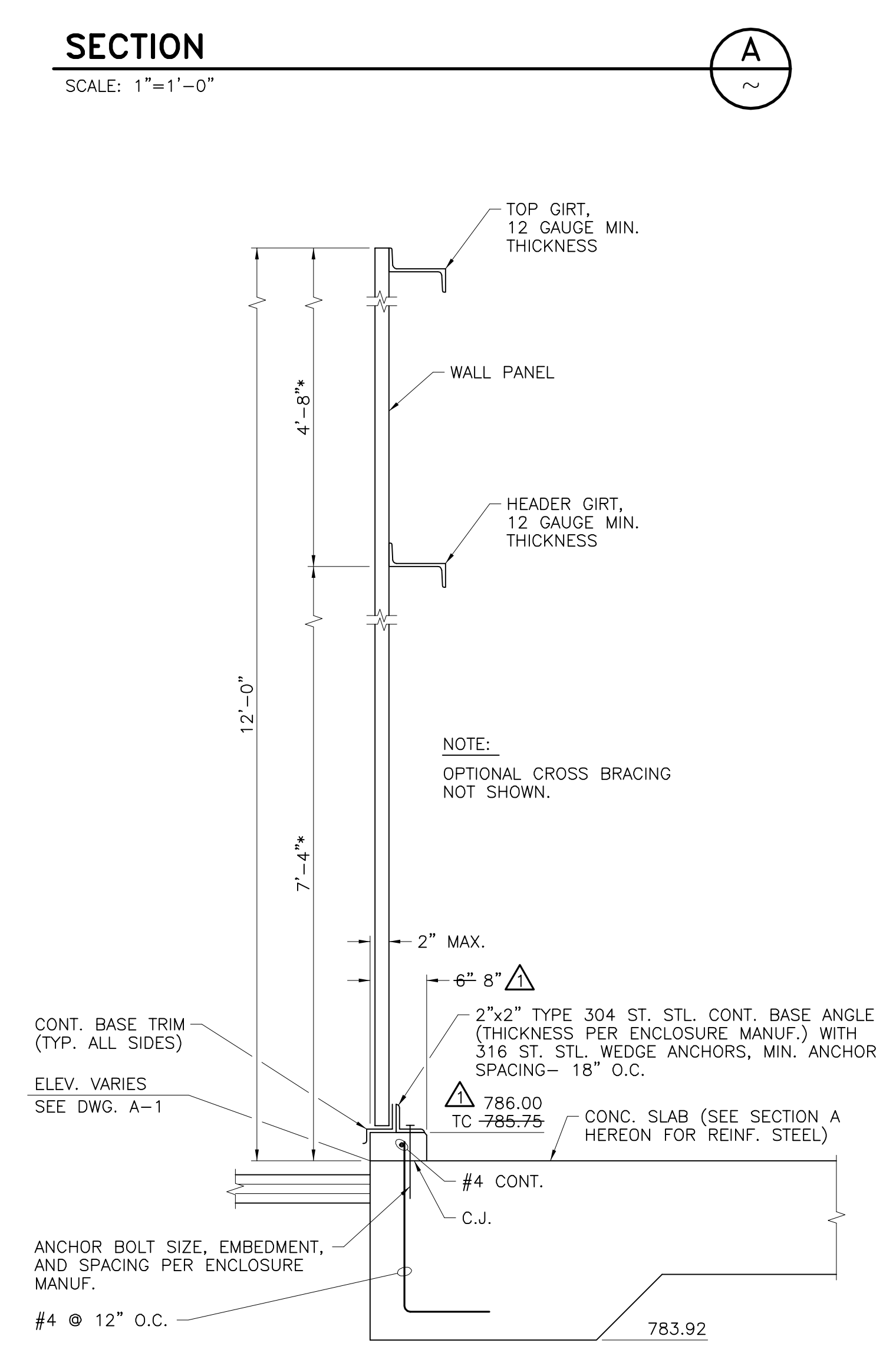
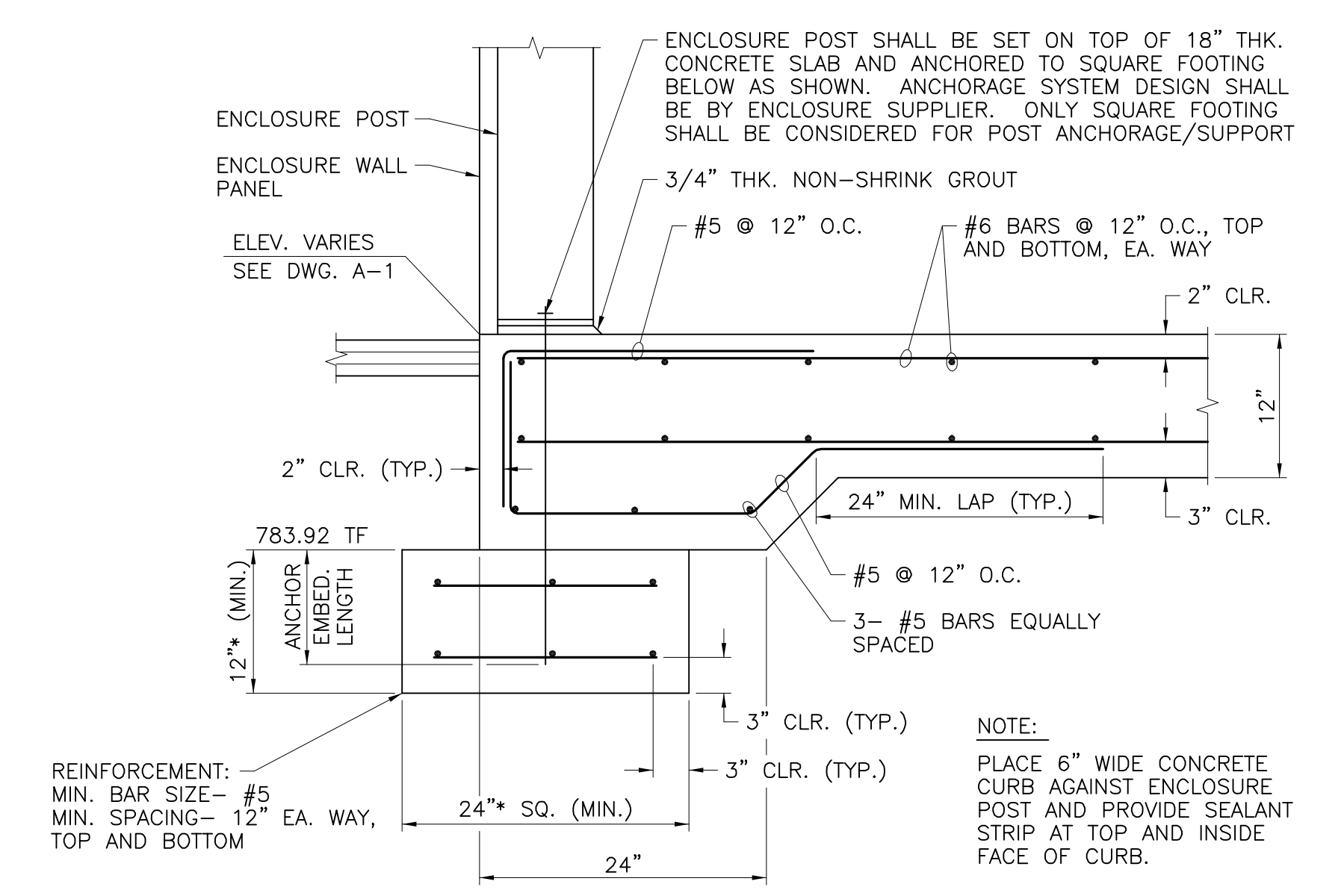
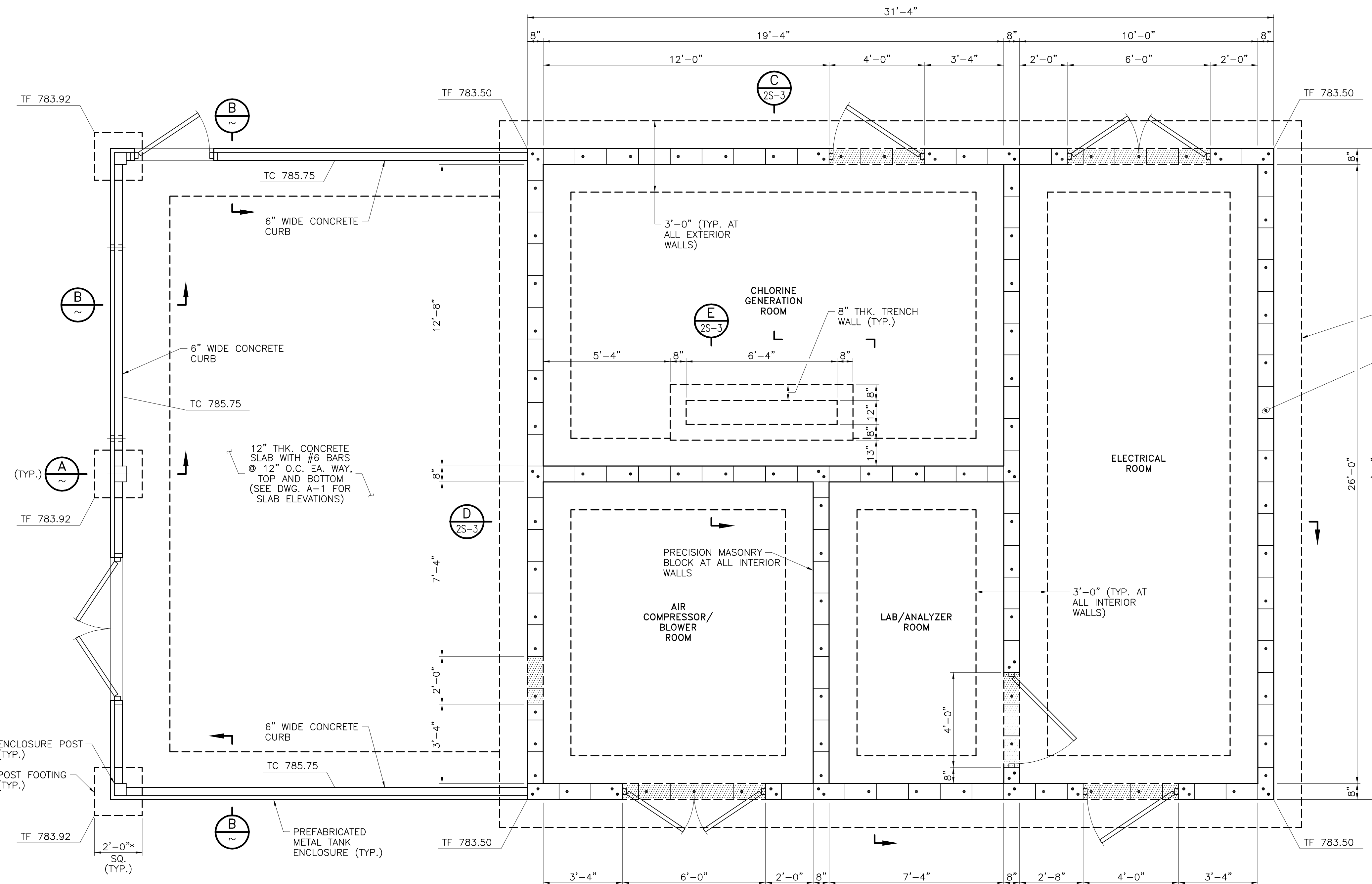
**RUBIDOUX COMMUNITY SERVICES DISTRICT**

WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

**FILTER SECTIONS AND DETAILS**

DRAWING  
**1S-2**  
47 OF 69 SHEETS  
11757  
R.C.S.D. PLAN No.

DWG. NO.: RE-98-18-34-21 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:10AM PLOT SCALE: 1"=1'



**RECORD DRAWING**  
BY: *R. C. V. H.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *William George Hoffman*  
REGISTERED ENGINEER No. 70939 DATE 2/15/11

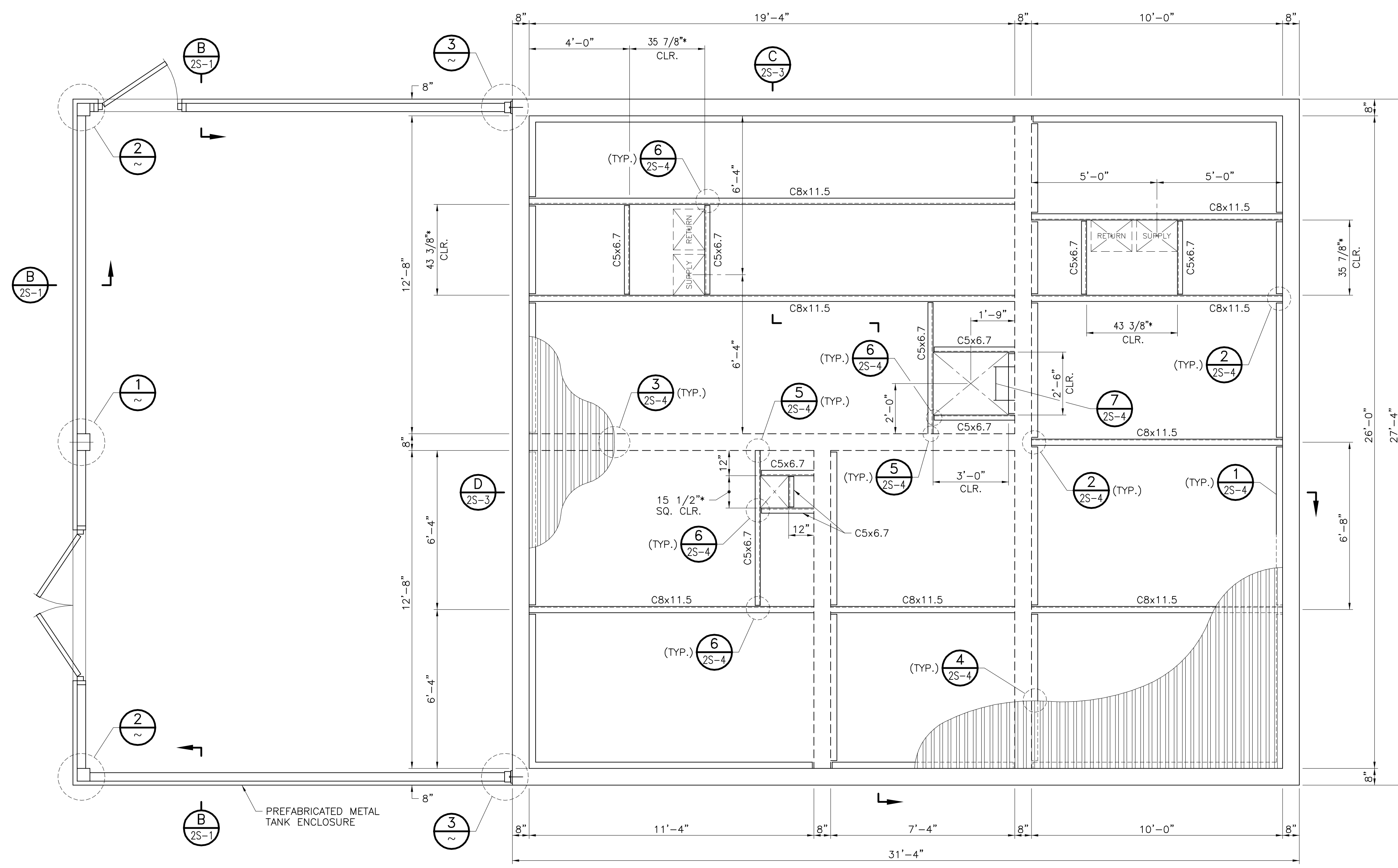
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	TMM
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING**  
**FOUNDATION PLAN AND SECTIONS**

DRAWING  
**2S-1**  
48 OF 69 SHEETS  
11758  
R.C.S.D. PLAN No.



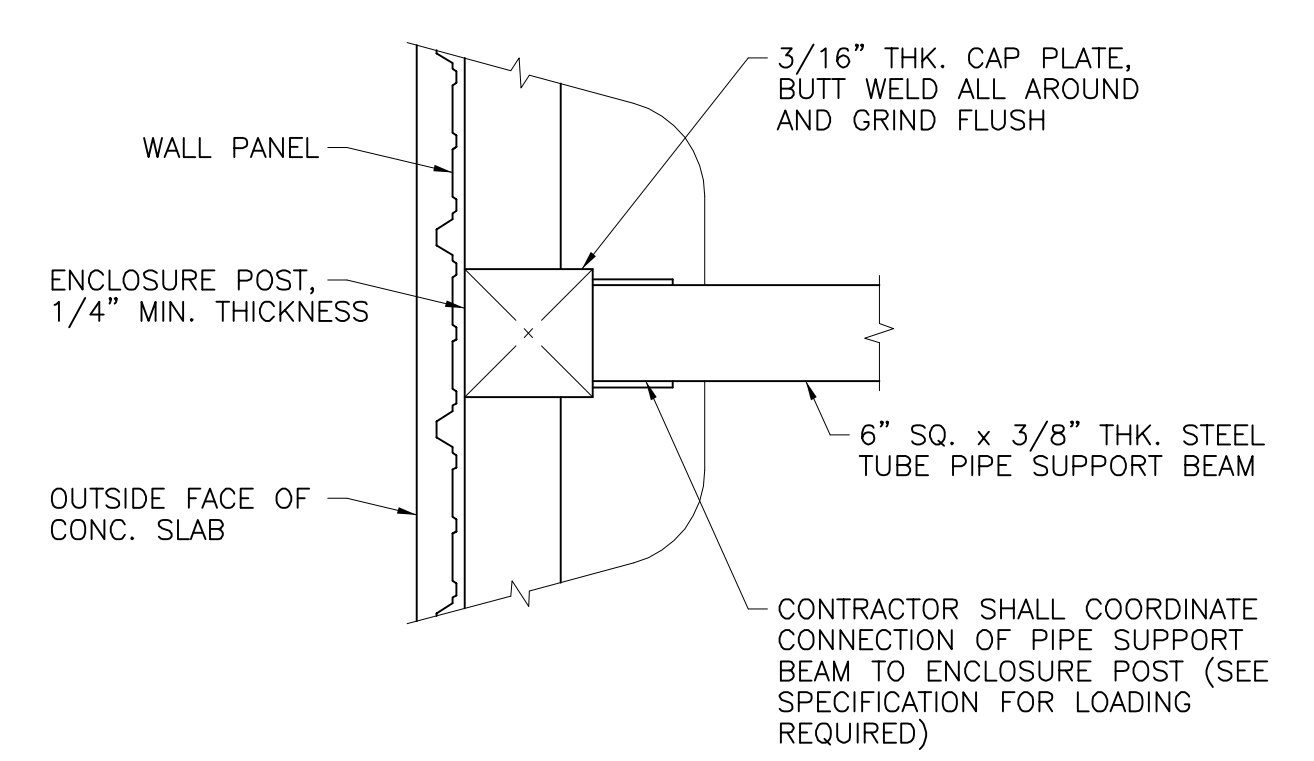
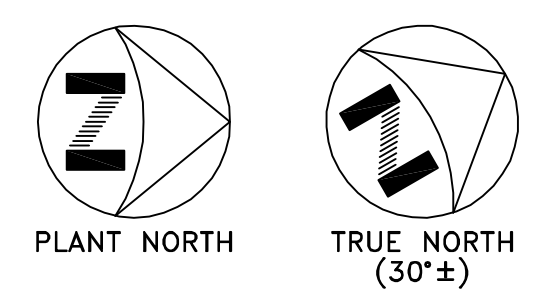
DWG. NO.: 87-19-54-22 FILE NO.: 87-19-54-22\_UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 11:10AM PLOT SCALE: 1=1



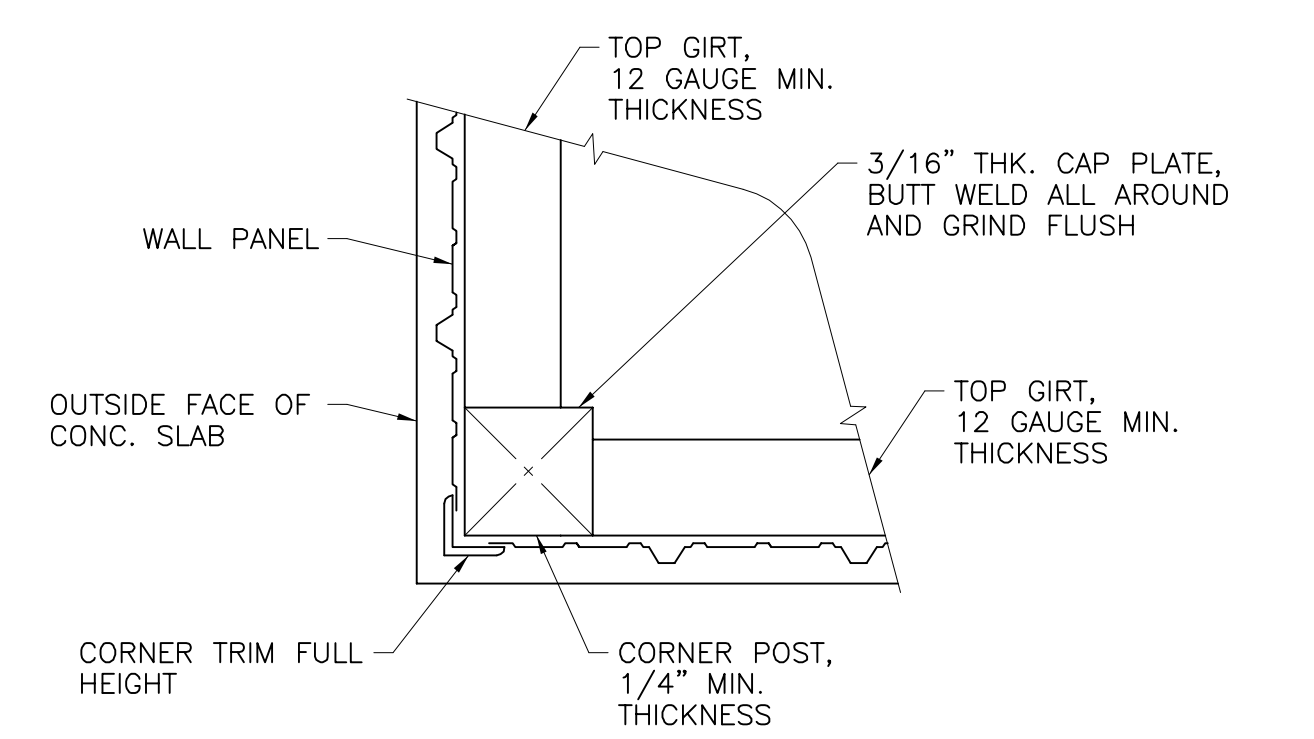
**NOTE:**  
 \* BASED ON TRANE MODEL 4TCC3036 A/C UNIT AND ROOF CURB, MODEL BAYCURB050A. CONTRACTOR SHALL ADJUST DIMENSIONS AS REQUIRED TO CENTER A/C UNIT SUPPLY OUTLET OVER SUPPLY AIR DUCTING.

**EQUIPMENT BUILDING ROOF FRAMING PLAN**

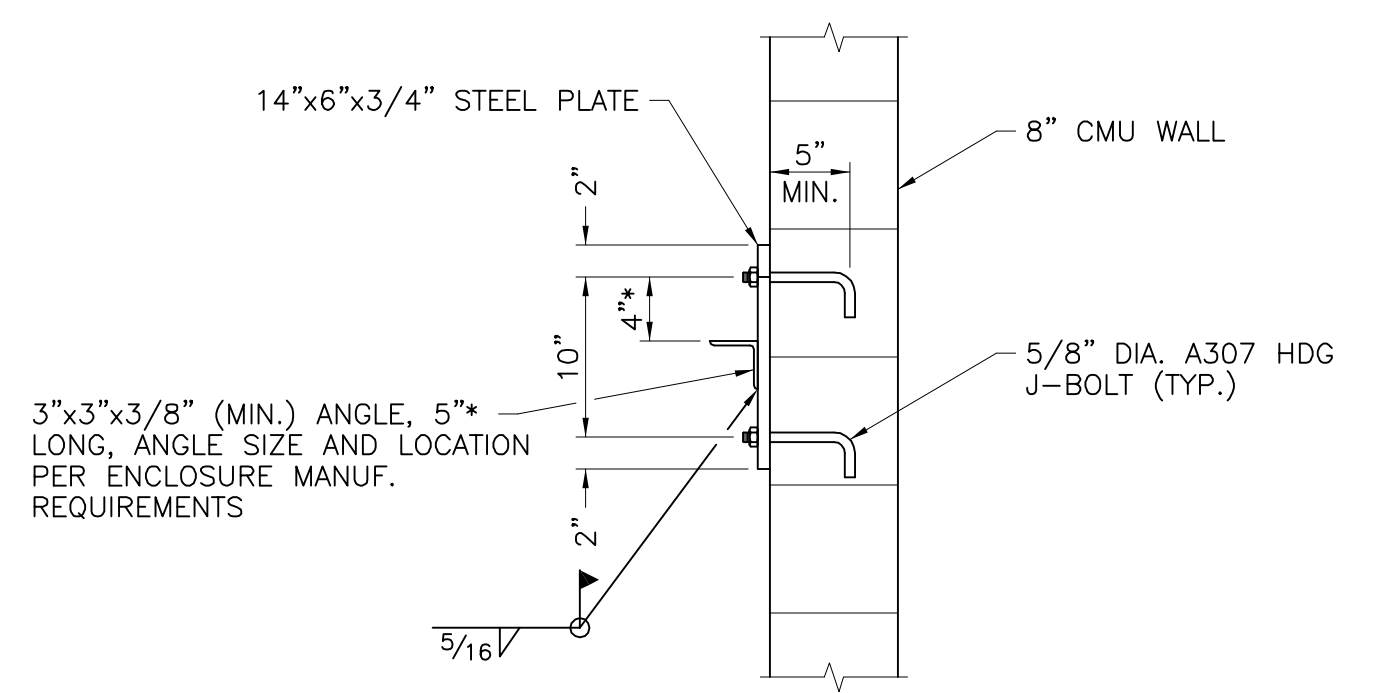
SCALE: 3/8"=1'-0"



**ENCLOSURE CENTER POST DETAIL** 1  
 N.T.S.



**ENCLOSURE CORNER DETAIL** 2  
 N.T.S.



ALLOWABLE LOADING ON EMBED PLATE FROM PREFABRICATED METAL TANK ENCLOSURE (UNFACTORED):  
 MAXIMUM LOAD PERPENDICULAR TO PLATE- 2,500 LBS (±)  
 MAXIMUM SHEAR LOAD (ANY DIRECTION PARALLEL TO PLATE)- 1,700 LBS

**ENCLOSURE EMBED PLATE DETAIL** 3  
 N.T.S.

**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



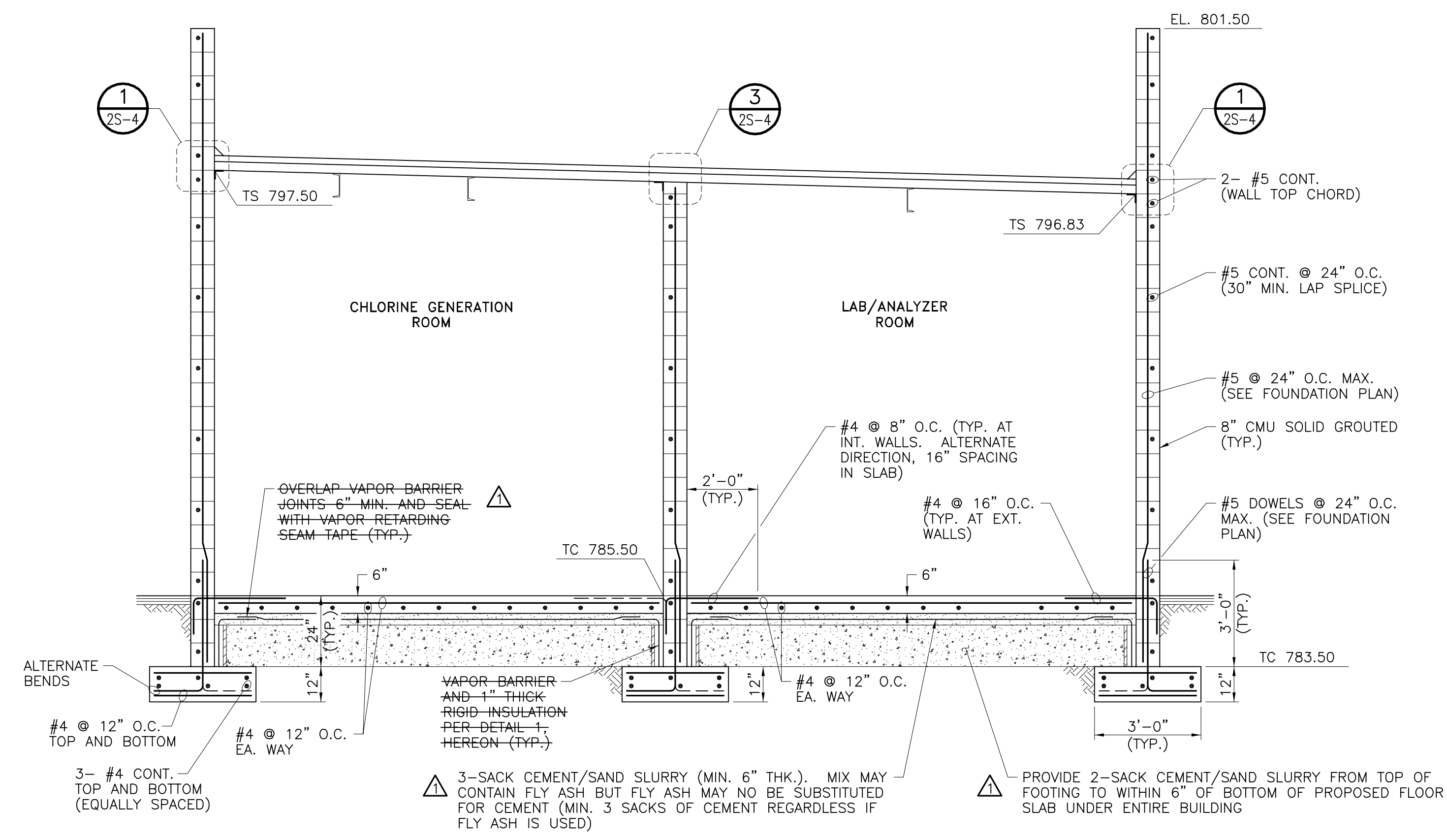
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *William George Hoffmann*  
 REGISTERED ENGINEER No. 70939 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	TMM
CHECKED	PES

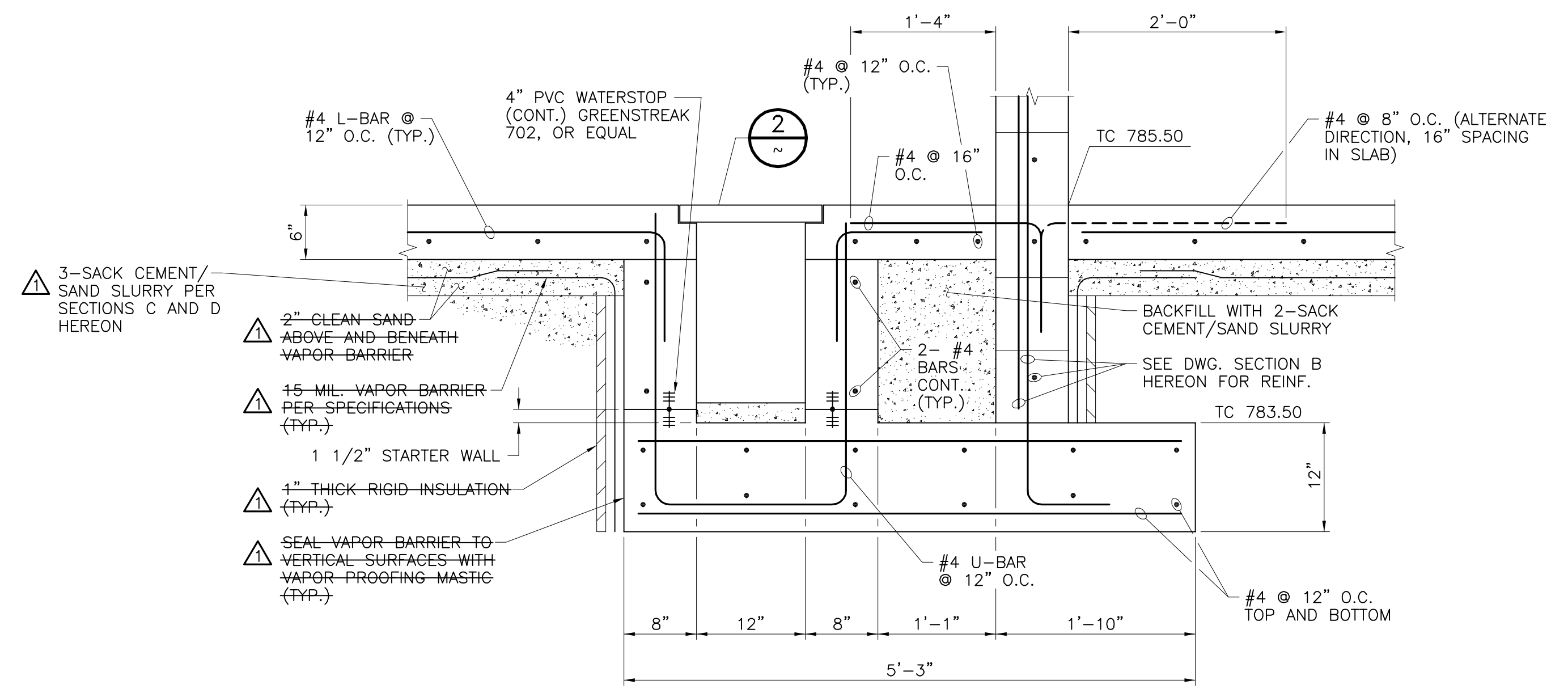
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING**  
**ROOF FRAMING PLAN AND DETAILS**

DRAWING  
**2S-2**  
 49 OF 69 SHEETS  
 11759  
 R.C.S.D. PLAN No.

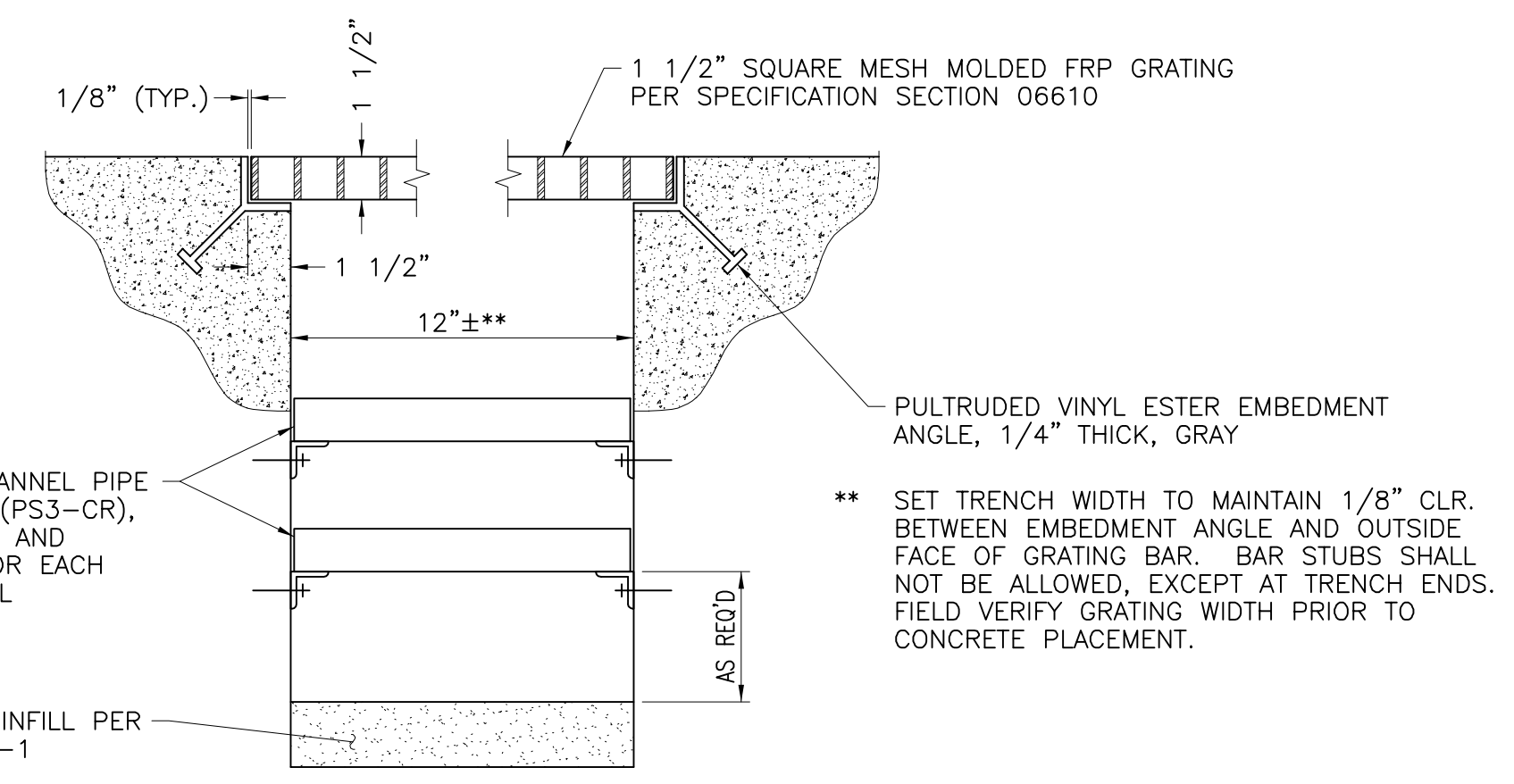
DWG. NO.: RC-80-18-54-03 FILE NO.: 587-19-54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 1:24PM PLOT SCALE: 1"=1'



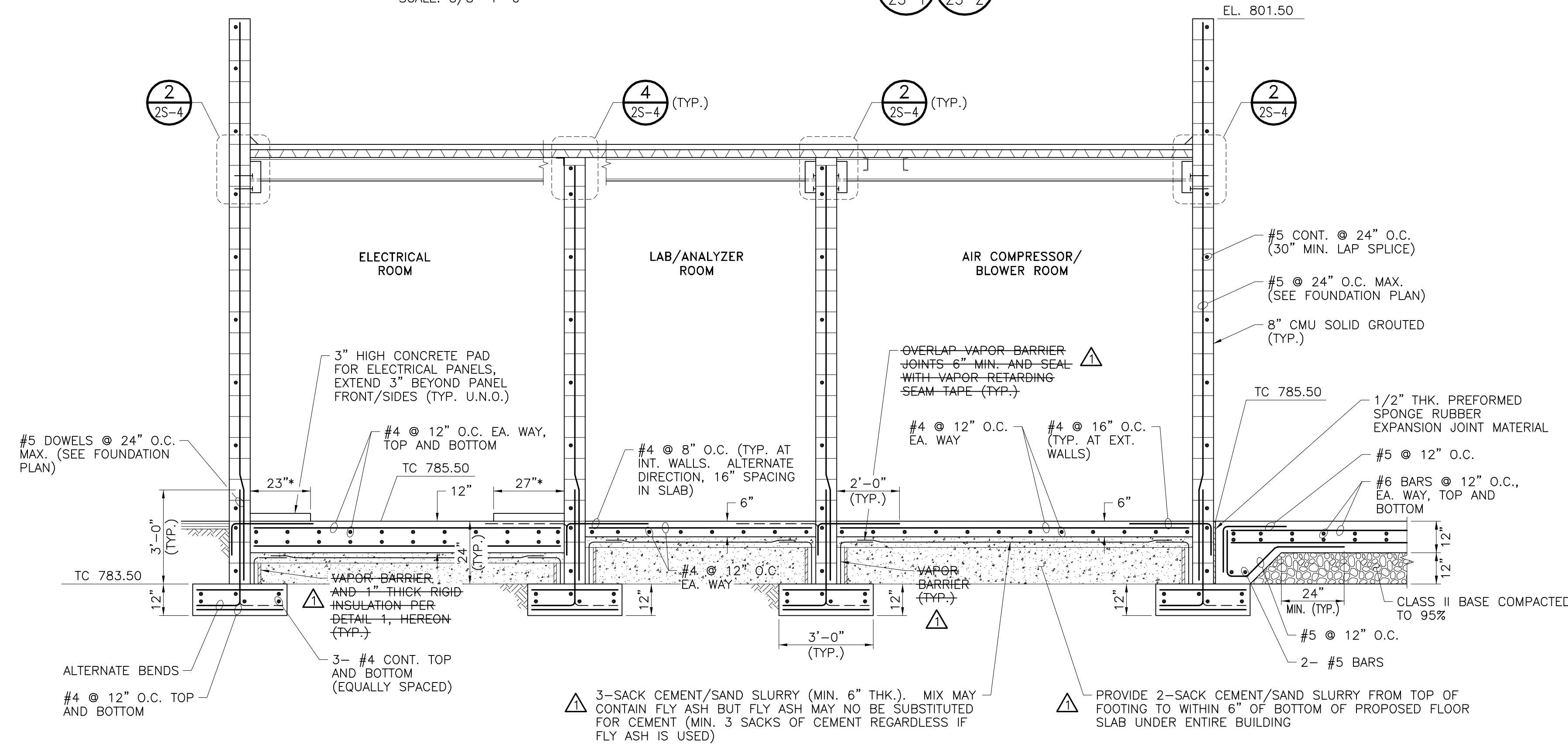
**SECTION C-C**  
SCALE: 3/8"=1'-0"



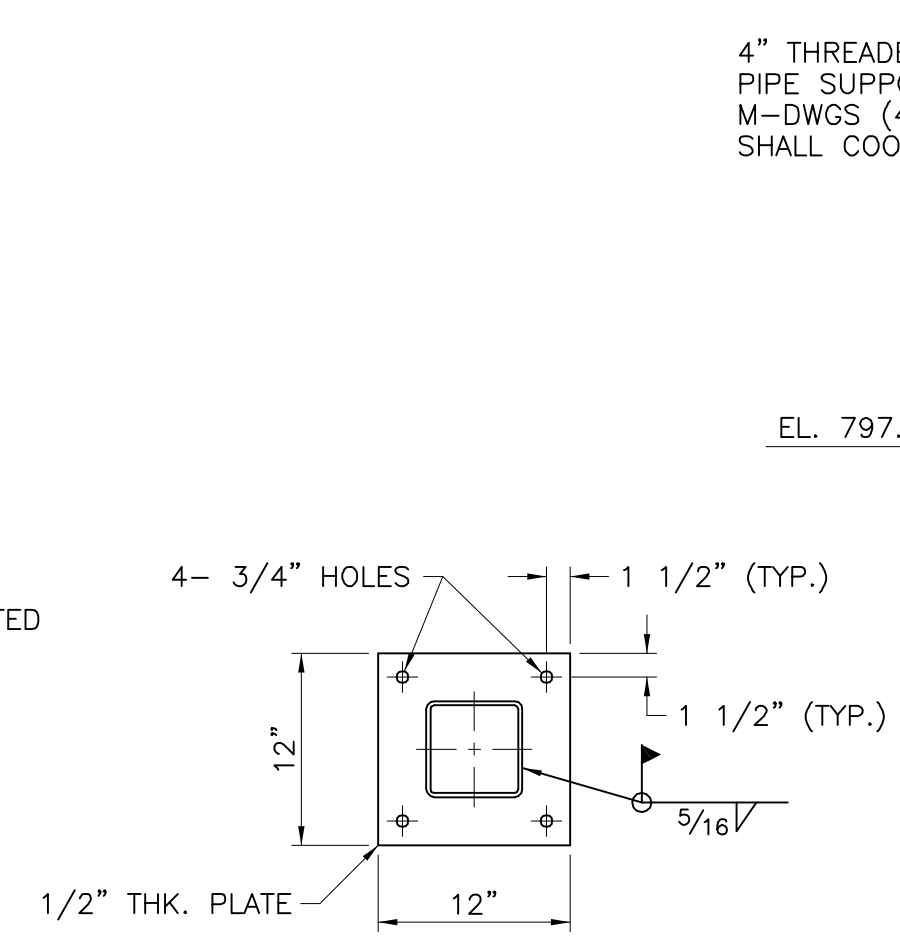
**TRENCH SECTION E-E**  
SCALE: 1"=1'-0"



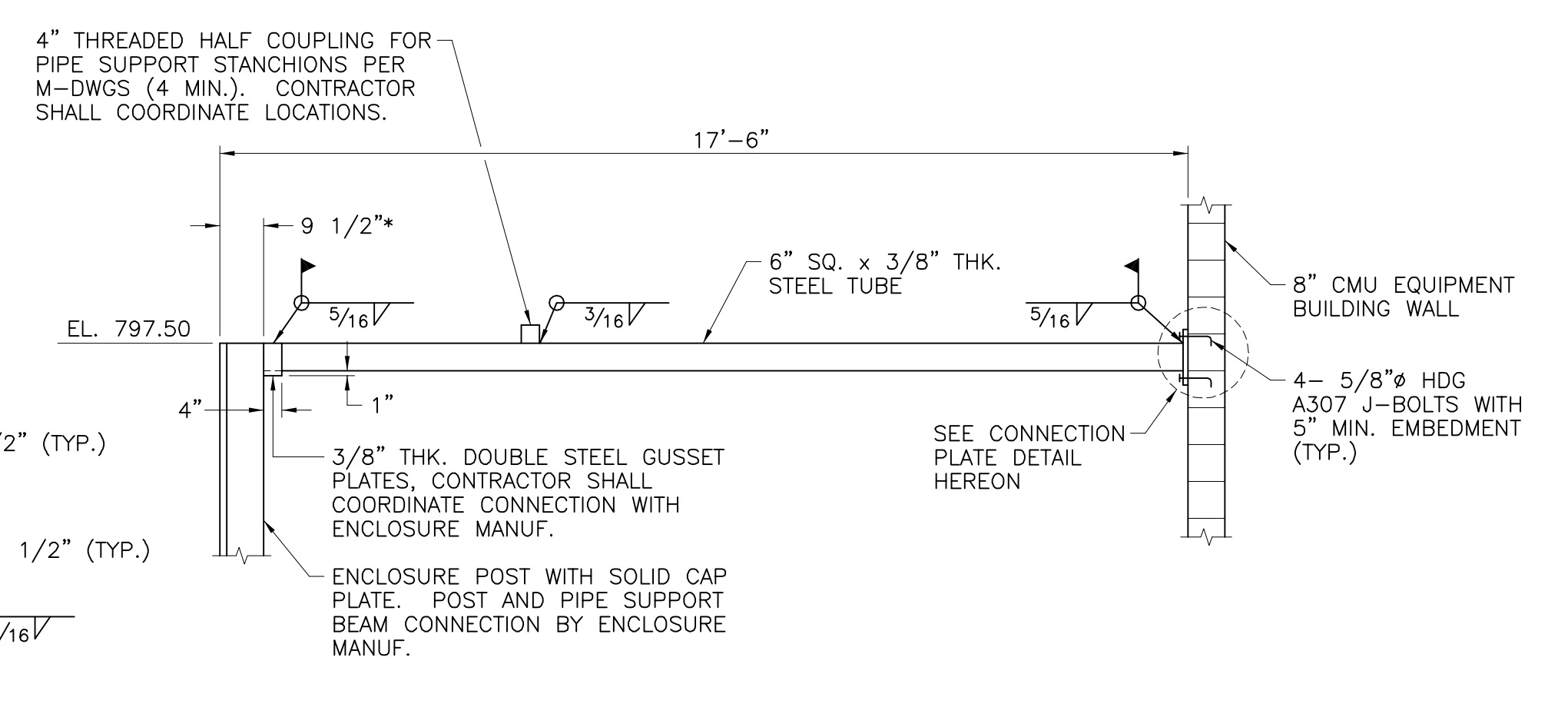
**TRENCH DETAIL 2**  
N.T.S.



**SECTION D-D**  
SCALE: 3/8"=1'-0"



**CONNECTION PLATE DETAIL**  
SCALE: 1"=1'-0"



**PIPE SUPPORT BEAM DETAIL 3**  
SCALE: 3/8"=1'-0"

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



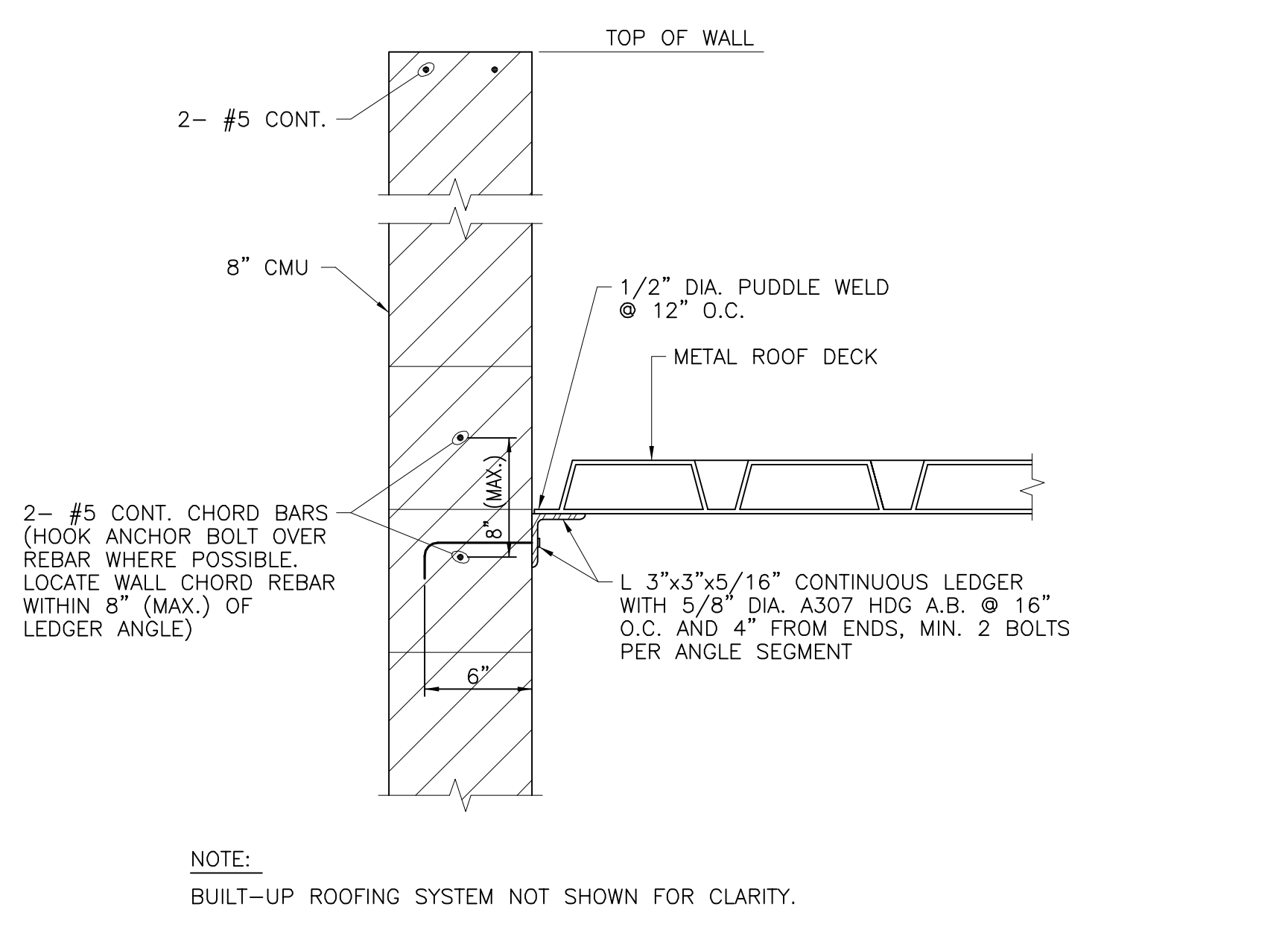
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *William George Hoffman*  
REGISTERED ENGINEER No. 70939 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	SPK
CHECKED	PES

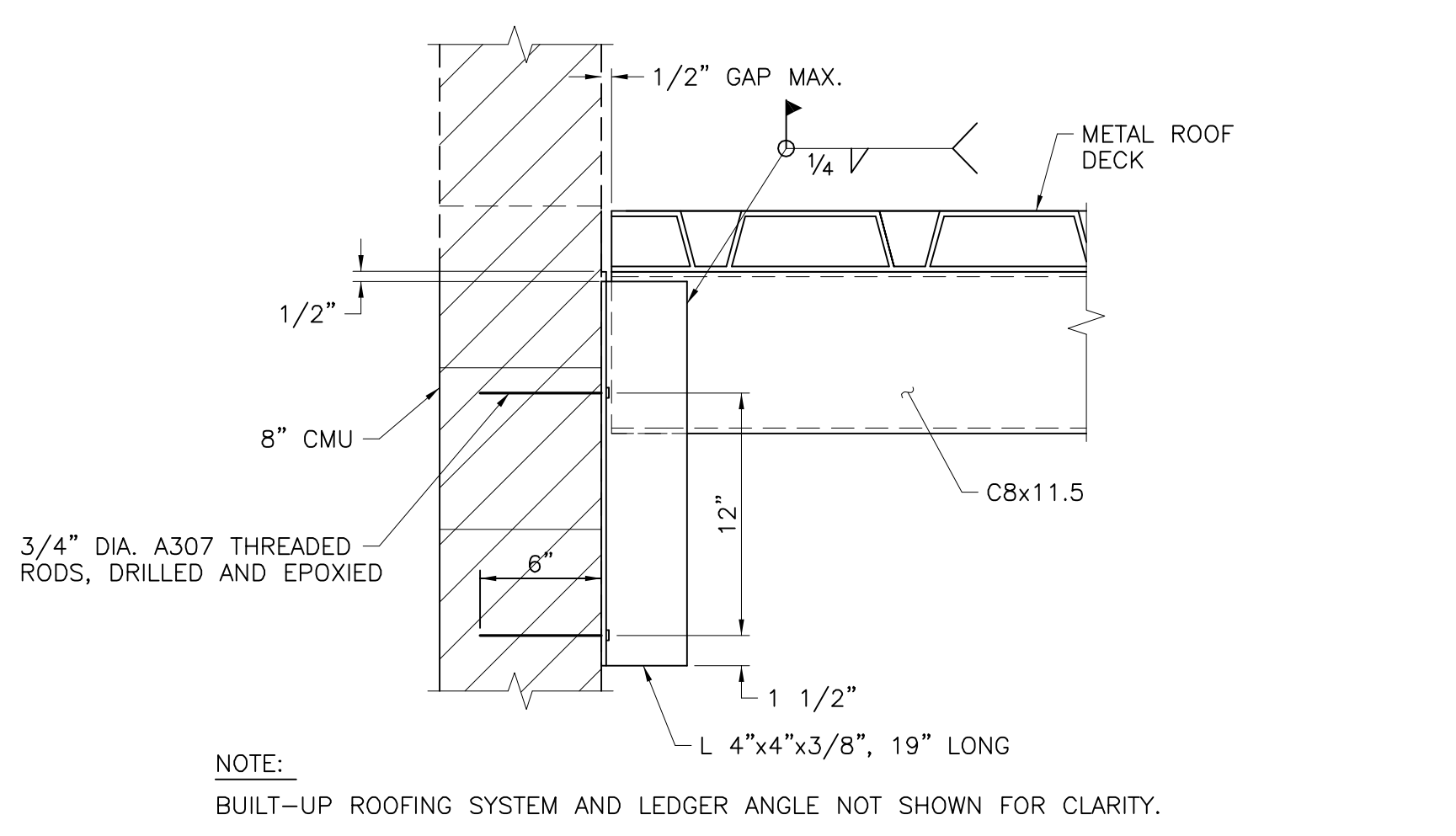
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING**  
SECTIONS AND DETAILS

DRAWING  
**2S-3**  
50 OF 69 SHEETS  
11760  
R.C.S.D. PLAN No.

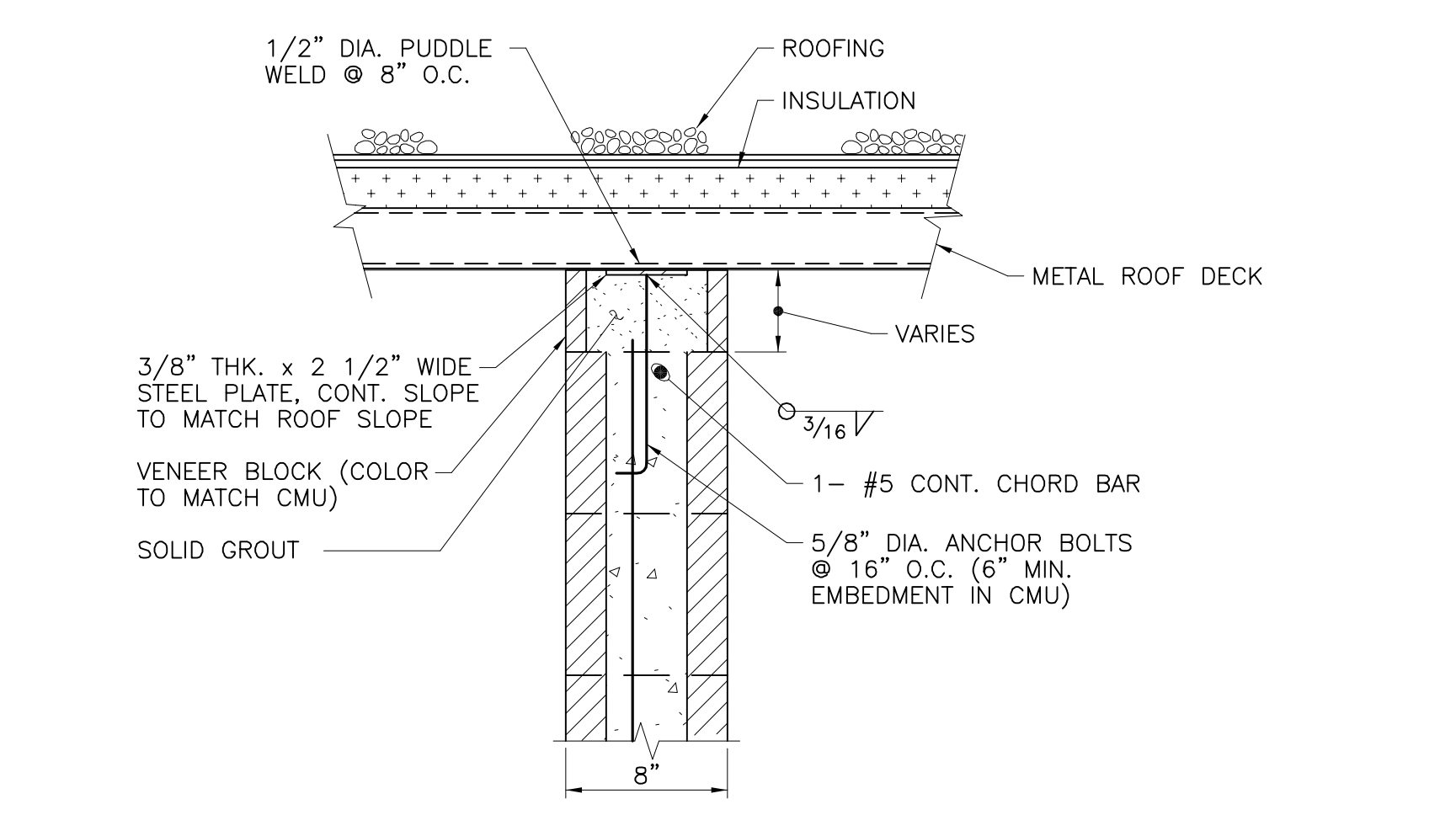
DWG. NO.: RC-80-18-54-241 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:37PM PLOT SCALE: 1"=1'



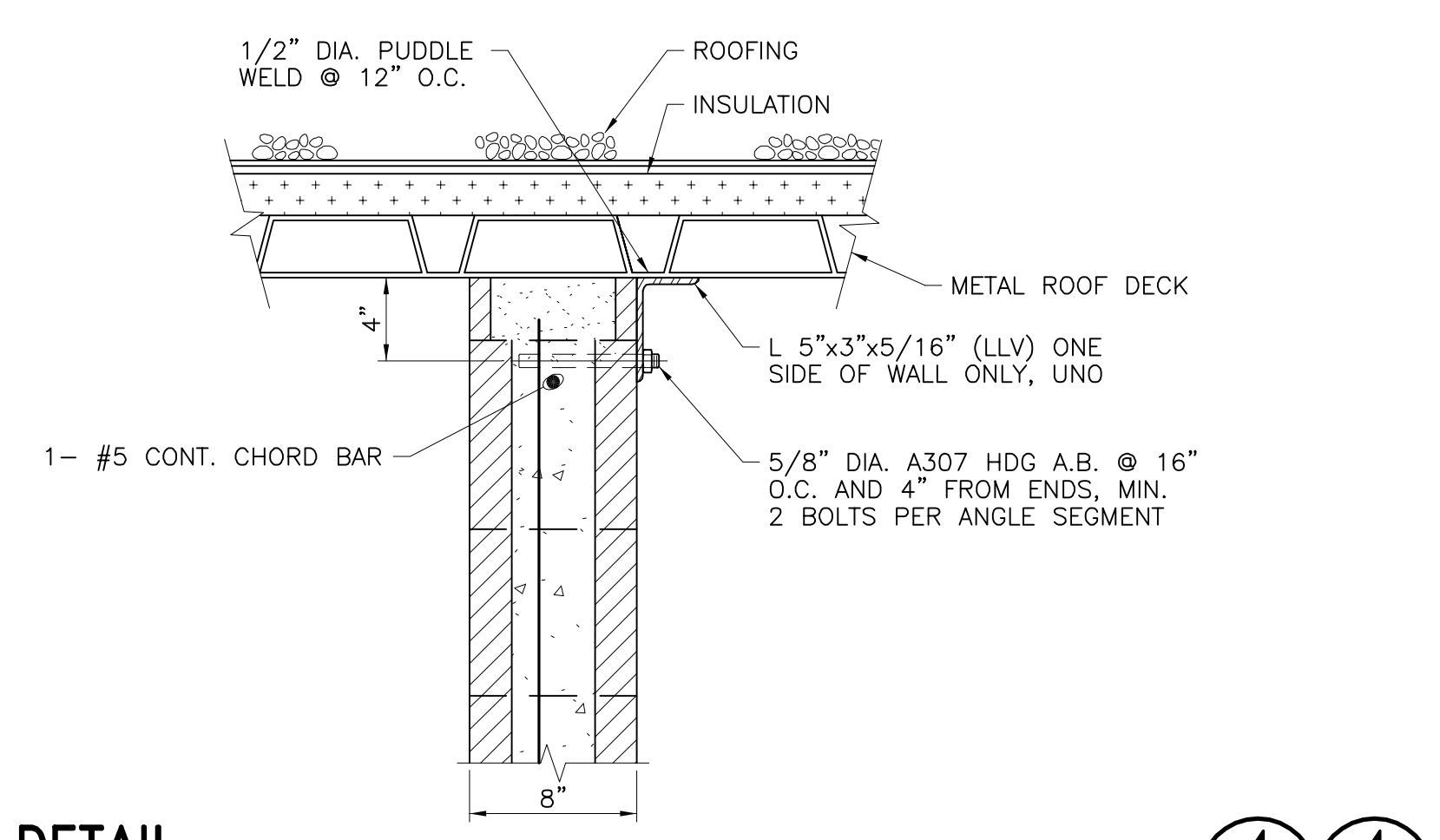
**DETAIL 1**  
SCALE: 1 1/2"=1'-0"  
2S-2 2S-3



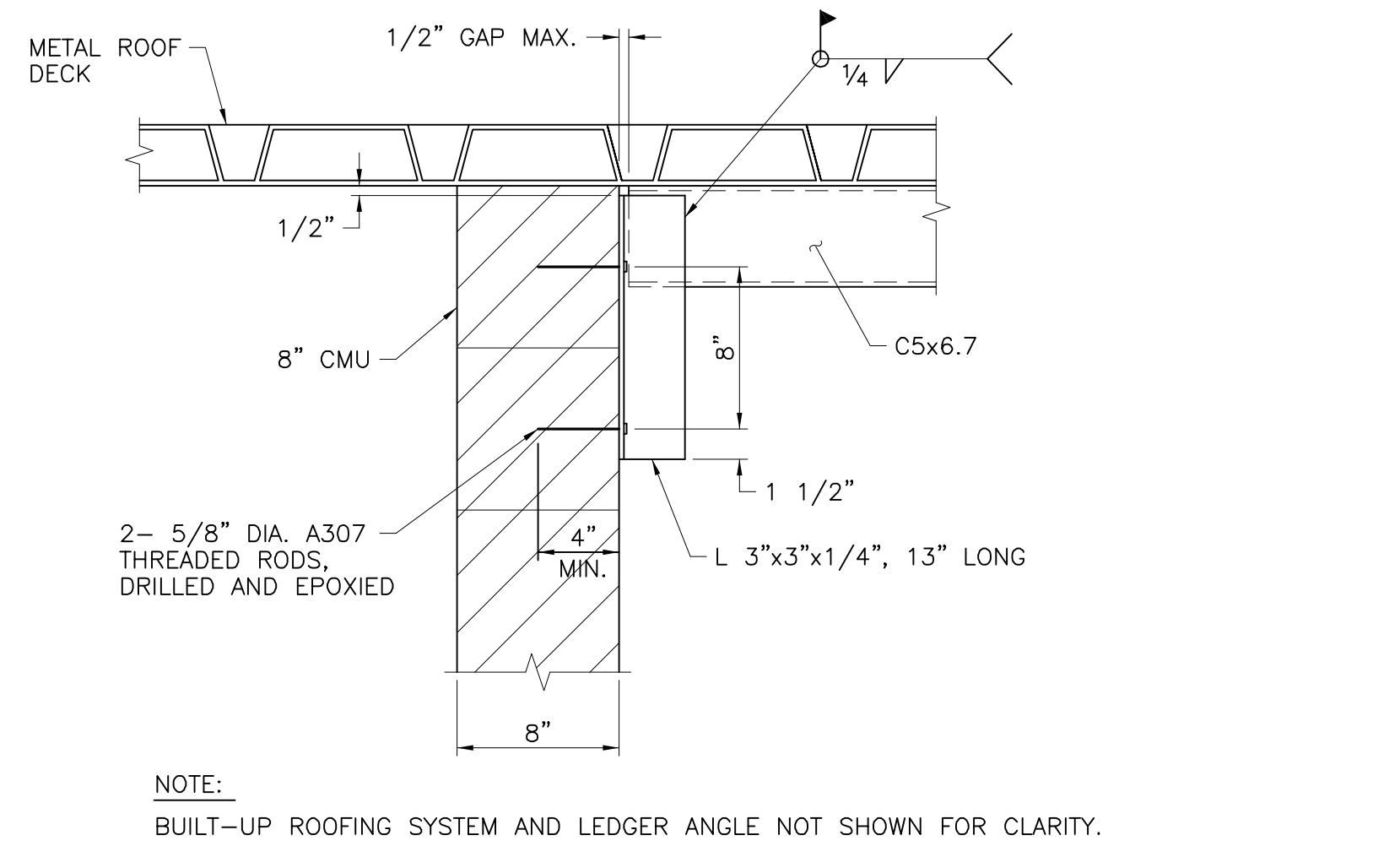
**DETAIL 2**  
SCALE: 1 1/2"=1'-0"  
2S-2 2S-3



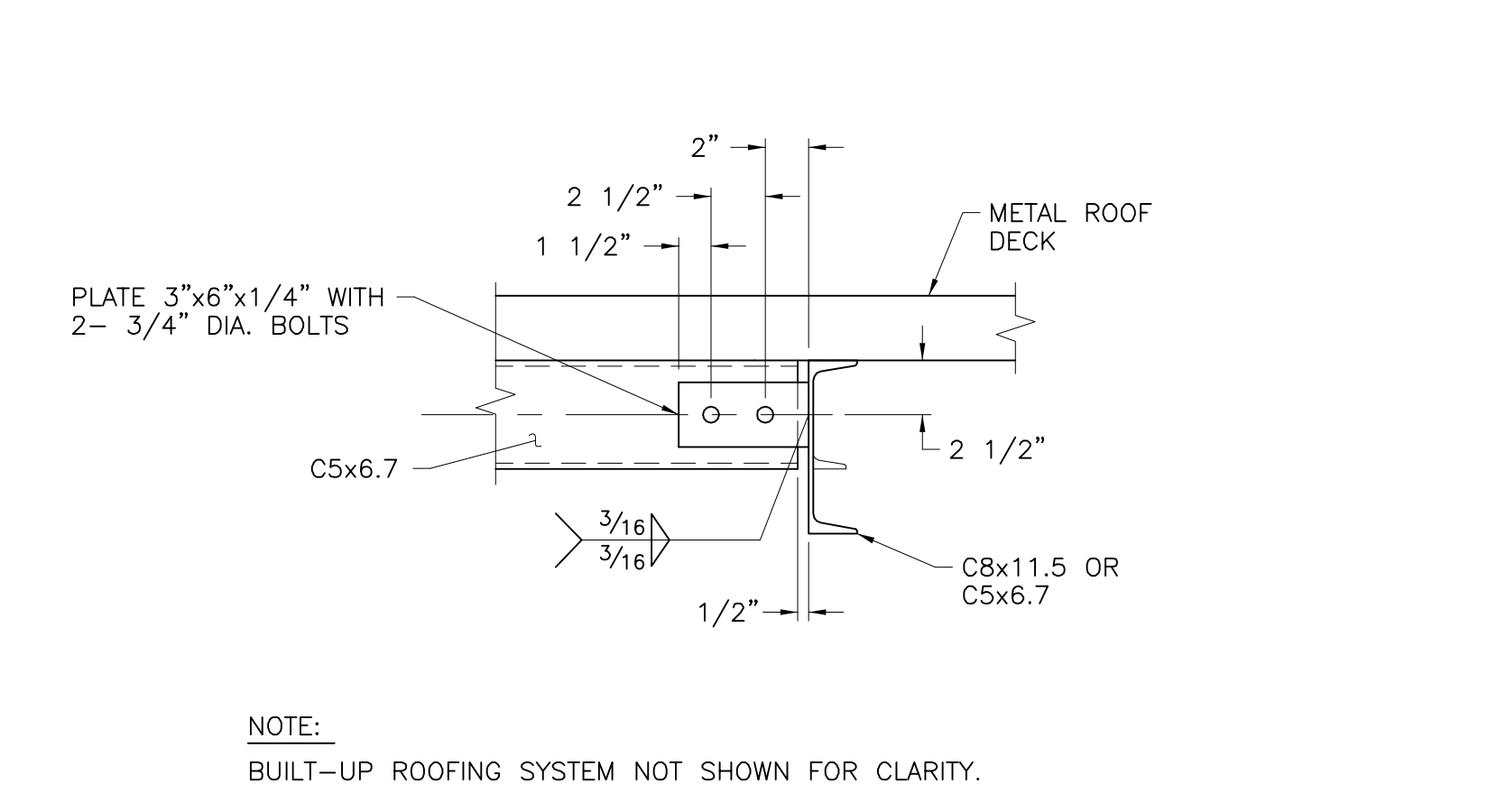
**DETAIL 3**  
SCALE: 1 1/2"=1'-0"  
2S-2 2S-3



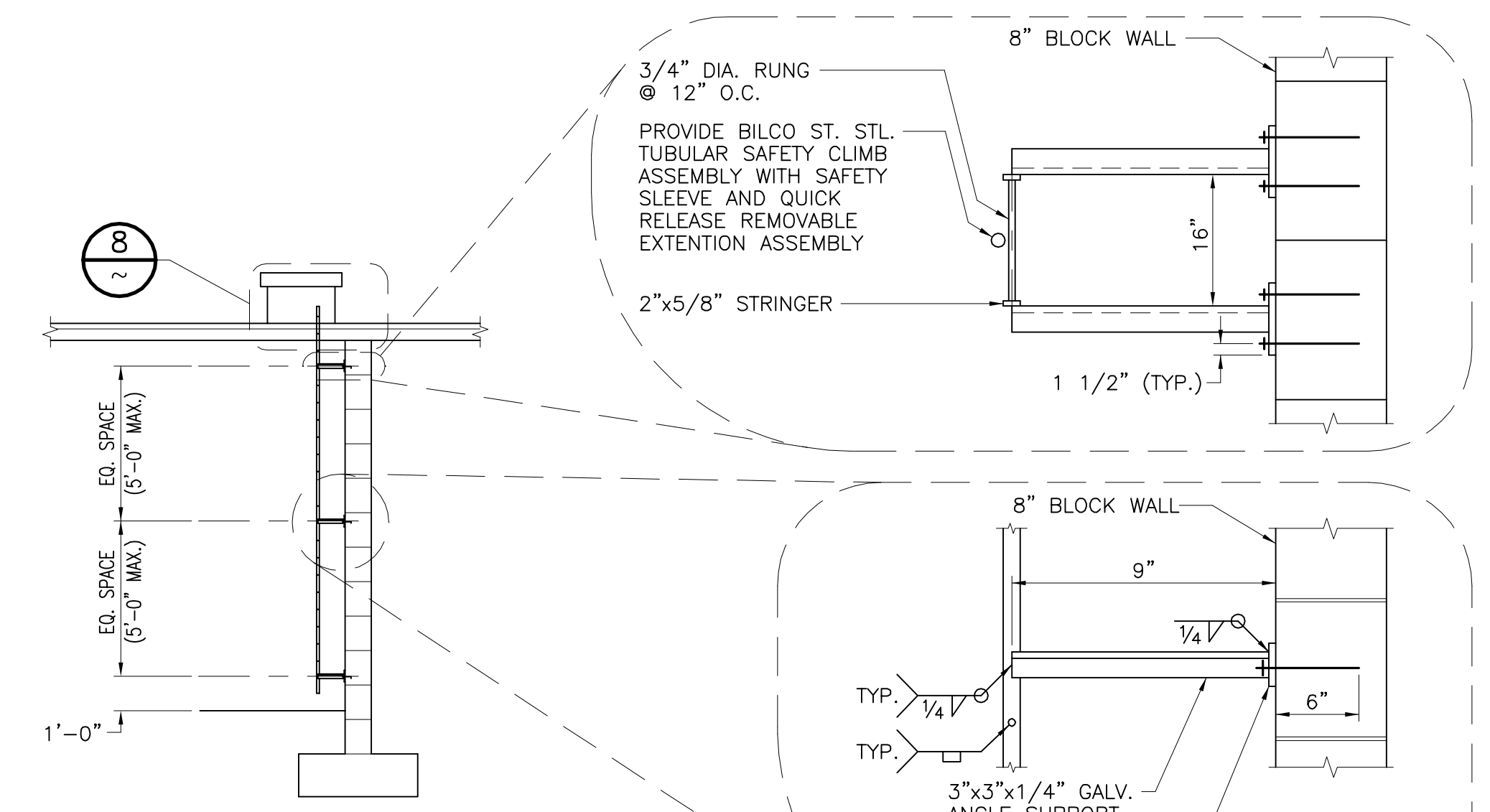
**DETAIL 4**  
SCALE: 1 1/2"=1'-0"  
2S-2 2S-3



**DETAIL 5**  
SCALE: 1 1/2"=1'-0"  
2S-2

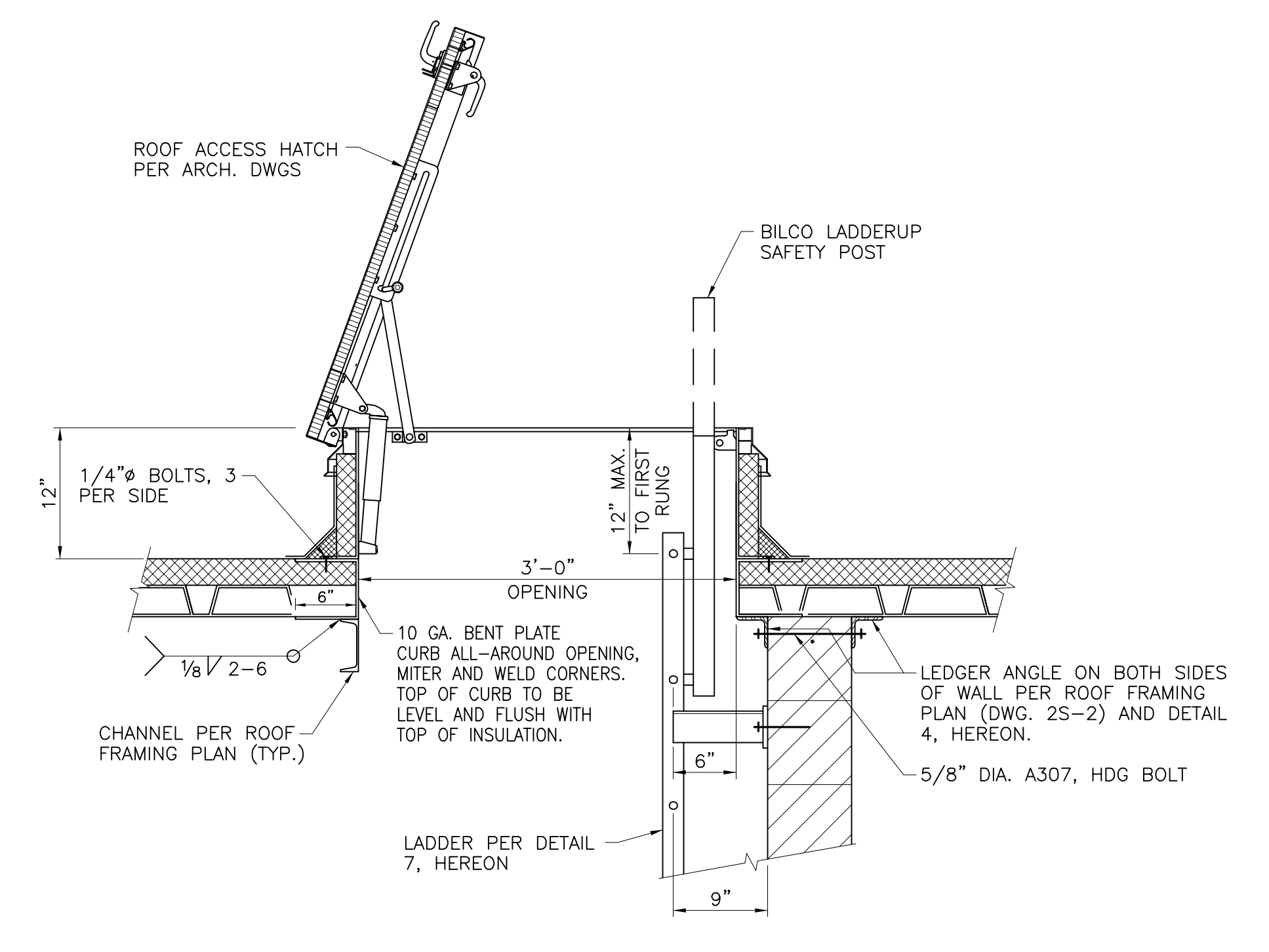


**DETAIL 6**  
SCALE: 1 1/2"=1'-0"  
2S-2



- NOTES:**
- ALL LADDER MATERIAL SHALL BE A36 STEEL AND SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
  - PROVIDE ONE SAFETY BELT WITH SAFETY CLIMB ASSEMBLY.

**EQUIPMENT BUILDING LADDER DETAIL 7**  
N.T.S.  
2S-2



**ROOF ACCESS HATCH DETAIL 8**  
N.T.S.  
2S-2

**RECORD DRAWING**

BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *William George Hoffman*  
REGISTERED ENGINEER No. 70939 DATE 2/15/11

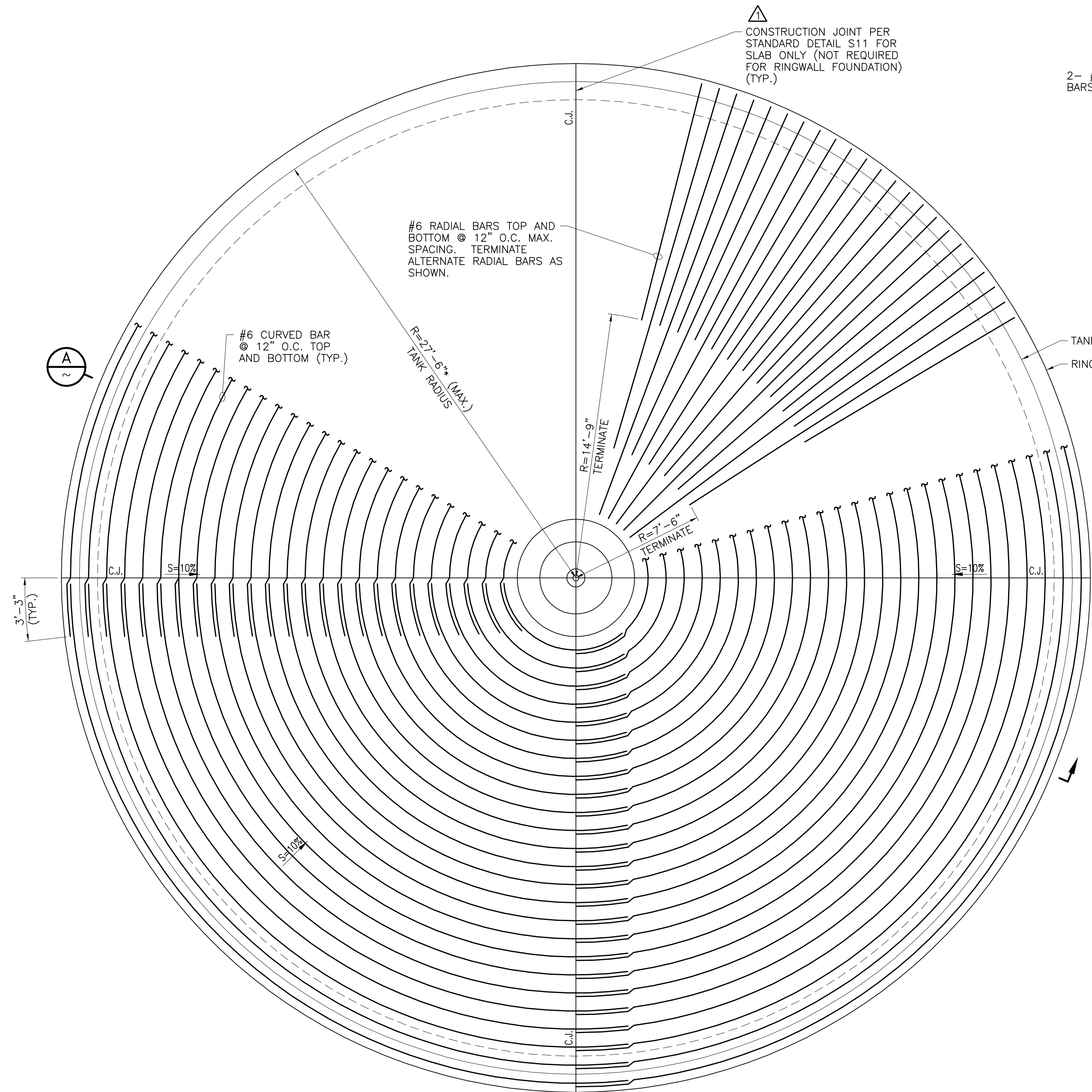
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	WGH
DRAWN	SPK
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING DETAILS**

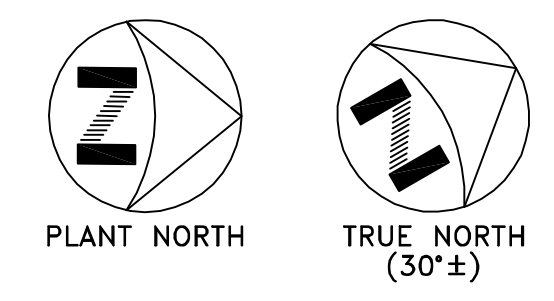
DRAWING  
**2S-4**  
51 OF 69 SHEETS  
11761  
R.C.S.D. PLAN No.



DWG. NO.: RE-98-18-34-31 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:38PM PLOT SCALE: 1"=1'



**BWw TANK FLOOR PLAN**  
SCALE: 1/4"=1'-0"



**RECORD DRAWING**  
BY: *R. C. V. J.* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
△	RECORD DRAWING	05/21/13	BCV

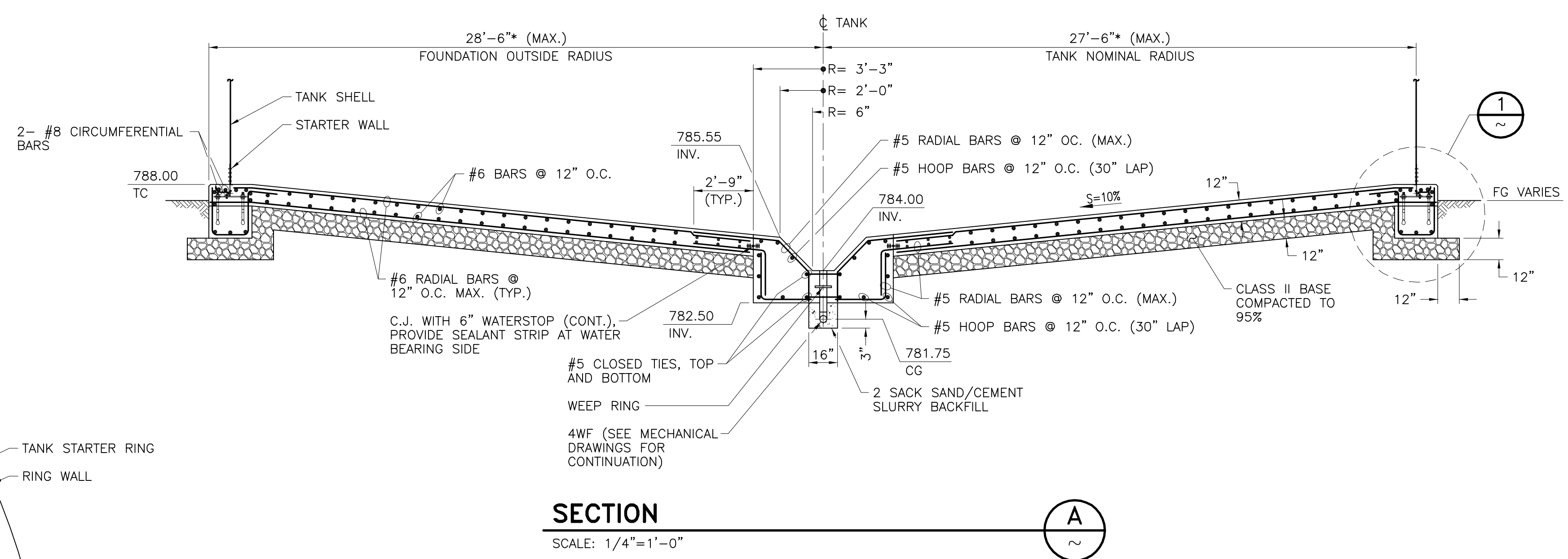


**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Philip L. Egan*  
REGISTERED ENGINEER No. 37263 DATE 2/15/11

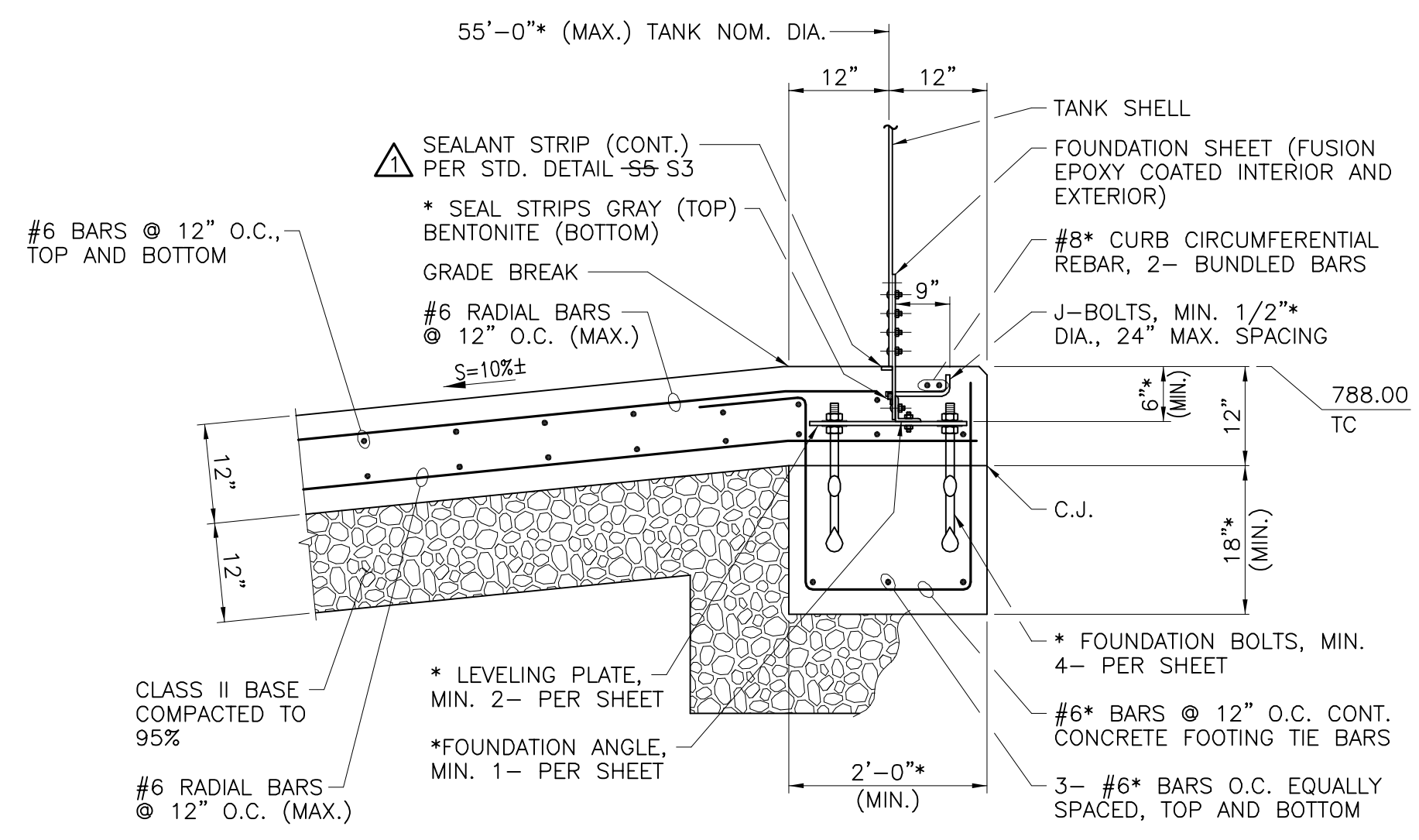
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	SPK
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**BACKWASH WASTE TANK**  
PLAN, SECTION, AND DETAIL

DRAWING  
**3S-1**  
52 OF 69 SHEETS  
11762  
R.C.S.D. PLAN No.



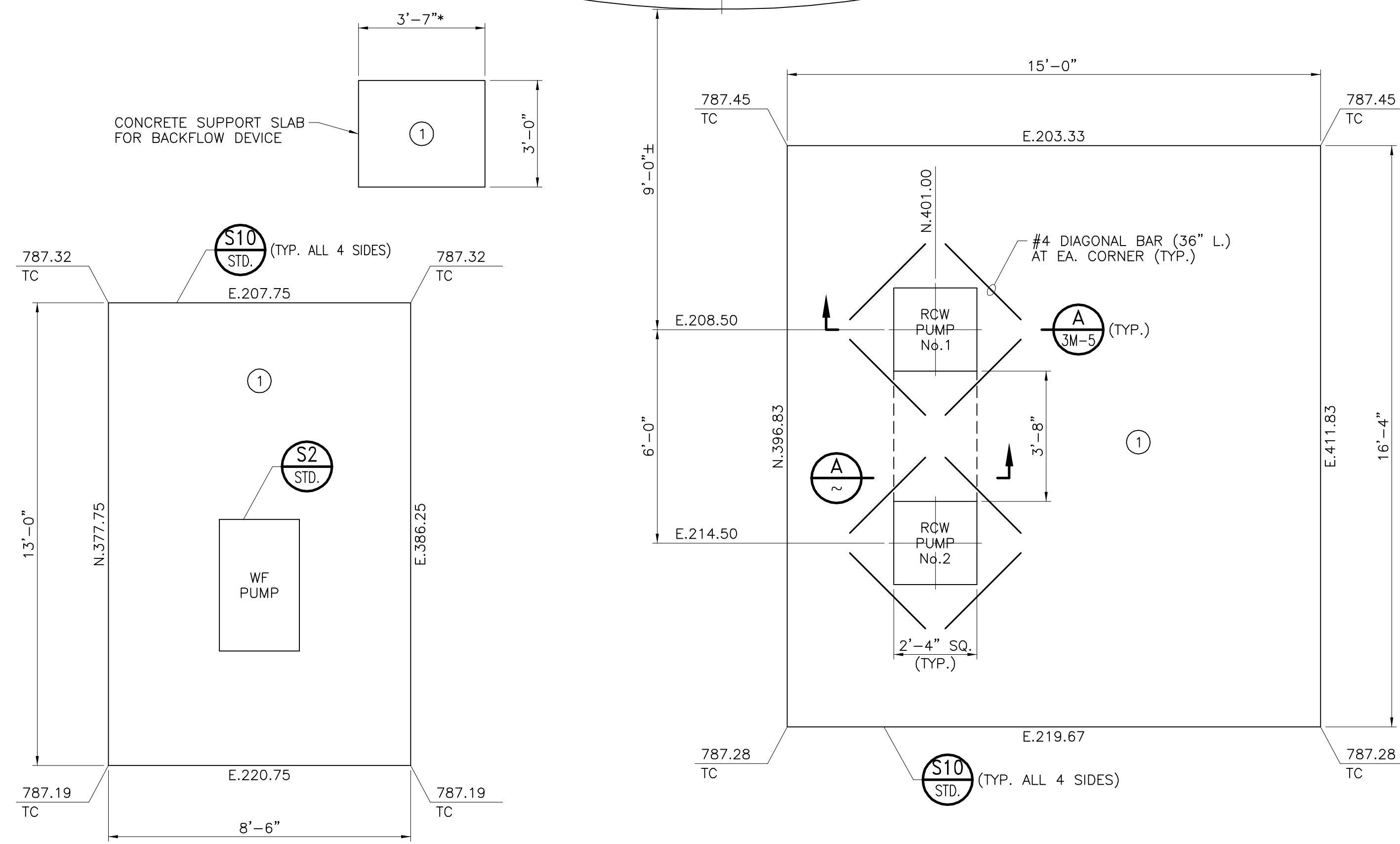
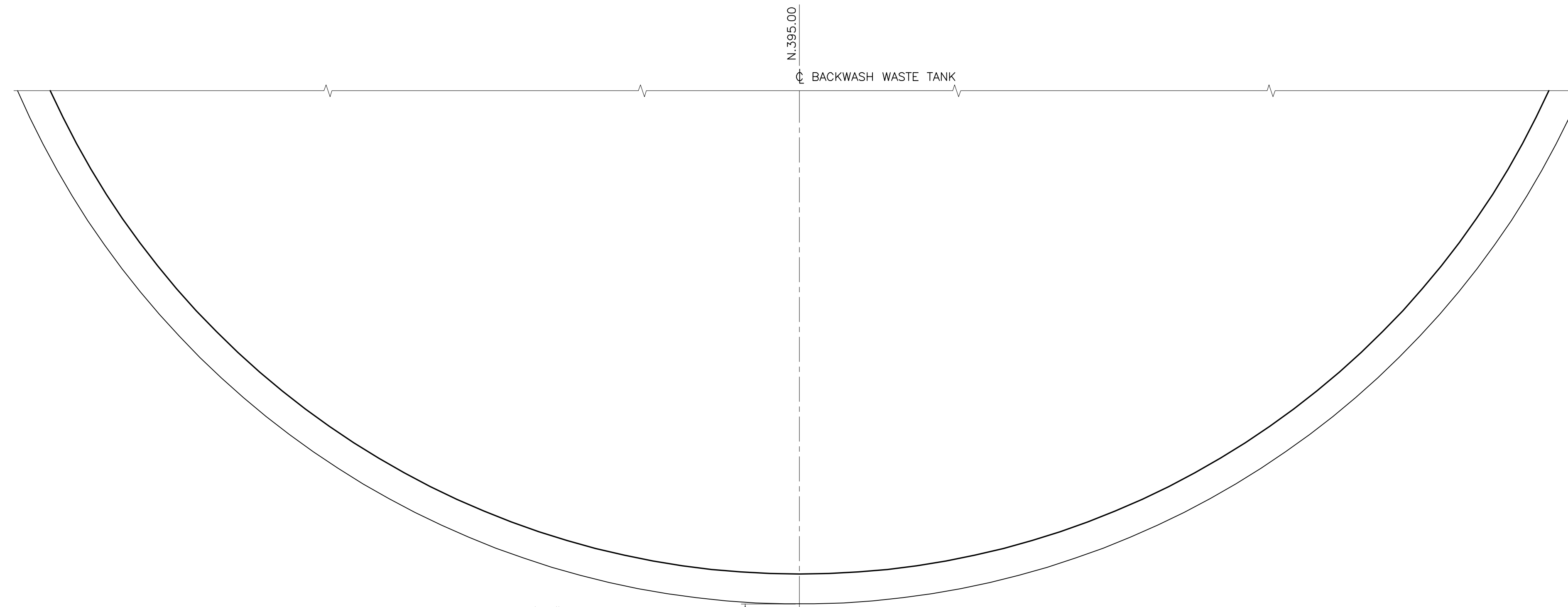
**SECTION A**  
SCALE: 1/4"=1'-0"



**RINGWALL FOOTING DETAIL**  
N.T.S.

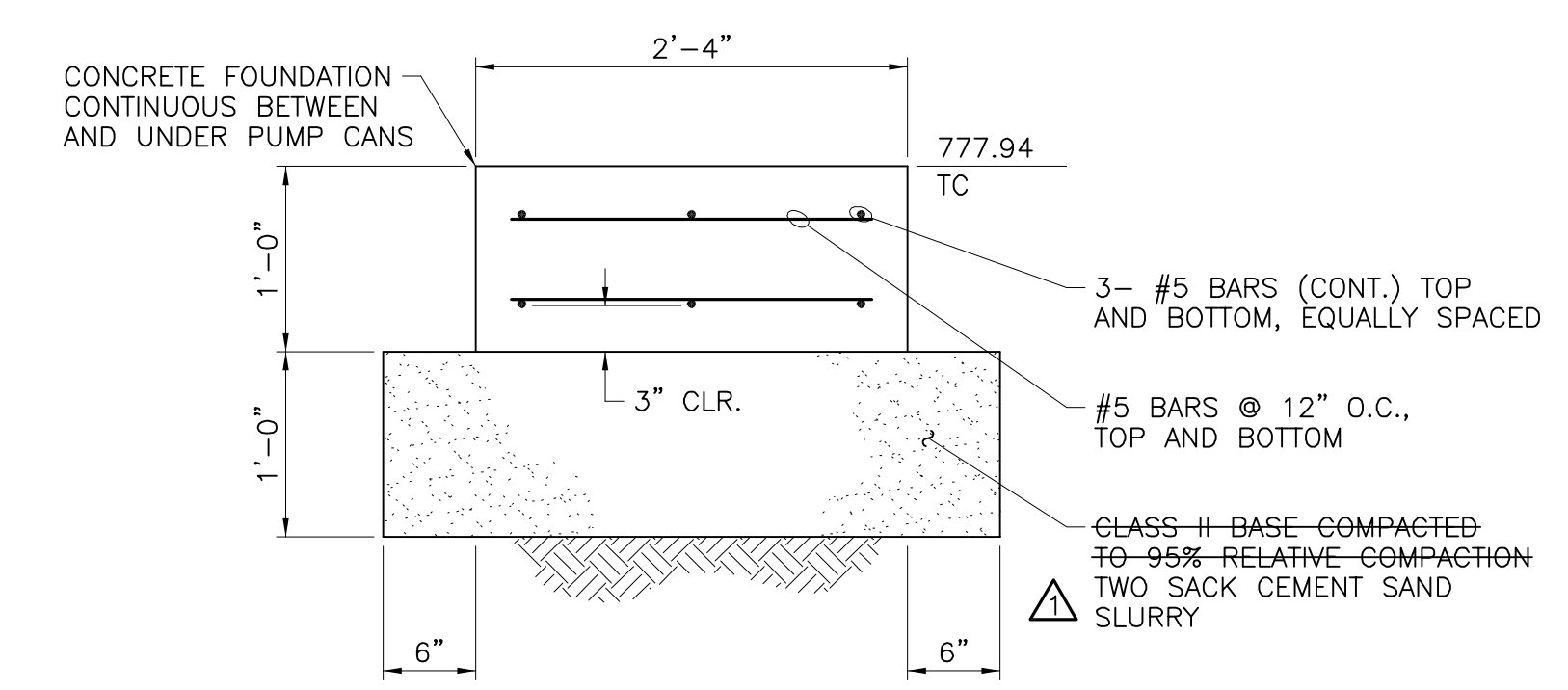
- NOTES:
- CONCRETE RINGWALL FOOTINGS SHALL BE PLACED ON 12" THICK CLASS II BASE COMPACTED TO 95% RELATIVE COMPACTION.
  - \* THESE DIMENSIONS AND QUANTITIES TO BE SUPPLIED BY THE TANK MANUFACTURER. UNO, SIZES, QUANTITIES, AND DIMENSIONS SHOWN HEREON ARE MINIMUM REQUIREMENTS.

① MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 3S-2:  
 1. 6" THICK CONCRETE SLAB PER STANDARD DETAIL S8.



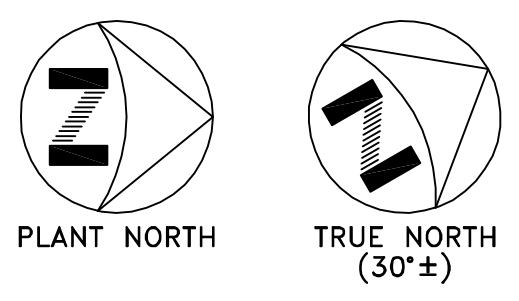
**PLAN**

SCALE: 3/8"=1'-0"



**SECTION**

SCALE: 1"=1'-0"



**RECORD DRAWING**

BY: *R. C. V. H.* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
 CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Philip L. Egan*  
 REGISTERED ENGINEER No. 37263 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	PES
DRAWN	SPK
CHECKED	JCR

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**RCW/WF PUMP STATION PLAN**

DRAWING  
**3S-2**  
 53 OF 69 SHEETS  
 11763  
 R.C.S.D. PLAN No.

DWG. NO.: RC-80-18-54-30 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:39PM PLOT SCALE: 1"=1'

ELECTRICAL SYMBOLS AND LEGENDS

SYMBOL	DESCRIPTION
	CONDUIT, (MIN. 3/4") WITH- #12 CONDUCTORS, NUMBER INDICATED EXCLUDING REQUIRED GROUND WIRE.
	CONDUIT, (MIN. 3/4") WITH- #12 CONDUCTORS, NUMBER INDICATED EXCLUDING REQUIRED GROUND, TO LP, CRT. NUMBER AS SHOWN.
	CONDUITS, (MIN. 3/4") RUN EXPOSED, UNLESS NOTED OTHERWISE.
	CONDUITS, (MIN. 3/4") RUN CONCEALED. UNDERGROUND, UNDER CONCRETE OR IN CONCRETE, UNLESS NOTED OTHERWISE.
	ELECTRICAL DUCT BANK
	DISCONNECT SWITCH (NON-FUSED)
	FUSED DISCONNECT SWITCH
	THERMAL MAGNETIC BREAKER, 225 INDICATES FRAME SIZE, 100 INDICATES TRIP SIZE, 3 POLES UNLESS NOTED OTHERWISE
	MOTOR CIRCUIT PROTECTOR SIZE BY MANUFACTURER BASED ON MOTOR FURNISHED
	TRANSFORMER
	FULL VOLTAGE NON-REVERSING COMBINATION MOTOR STARTER, WITH MOTOR CIRCUIT PROTECTOR AND AIR CONTACTORS. SIZE 0 MINIMUM WITH ELECTRONIC OVERLOADS AND AUXILIARY CONTACTS (MINIMUM ONE N.C. AND ONE N.O.) OR AS REQUIRED FOR CONTROL, WITH ONE SPARE N.O. AND ONE SPARE N.C. SUBSCRIPT INDICATES NEMA SIZE
	VARIABLE FREQUENCY DRIVE, VARIABLE TORQUE UNLESS NOTED "CT" FOR CONSTANT TORQUE, WITH CIRCUIT BREAKER OR MCP PER MANUFACTURE RECOMMENDATIONS, AND IN LINE FUSES. REFER TO SPECIFICATIONS FOR TEMPERATURE RATING, BYPASS CONTACTS, HARMONIC DISTORTION EQUIPMENT, ETC..
	REDUCED VOLTAGE SOLID STATE MOTOR CONTROLLER WITH SHUNTING CONTACTORS AND SOLID STATE OVERLOAD PROTECTION UNO.
	THERMAL OVERLOAD RELAY
	MOTOR (NUMBER INDICATES HORSEPOWER)
	GROUND WELL
	JUNCTION BOX, CROUSE-HINDS, APPLETON OR EQUAL CAST CONDULET DEVICE BOX SURFACE MOUNTED ON WALL OR CEILING OR UNISTRUT FLOOR MOUNTED AND WATERPROOF OUT OF DOORS. MIN. TWO GANG SIZE WITH SOLID COVER. PROVIDE LARGER IF NECESSARY FOR SPLICING.
	EXPLOSION PROOF NEMA 7 JUNCTION BOX. SIZE AS SPECIFIED OR AS REQUIRED FOR CONDUCTORS INSTALLED.
	JUNCTION BOX, MINIMUM 4"x4"x3". PROVIDE LARGER SIZE WHERE SPECIFIED OR REQUIRED FOR CONDUCTOR SIZE. NEMA 4X STAINLESS STEEL INDOORS AND OUT OF DOORS.
	COOLING TYPE LINE VOLTAGE THERMOSTAT., 120V WITH CONTACTS RATED MIN. 7 AMP AND 2" DIFFERENTIAL, DAYTON HEAVY DUTY WITH ON-OFF SWITCH AND JUNCTION BOX WALL MOUNTED AT 5'-6" ABOVE FINISH FLOOR
	LINE VOLTAGE THERMOSTAT MOUNTED IN MCC OR DISTRIBUTION PANEL, COOLING TYPE FOR EXHAUST OR SUPPLY FAN WITH 15' F. DIFFERENTIAL DAYTON, CHROMALOX, OR EQUAL. HEATING TYPE FOR STRIP HEATER WITH 3' TO 10' F. DIFFERENTIAL DAYTON, CHROMALOX, OR EQUAL.
	TWO STAGE COOLING LINE VOLTAGE THERMOSTAT WITH MIN. 5 AMP CONTACTS, HIGH AND LOW SET POINTS FOR WALL MOUNT JUNCTION BOX.
	AIR CONDITIONER SYSTEM THERMOSTAT.
	TIMER, LINE VOLTAGE TYPE, 24 HOUR WITH 15 MIN. INTERVALS ON-OFF SWITCH AND MANUAL START SWITCH WATERPROOF LOCK-OUT-STOP, HEAVY DUTY, NEMA 4 TYPE WITH LOCK OUT IN STOP POSITION.
	LOCK-OUT STOP NEMA 4X ENCL. (STAINLESS STEEL).
	SUBMERSIBLE EMERGENCY STOP MOMENTARY CONTACT PUSH BUTTON STATION NEMA TYPE 6 OR IP 67.
	DEVICE BOX WITH DUPLEX CONVENIENCE RECEPTACLE, 1 POLE (UNLESS NOTED OTHERWISE), 120 VOLTS AC MTG HT 18" ABOVE FLOOR UNLESS NOTED OTHERWISE. (F- INDICATES FLOOR MOUNTED, H- HAZARDOUS AREA EXPLOSION PROOF, WR- OUTDOOR WEATHER RESISTANT, GFI- GROUND FAULT INTERRUPTER), RECESS INTO STUD WALLS, SURFACE MOUNT ON MASONRY OR CONCRETE WALL, AND PROVIDE WATERPROOF IF OUT OF DOORS. WR RECEPTACLES SHALL BE HEAVY DUTY, COMMERCIAL GRADE, 20 AMP DUPLEX RECEPTACLES, PASS & SEYMOUR No.WR5362-1, OR EQUAL.
	EXPLOSION PROOF CONDUIT SEAL FITTING, CROUSE-HINDS TYPE EYS FILLED WITH CHICO TYPE A SEALER. LOCATE ABOVE GRADE (EXPOSED) FOR ACCESS.
	MCC (OR DISTRIBUTION PANEL) AIR SUPPLY OR EXHAUST OPENING WITH GRILL AND FILTER.

SYMBOL	DESCRIPTION
	LIGHTING FIXTURE (TYPE AND MOUNTING AS NOTED)
	NO. OF FIXTURES FIXTURE TYPE FIXTURE IDENTIFICATION NUMBER OF LAMPS/LAMP WATTAGE
	MCC STRIP HEATER MOUNTED IN BOTTOM PORTION OF ELECTRICAL PANEL, 150 WATT, 120 VOLT, CHROMALOX, DAYTON, OR EQUAL.
	MCC EXHAUST FAN AT TOP OF MCC OR DISTRIBUTION PANEL, OR TOP OF 3R WRAP COMPLETE WITH GASKETS, FILTER, AND LOUVERED PLATE. 4" DIAMETER, 120 VOLT, 100 CFM MIN., DAYTON, HOFFMAN, OR EQUAL. SPECIAL SIZE AS REQUIRED FOR VFD, PER VFD MANUFACTURE IN NECESSARY IN ADDITION TO SUPPLY FAN.
	AIR EXHAUST OPENING IN 3R WRAP DOOR OF MCC OR DISTRIBUTION PANEL AT BOTTOM WITH GASKETS, FILTER, AND LOUVER PLATE.
	AIR EXHAUST OPENING IN 3R WRAP DOOR OF MCC OR DISTRIBUTION PANEL AT TOP WITH GASKETS, FILTER, AND LOUVER PLATE.
	SUPPLY FAN AT BOTTOM OF MCC OR DISTRIBUTION PANEL, WITH FILTER AND GRILL. MINIMUM 4" DIAMETER, 120 VOLT, 100 CFM, DAYTON, HOFFMAN, OR EQUAL. PROVIDE LARGER CAPACITY FAN FOR COOLING PER CALCULATIONS BY MANUFACTURER FOR VFD'S. SEE SPECIFICATIONS.
	LINE VOLTAGE HEATING THERMOSTAT FOR STRIP HEATER IN ELECTRICAL PANEL.
	LINE VOLTAGE COOLING THERMOSTAT FOR SUPPLY FAN, OR EXHAUST FAN IN ELECTRICAL PANEL.
	DEVICE BOX WITH SWITCH (1 POLE UNLESS OTHERWISE NOTED) RECESSED INTO STUD WALL, SURFACE MOUNTED ON MASONRY OR CONCRETE WALL, AND WATERPROOF OUT-OF-DOORS, 3W- DENOTES 3 WAY SWITCH, 3P- DENOTES 3 POLE SWITCH, ETC.
	CURRENT TRANSFORMER (3 INDICATES NUMBER OF CT'S) 600/5 INDICATES XFMR RATIO
	NORMALLY OPEN CONTACT
	NORMALLY CLOSED CONTACT
	TORQUE SWITCH.
	NORMALLY OPEN LIMIT SWITCH.
	NORMALLY CLOSED LIMIT SWITCH.
	FLOAT TYPE LIQUID LEVEL SWITCH. CLOSING ON RISING LEVEL.
	FLOAT TYPE LIQUID LEVEL SWITCH. OPENING ON RISING LEVEL.
	VACUUM OR PRESSURE SWITCH. CLOSING ON RISING PRESSURE.
	VACUUM OR PRESSURE SWITCH. OPENING ON RISING PRESSURE.
	TEMPERATURE ACTUATED SWITCH. CLOSING ON RISING TEMPERATURE.
	TEMPERATURE ACTUATED SWITCH. OPENING ON RISING TEMPERATURE.
	FLOW SWITCH (AIR, WATER, ETC..) CLOSING ON FLOW INCREASE.
	FLOW SWITCH (AIR, WATER, ETC..) OPENING ON FLOW INCREASE.
	NORMALLY OPEN PUSHBUTTON, MOMENTARY CLOSE.
	NORMALLY CLOSED PUSHBUTTON, MOMENTARY OPEN.
	N.O./N.C. MAINTAINED PUSHBUTTON.
	TWO-POSITION SELECTOR SWITCH; H=HAND, M=MANUAL, R=REMOTE, L=LOCAL, A=AUTOMATIC, AND O=OFF.
	THREE-POSITION SELECTOR SWITCH; (SAME AS ABOVE).
	SINGLE POLE TOGGLE SWITCH (ON, OFF, ETC..).
	GROUND CONNECTION
	OVERLOAD RELAY CONTACTS.
	ENERGIZED, NORMALLY OPEN WITH TIME DELAY CLOSED.
	ENERGIZED, NORMALLY CLOSED WITH TIME DELAY OPENING.
	DE-ENERGIZED, NORMALLY OPEN WITH INSTANT CLOSING WHEN ENERGIZED AND TIME DELAY OPENING.

SYMBOL	DESCRIPTION
	DE-ENERGIZED, NORMALLY CLOSED WITH INSTANT OPENING AND TIME DELAY CLOSING.
	HEATER
	CONDUCTORS - NOT CONNECTED.
	CONDUCTORS - CONNECTED.
	DENOTES A DRY CONTACT OFF RELAY TF1 TO TERMINAL BLOCK IN MCP FOR INPUT TO TELEMETRY (RTU), MCC- CONTROL OR OTHER PANEL AS NOTED.
	DENOTES A CONNECTION FROM MCP TERMINAL BLOCKS TO MCC BUCKET, ATS, FIELD DEVICE, OR OTHER REMOTE TERMINAL.
	PUSH TO TEST INDICATOR LIGHT; A=AMBER, G=GREEN, R=RED, W=WHITE. ALLEN BRADLEY MODEL No. 800T-Q10, OR EQUAL.
	THERMAL OVERLOAD RELAY.
	ELAPSED TIME METER.
	PHASE FAIL RELAY (POWER MONITOR)
	PRESSURE SWITCH.
	PRESSURE TRANSMITTER.
	TEMPERATURE SWITCH.
	DOOR SWITCH.
	SOLENOID VALVE.

FIXTURE LIST

	PENDENT MOUNT FLUORESCENT FIXTURE WITH 3- 32W TUBES, GASKETED, LITHONIA LIGHTING DMS332AR120. RATED FOR USE IN HARSH ENVIRONMENTS WHERE DUST, DIRT, HUMIDITY OR MOISTURE IS PRESENT. PROVIDE THREADED RODS AND SUPPORT TRACK (ST. STL. UNISTRUT) FOR PENDENT MOUNT. SUPERScript DENOTES NUMBER OF FIXTURES (TYP.) MOUNT FIXTURES 9'-4" ABOVE FLOOR UNLESS SHOWN OTHERWISE ON DRAWINGS.
	WALL MOUNT HIGH PRESSURE SODIUM FIXTURE, 50W WITH PHOTO CELL, MEDIUM BRONZE LITHONIA LIGHTING TWP50S 120, OR EQUAL. PROVIDE CAST METAL DEVICE BOX RECESSED INTO WALL FOR WIRING CONNECTIONS. FIXTURE AND DEVICE BOX ASSEMBLY SHALL BE WEATHER-TIGHT.
	POLE MOUNTED EXTERIOR WORK LIGHTS, WITH 2- 100 WATT HIGH PRESSURE SODIUM LIGHTS, LITHONIA LIGHTING HI-TEK TFL SERIES, TFL100STA2 120, MEDIUM BRONZE, WITH SQUARE STRAIGHT ALUMINUM POLE, 10' HIGH, AND BS28 MOUNTING BRACKET. ANCHOR TO CONCRETE TANK/SLAB WITH 4- 1/2" EPOXY ANCHORS WITH LEVELING NUTS, OR PROVIDE POLE FOUNDATION PER MISCELLANEOUS DETAIL DRAWING. PROVIDE SWITCH AND RECEPTACLE WHERE SHOWN.
	WALL MOUNTED WORKLIGHT WITH 1-100 WATT HIGH PRESSURE SODIUM LIGHT, LITHONIA LIGHTING HI-TEK TFL SERIES, TFL100STA2 120, MEDIUM BRONZE, ANCHOR TO WALL 12" BELOW TOP OF BUILDING WITH EPOXY ANCHORS.

ELECTRICAL ABBREVIATIONS

A	AMPERES, AMMETER	L	LOAD
AC	ALTERNATING CURRENT	LO	LUGS ONLY
AF	AMPERE FRAME	LOS	LOCK-OUT STOP
AFB	ABOVE FINISHED FLOOR	LP	LIGHTING PANEL
AFRC	AIR FUEL RATIO CONTROLLER	LTG	LIGHTING
AI	ANALOG INPUT TO PLC OR RTU	LV	LOW VOLTAGE (GENERALLY BELOW 600V)
AIC	AMPERES INTERRUPTING CAPACITY	M	MOTOR
AO	ANALOG OUTPUT FROM PLC OR RTU	MAX	MAXIMUM
AR	ALARM RELAY	MCC	MOTOR CONTROL CENTER
AT	AMPERE TRIP	MCM	THOUSAND CIRCULAR MILLS
ATS	AUTOMATIC TRANSFER SWITCH	MCP	MAIN CONTROL PANEL OR MOTOR CIRCUIT PROTECTOR
AUTO	AUTOMATIC	MIN	MINIMUM
AWG	AMERICAN WIRE GAUGE	MP	MOISTURE PROTECTION CONTROL MODULE
BC	BARE COPPER CONDUCTOR	MR	MOTOR CONTACTOR RELAY
BKR	BREAKER	MSF	MAIN SERVICE FEEDER
C.	CONDUIT	MTD	MOUNTED
C101	CONDUIT No.101 WITH CONTROL POWER CONDUCTORS	MTG. HT.	MOUNTING HEIGHT
CB	CIRCUIT BREAKER	MTS	MANUAL TRANSFER SWITCH
CKT	CIRCUIT	N	NORMAL
CO, C.O.	CONDUIT ONLY	N/A	NOT APPLICABLE
COMP	COMPARTMENT	NC	NORMALLY CLOSED
CONC	CONCRETE	NCTO	NORMALLY CLOSED, TIMED TO OPEN ON ENERGIZING
CPT	CONTROL POWER TRANSFORMER	NEC	NATIONAL ELECTRICAL CODE (LATEST EDITION)
CR	CONTROL RELAY	NIC	NOT IN CONTRACT
CT	CURRENT TRANSFORMER	NO	NORMALLY OPEN
CU	COPPER	NOTC	NORMALLY OPEN, TIMED TO CLOSE ON ENERGIZING
DC	DIRECT CURRENT	NTS	NOT TO SCALE
DET	DETAIL	OC	ON CENTER
DI	DIGITAL INPUT TO PLC OR RTU	O.L.	OVERLOAD
DIAG	DIAGRAM	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
DO	DIGITAL OUTPUT FROM PLC OR RTU	P	POLE, PHASE
DS	DOOR SWITCH	PB	PULL BOX, PUSH BUTTON
E	EMERGENCY	PF	POWER FEEDER PER SINGLE LINE DIAGRAM
EL	ELEVATION	PLC	PROGRAMMABLE LOGIC CONTROLLER
ENCL	ENCLOSURE/ENCLOSED	PROVIDE	FURNISH, INSTALL & CONNECT
EQUIP	EQUIPMENT	PT	POTENTIAL TRANSFORMER,
ETM	ELAPSE TIME METER	PT	PRESSURE TRANSDUCER
FDR	FEEDER	PVC	POLYVINYL CHLORIDE
FLA	FULL LOAD AMPERAGE	REQD	REQUIRED
FLEX	FLEXIBLE	RGS	RIGID GALVANIZED STEEL CONDUIT
FUT	FUTURE	RMS	ROOT MEAN SQUARE
G	GREEN GROUND CONDUCTOR, GENERATOR	RTU	REMOTE TERMINAL UNIT
GALV	GALVANIZED	SCE	SOUTHERN CALIFORNIA EDISON
GF	GENERATOR FEEDER	SCH.	SCHEDULE
GFI	GROUND FAULT INTERRUPTER	SEC	SECONDARY, SECONDS
GND, GRD	GROUND	SEL	SELECTOR
H/A	HAND/AUTO	SH	SHIELDED
HGD	HOT DIPPED GALVANIZED SCH.40 STEEL CONDUIT	SPEC	SPECIFICATIONS
HOA	HAND/OFF/AUTO	SSMS	SOLID STATE MOTOR STARTER
HP	HORSE POWER	SW	SWITCH
HPS	HIGH PRESSURE SODIUM	SYM.	SYMMETRICAL
HT	HEIGHT	T1	TRANSFORMER NO.1
HTR	HEATER	T.C.	TIME CLOSE
HV	HIGH VOLTAGE (GENERALLY ABOVE 600V)	TDR	TIME DELAY RELAY
HZ	HERTZ (CYCLES PER SECOND)	TEL	TELEPHONE, TELEMETRY
JB	JUNCTION BOX	T.O.	TIME OPEN
KVA	KILOVOLT-AMPERES	TRANS.	TRANSFORMER
KVAR	KILOVOLT-AMPERES, REACTIVE	TS	TEMPERATURE SWITCH
KW	KILOWATTS	TYP.	TYPICAL
KWH	KILOWATT HOUR	UG	UNDERGROUND
		UNO	UNLESS NOTED OTHERWISE
		VA	VOLT-AMPS
		W/	WITH
		WM	WATTMETER
		W/O	WITHOUT
		WP	WEATHERPROOF
		ZS	POSITION SWITCH
		3C5#12	3" CONDUIT WITH 5 #12 AND NUMBER OF GROUND (GRD.) CONDUCTORS AS INDICATED OR 1 #12 GRD. MIN. WHERE NOT SPECIFIED

RECORD DRAWING

BY: *John C. Stewart* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *John C. Stewart*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	TMW
CHECKED	PES

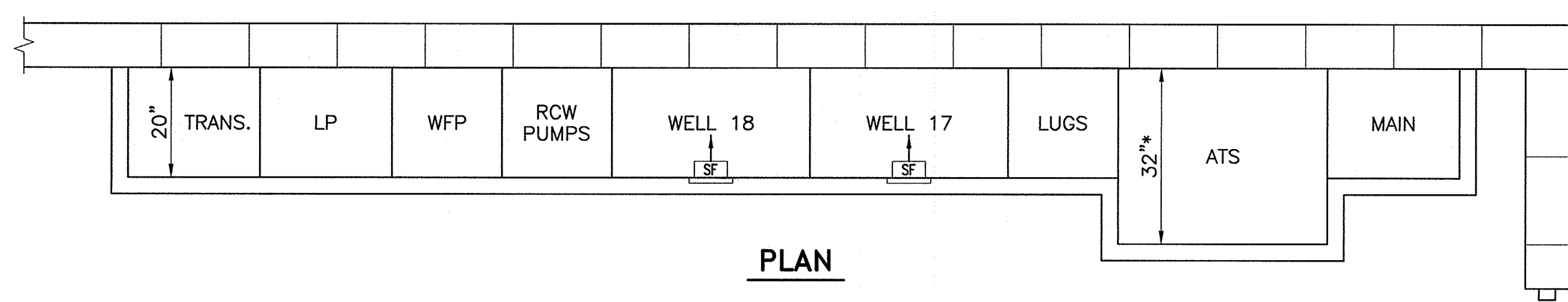
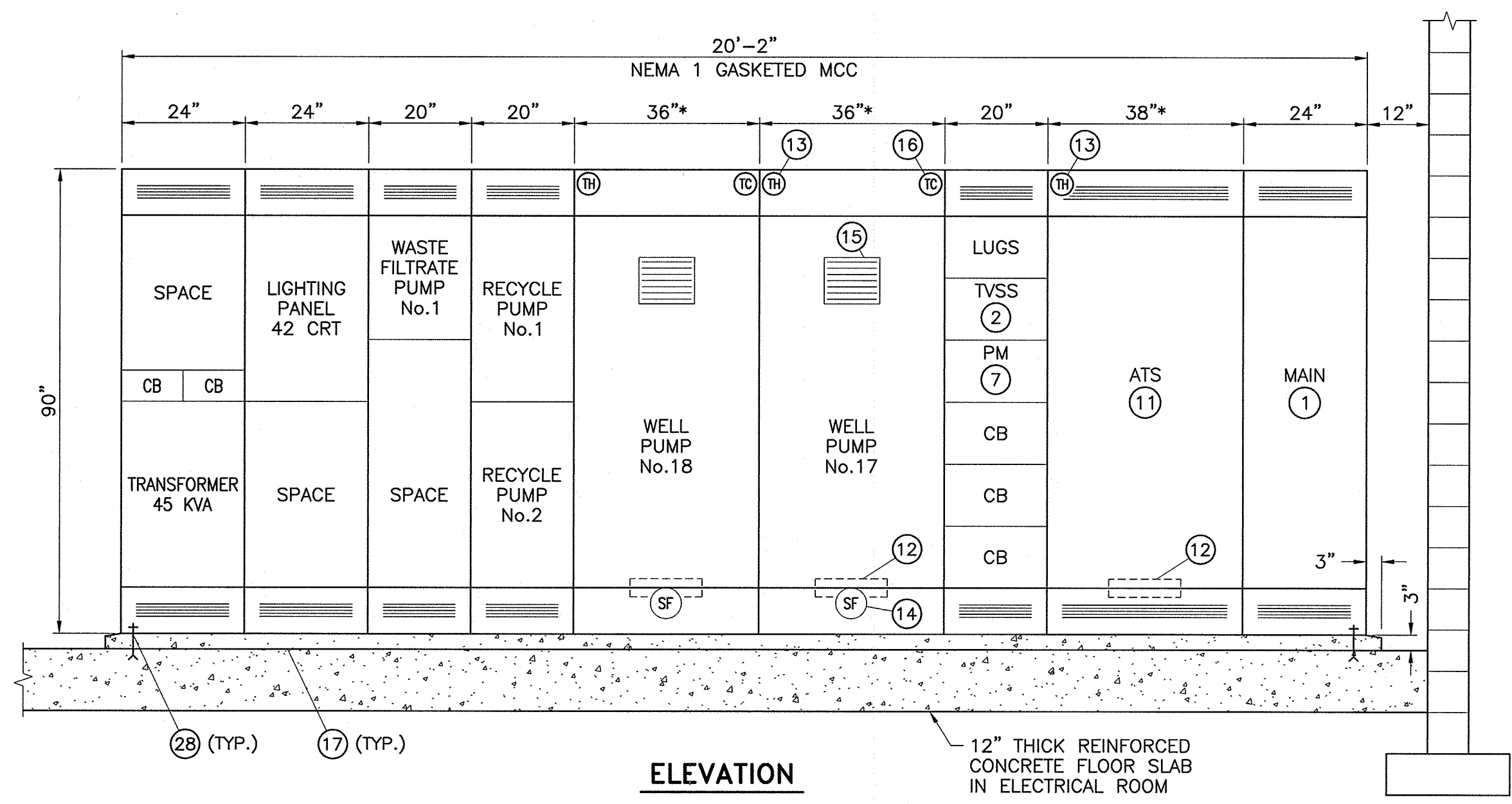
RUBIDOUX COMMUNITY SERVICES DISTRICT  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
ELECTRICAL SYMBOLS, ABBREVIATIONS,  
AND FIXTURE LIST

DRAWING  
**E-1**  
54 OF 69 SHEETS  
11764  
R.C.S.D. PLAN No.

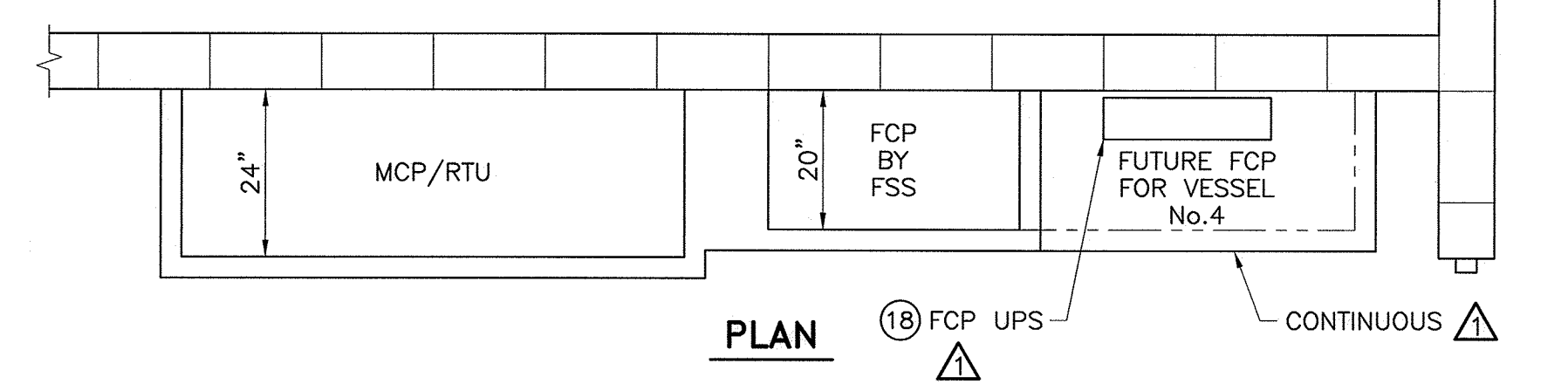
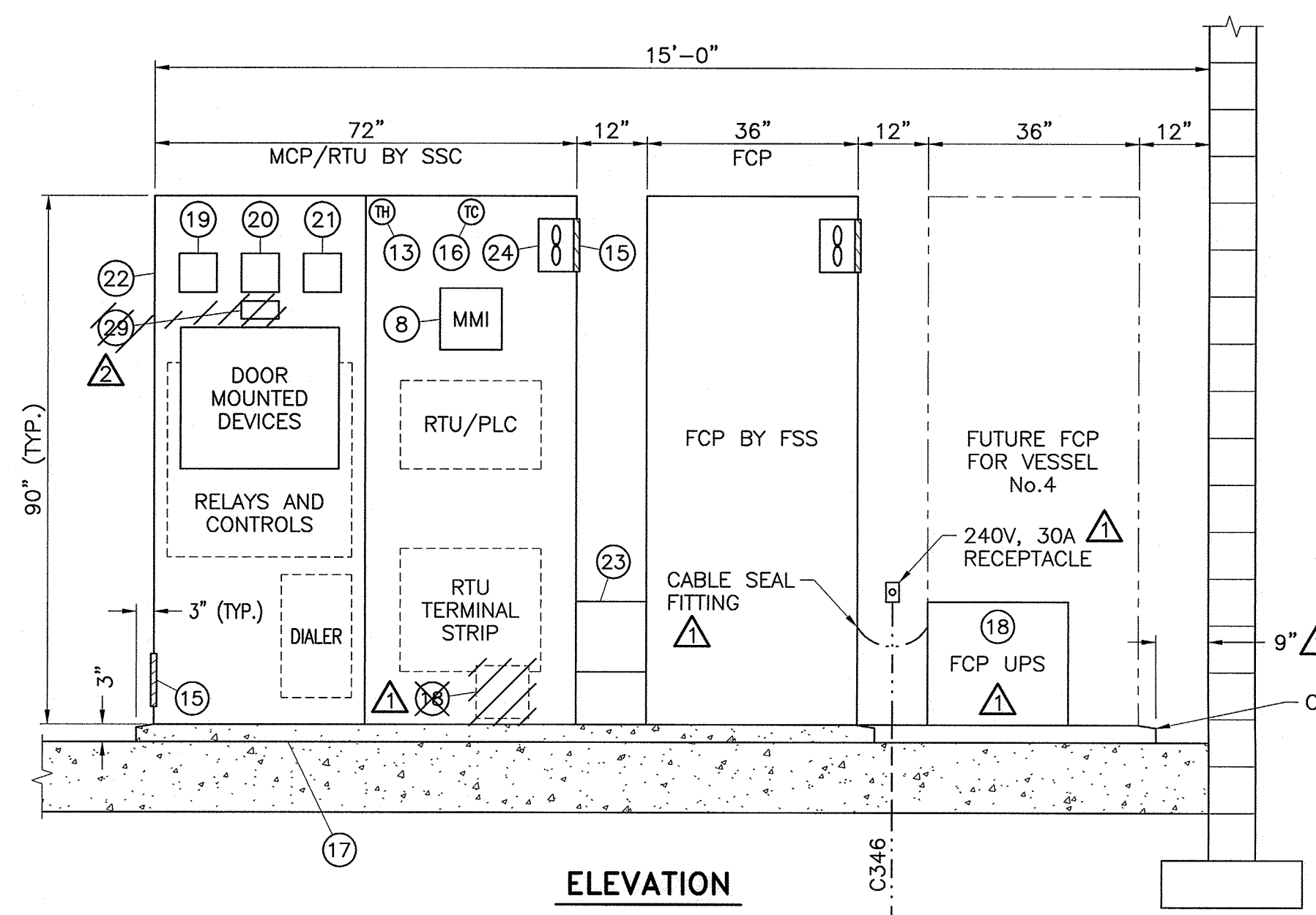




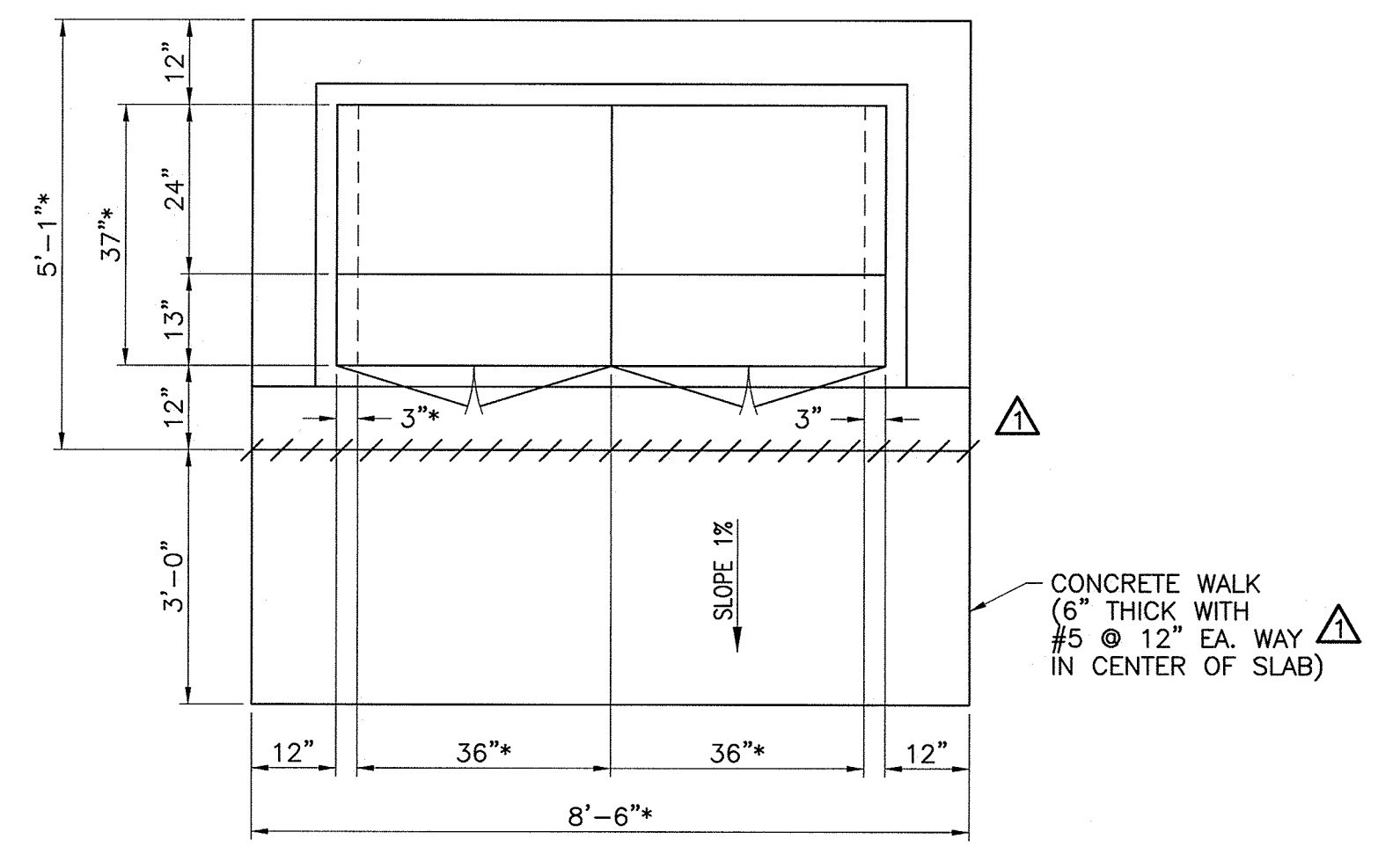
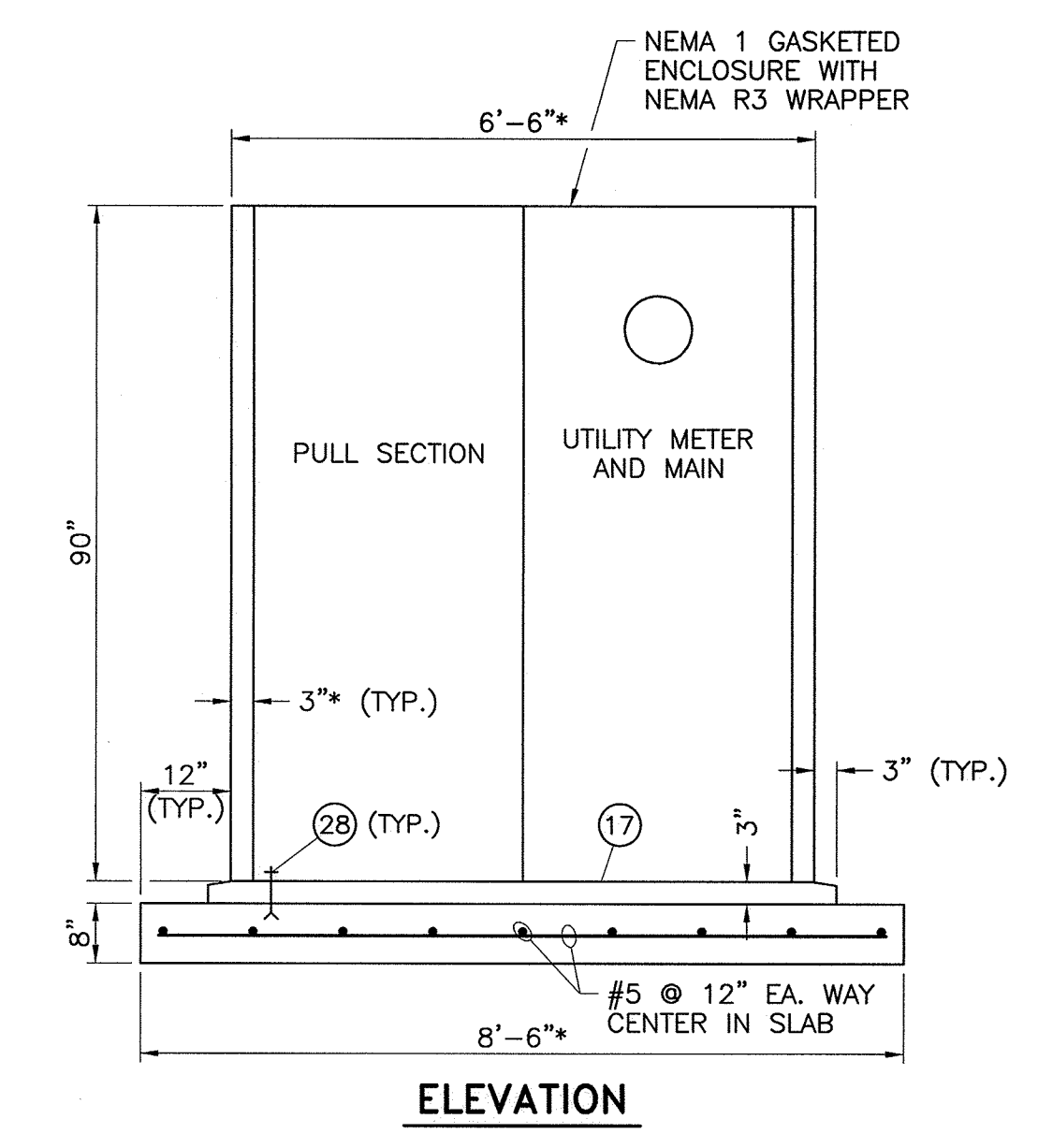
DWG. NO.: 05-587-19.54-3 FILE NO.: 587-19.54 UPDATE BY: MRN PROJ. ENG.: PES PLOT DATE: 02/14/14 PLOT TIME: 3:45PM PLOT SCALE: 1=1



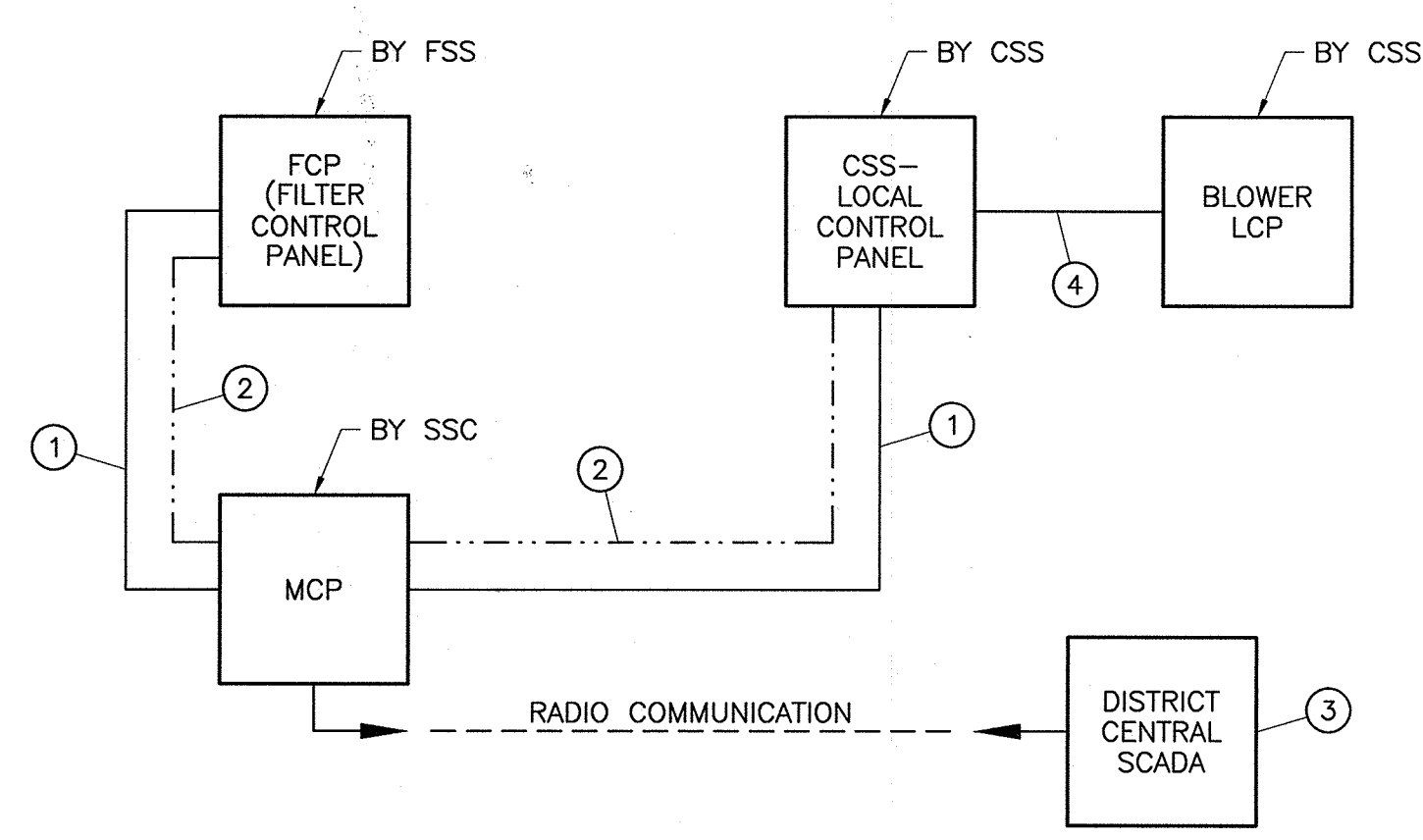
**MCC**  
 SCALE: 1/2"=1'-0"



**CONTROL PANELS PLAN AND ELEVATION**  
 SCALE: 1/2"=1'-0"

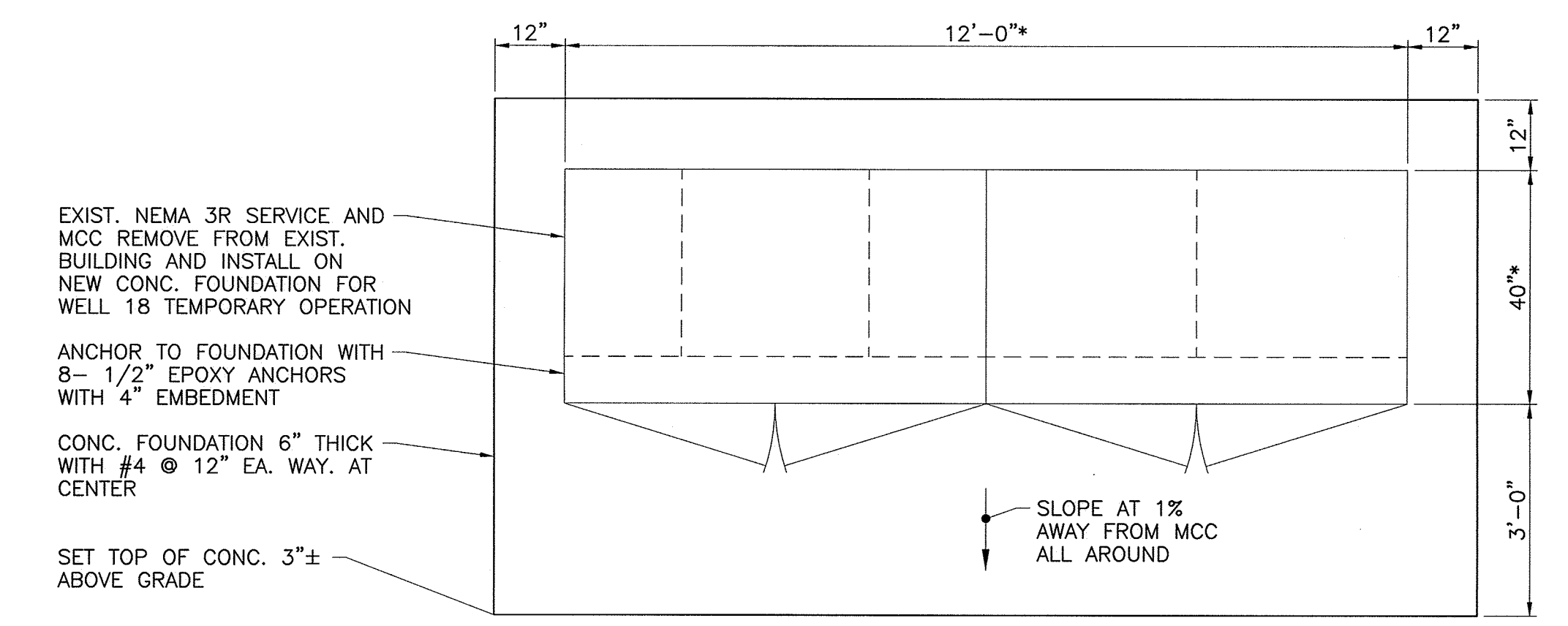


**SERVICE PANEL**  
 SCALE: 1/2"=1'-0"



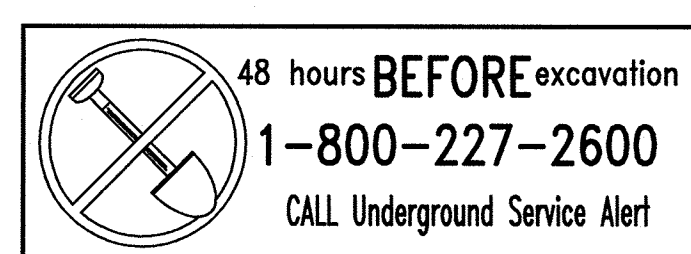
- NOTES:**
- ① CONDUCTORS FOR DO/DI.
  - ② CAT 6 ETHERNET CONNECTION.
  - ③ MODIFICATIONS TO CENTRAL SCADA BY SSC.
  - ④ CONDUCTORS FOR POWER AND CONTROL.

**CONNECTION SCHEMATIC OF CONTROL PANELS**  
 N.T.S.

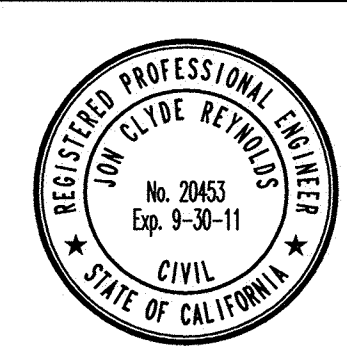


**RELOCATED SERVICE /MCC PLAN**  
 SCALE: 1/2"=1'-0"

**RECORD DRAWING**  
 BY: *[Signature]* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *[Signature]*  
 REGISTERED ENGINEER No. 20453 DATE 2/15/11

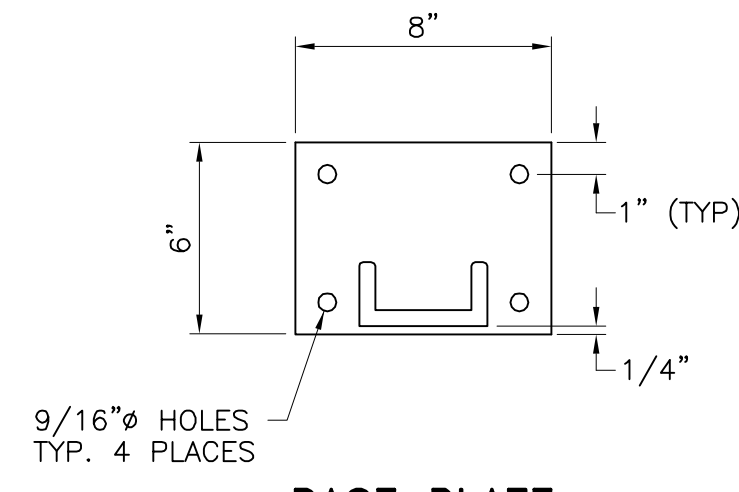
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**SERVICE SECTION, MCC, AND CONTROL PANELS PLANS, ELEVATIONS, AND SCHEMATIC**

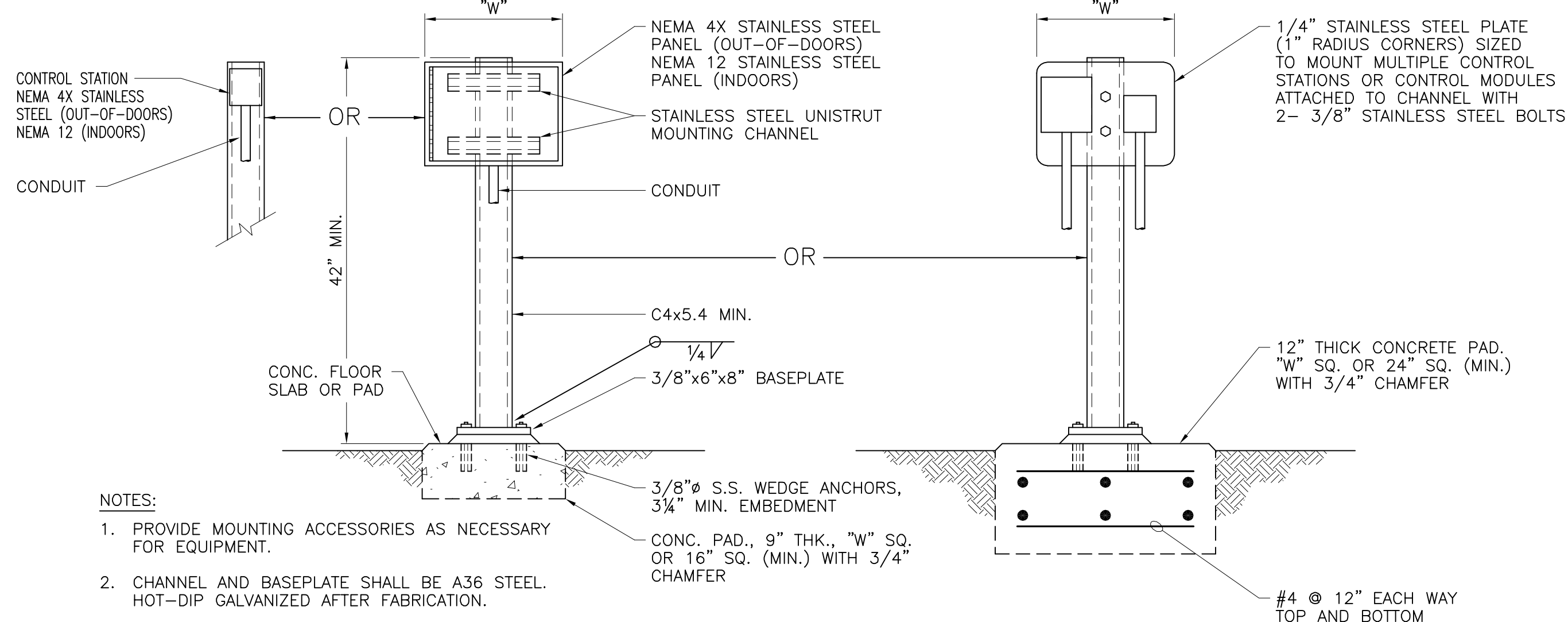
**DRAWING E-3**  
 56 OF 69 SHEETS  
 11766  
 R.C.S.D. PLAN No.



DWG. NO.: 19-54-44 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:43PM PLOT SCALE: 1=1



**BASE PLATE**

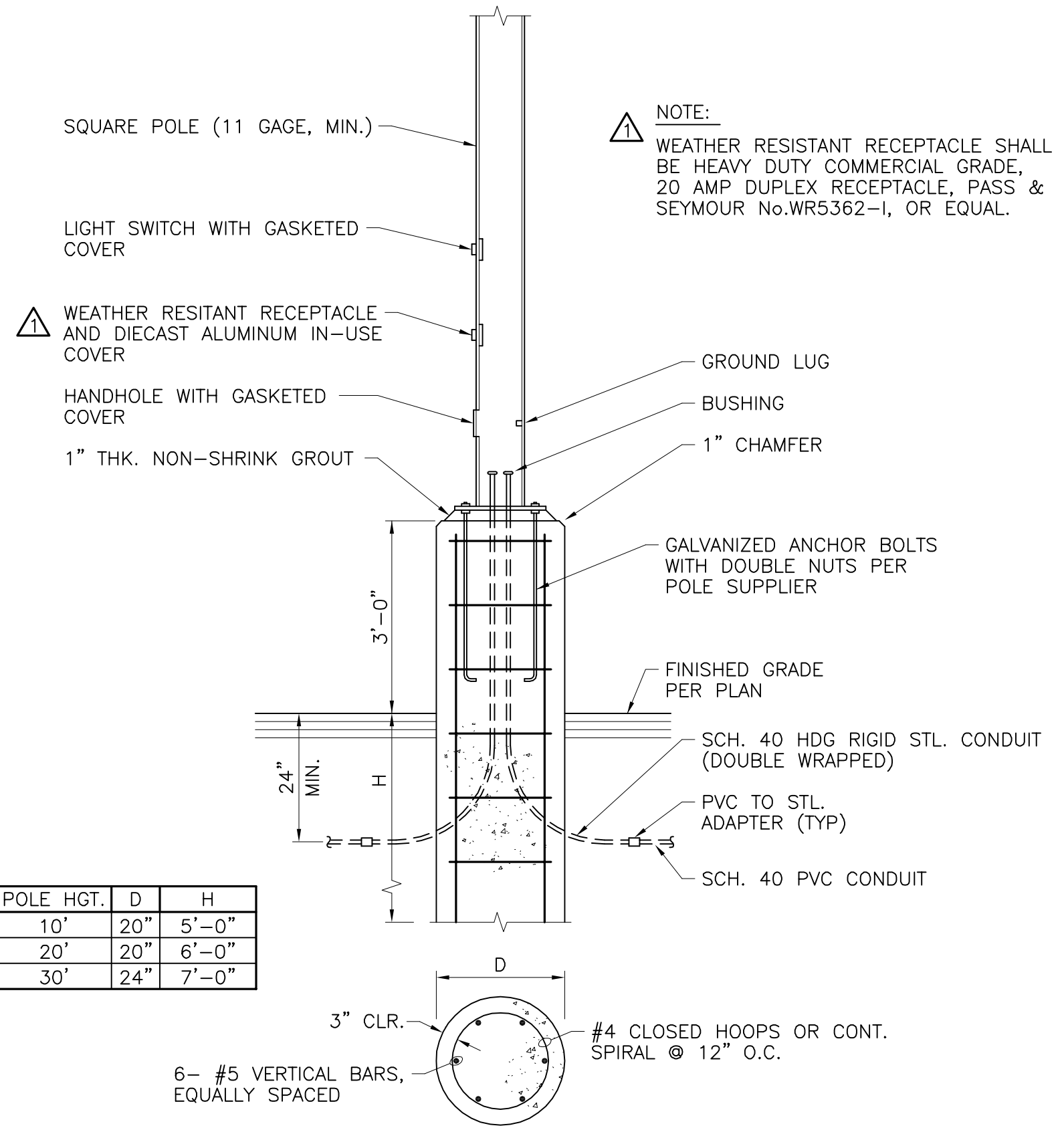


- NOTES:**
1. PROVIDE MOUNTING ACCESSORIES AS NECESSARY FOR EQUIPMENT.
  2. CHANNEL AND BASEPLATE SHALL BE A36 STEEL. HOT-DIP GALVANIZED AFTER FABRICATION.

**TYP. ELECTRICAL EQUIPMENT MOUNTING STANCHION DETAIL**

N.T.S.

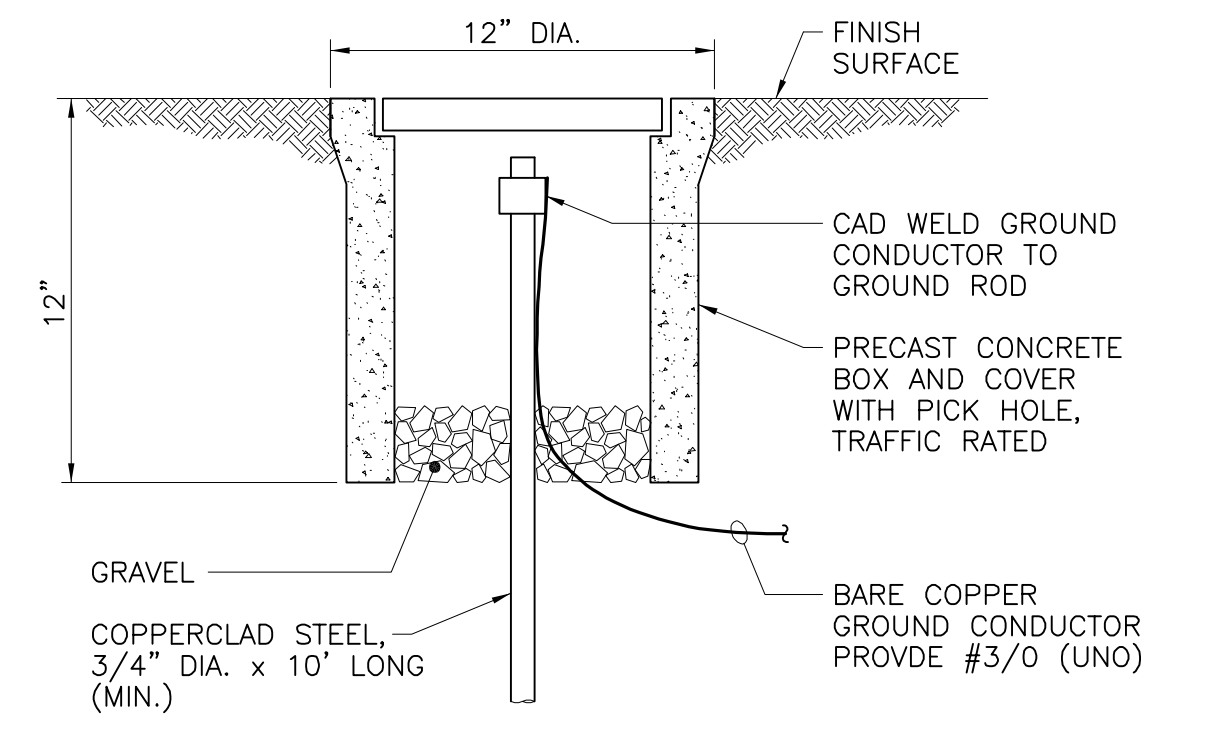
**E1**  
STD.



**TYP. LIGHTING POLE FOUNDATION DETAIL**

N.T.S.

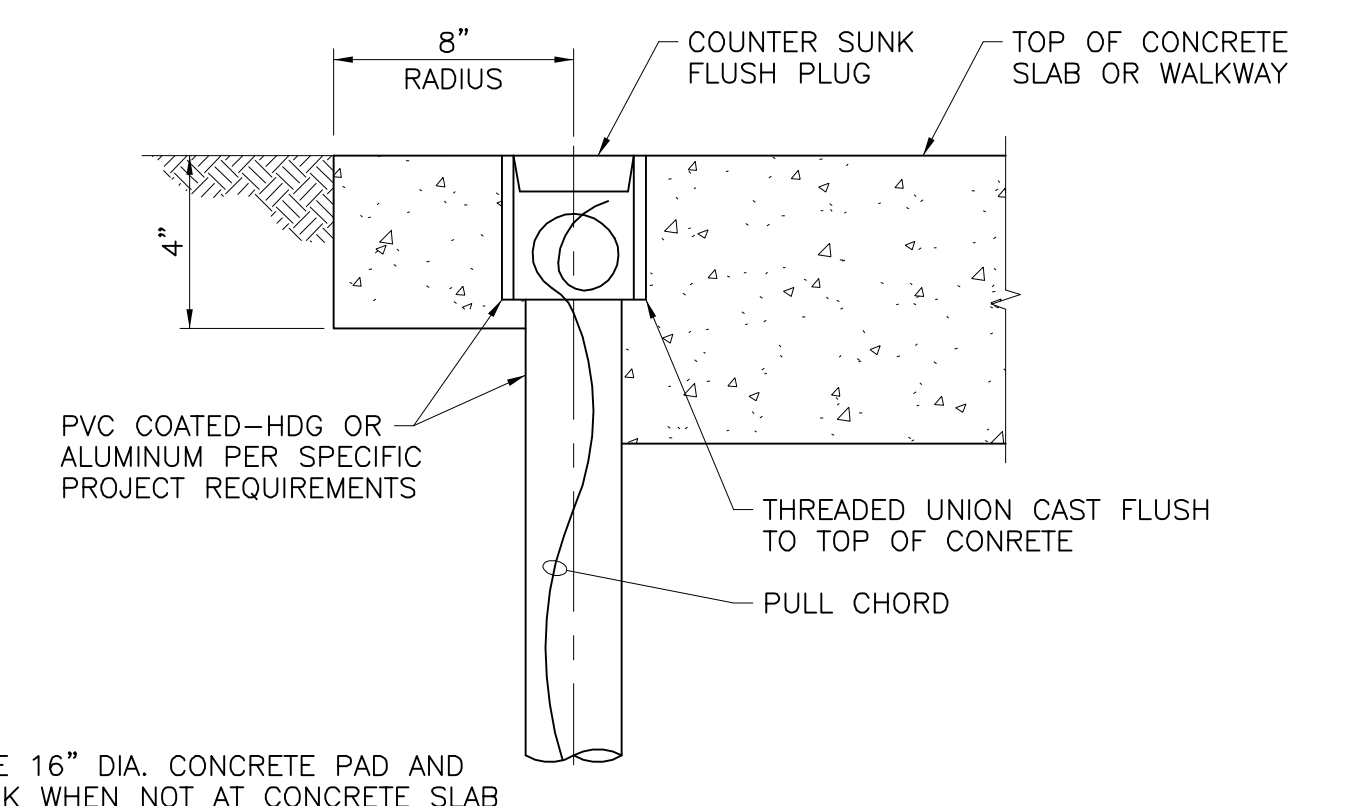
**E3**  
STD.



**TYP. GROUND WELL DETAIL**

N.T.S.

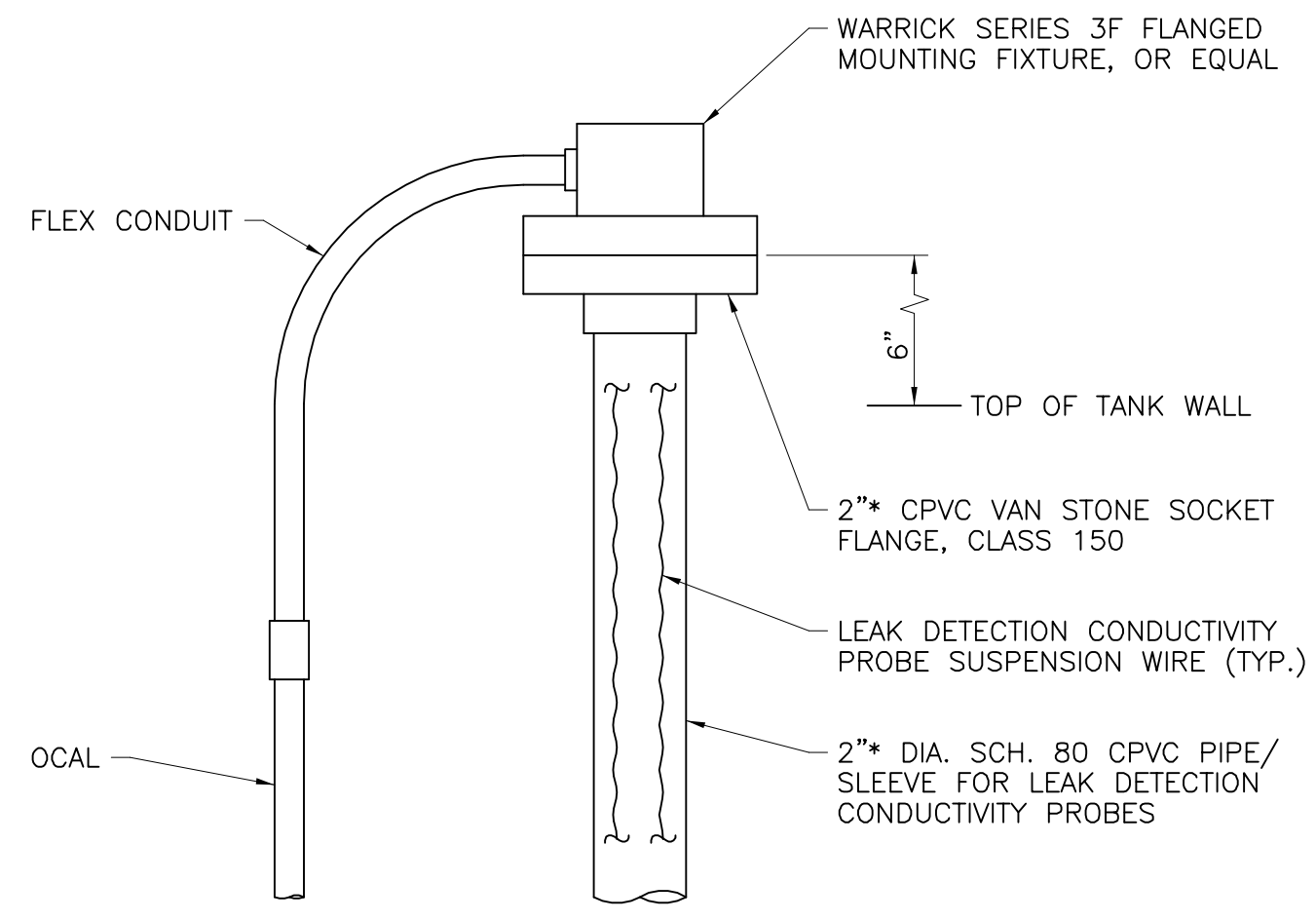
**E5**  
STD.



**SPARE CONDUIT FLUSH STUB-UP**

N.T.S.

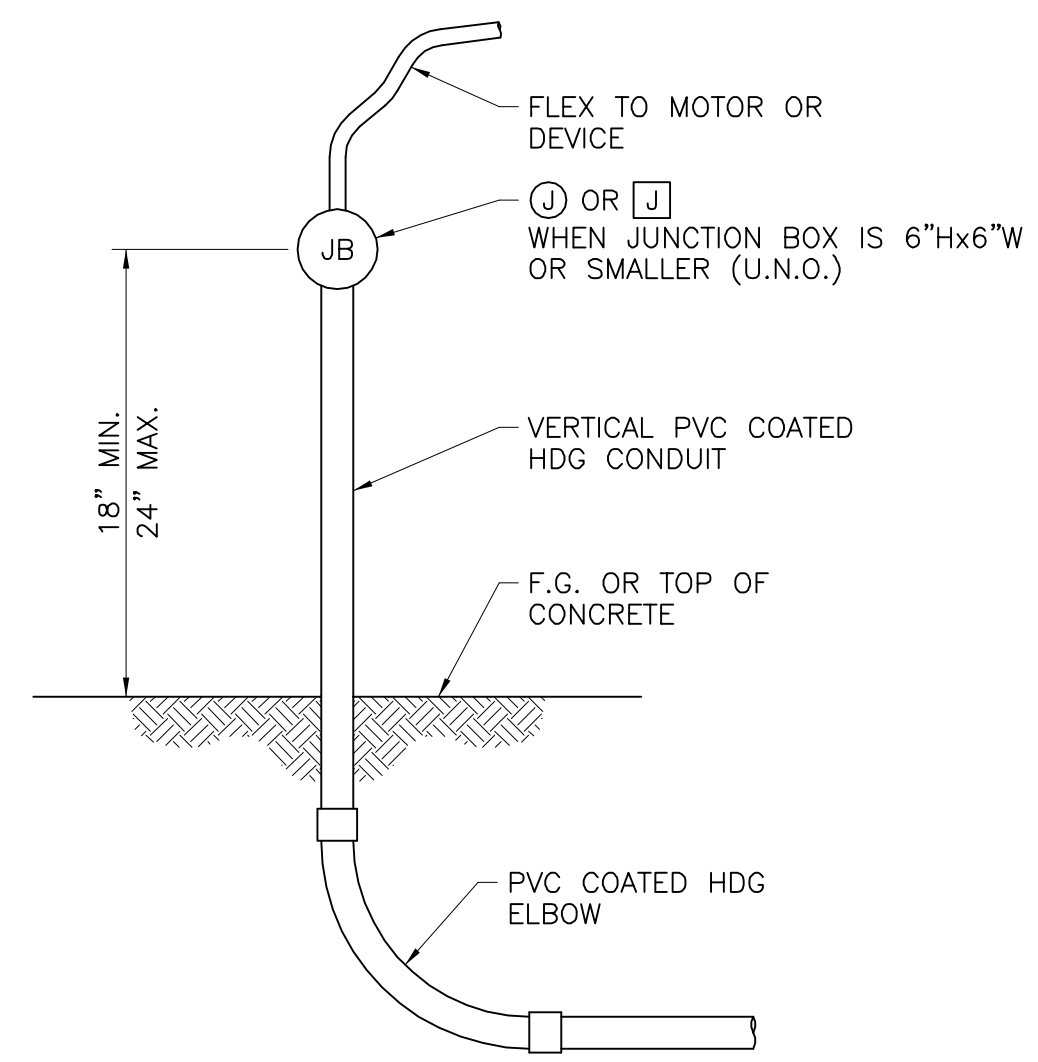
**E6**  
STD.



**MOUNTING FIXTURE FOR CHEMICAL STORAGE TANK LEAK DETECTION CONDUCTIVITY PROBES**

N.T.S.

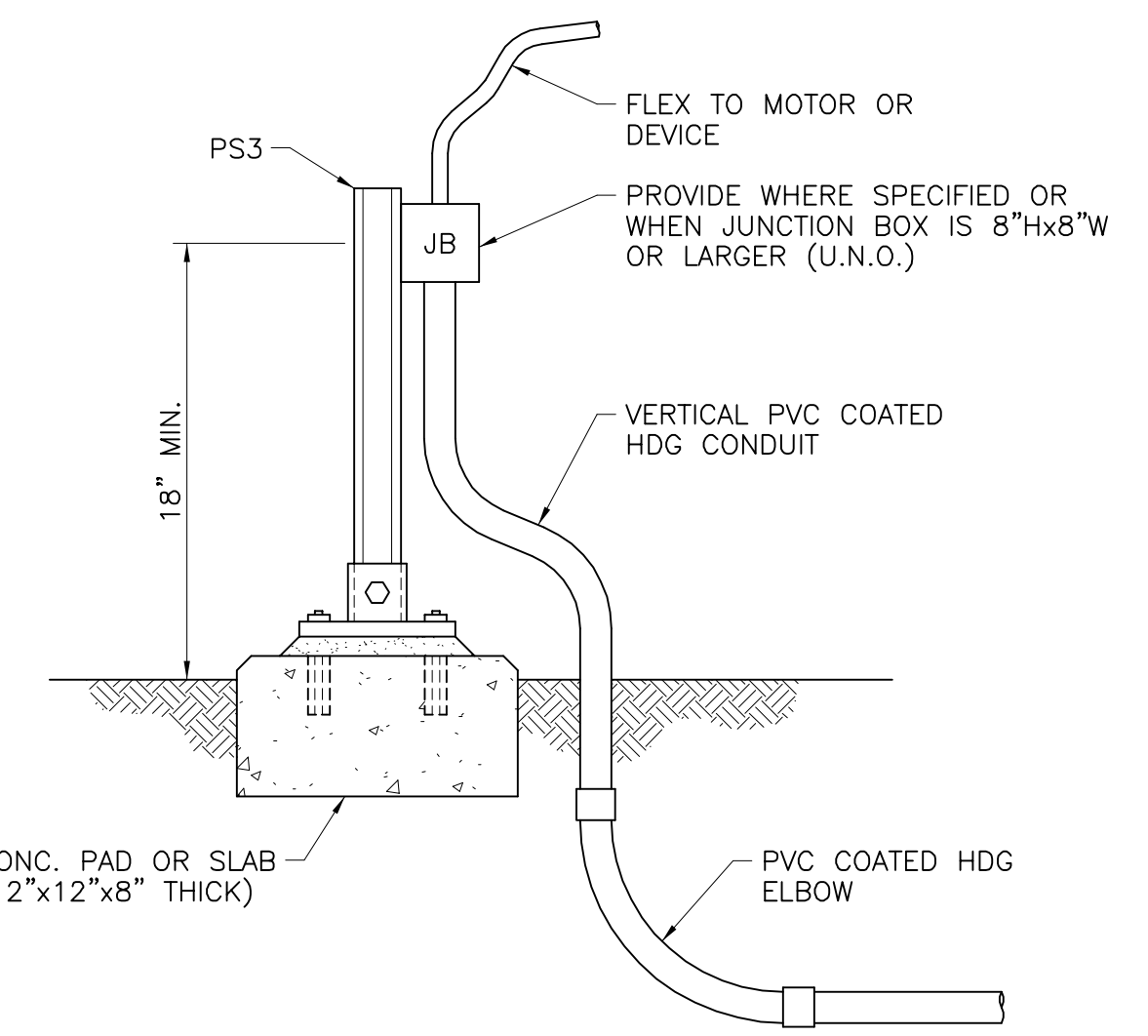
**E2**  
STD.



**JUNCTION BOX (J.B.) CONDUIT SUPPORT**

N.T.S.

**E7**  
STD.



**JUNCTION BOX (J.B.) SUPPORT WITH PS3**

N.T.S.

**E8**  
STD.

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**STANDARD ELECTRICAL DETAILS**

DRAWING  
**E-4**  
57 OF 69 SHEETS  
11767  
R.C.S.D. PLAN No.

CONDUIT No. (1)	POWER		CONTROL		FROM	TO	REMARKS	CONDUIT No. (1)	POWER		CONTROL		FROM	TO	REMARKS
	SIZE (1)	CONDUCTORS (2)	SIZE (1)	CONDUCTORS (2)					SIZE (1)	CONDUCTORS (2)	SIZE (1)	CONDUCTORS (2)			
MF1	2- 4" (12)	C.O.			INTERCEPT PULL BOX	TRANSFORMER	CONDUCTORS BY SCE, ONE 4" SPARE	C201	1"	C.O.	1 1/2"	12- #12, 1- #12 GRD	EPB1	RSP No.1	CONNECT TO RSP No.1 TERMINAL STRIP. SPARE
MF2	4- 4" (12)	C.O.			TRANSFORMER	NEW SERVICE SECTION	CONDUCTORS BY SCE	C202	1"	C.O.	1 1/2"	12- #12, 1- #12 GRD	EPB1	RSP No.2	CONNECT TO RSP No.2 TERMINAL STRIP. SPARE
MF3	4- 4" (12)	3- 500 MCM, 1- 3/0 GRD (3)			SERVICE SECTION	MCC MAIN		C203	1"	C.O.	1 1/2"	12- #12, 1- #12 GRD	EPB1	RSP No.3	CONNECT TO RSP No.3 TERMINAL STRIP. SPARE
MF4	2- 4" (12)	C.O. (11)			TRANSFORMER	RELOCATED SERVICE SECTION	CONDUCTORS BY SCE, FOR TEMPORARY OPERATION WELL 18 (11)	C204	1"	C.O.	1 1/2"	C.O.	EPB1	RSP No.4 (FUTURE)	STUB UP AND CAP
								C205	1"	C.O.	1"	8- #12, 1- #12 GRD	EPB1	PRESSURE RELIEF VALVE (PRV-3)	SOLENOID, LIMIT SWITCHES, SPARES
								C206	1"	C.O.	1" (4)	METER CABLE (9)	EPB1	FLOW METER	BACKWASH WATER FLOW METER 4-20MA
GF1	3- 4"	3- 300 MCM, 1- 3/0 GRD (3)	1"	4- #12, 1- #12 GRD	ATS	STANDBY GENERATOR	24V GENERATOR START/STOP SIGNAL	C207	1"	C.O.	1" (4)	METER CABLE (9)	EPB1	FLOW METER	FILTER No.1 EFFLUENT
GF2	2- 4"	C.O.			MANUAL TRANSFER SWITCH	STUB UP WEST OF MCC	STUB UP AND CAP 2' WEST OF RELOCATED MCC	C208	1"	C.O.	1" (4)	METER CABLE (9)	EPB1	FLOW METER	FILTER No.2 EFFLUENT
								C209	1"	C.O.	1" (4)	METER CABLE (9)	EPB1	FLOW METER	FILTER No.3 EFFLUENT
								C210	1"	C.O.	1" (4)	C.O.	EPB1	FLOW METER (FUTURE)	STUB UP AND CAP - FUTURE FILTER No.4
PF1	2- 4"	3- 300 MCM, 1- 3/0 GRD (3)	1 1/2"	16- #12, 1- #12 GRD	MCC	WELL No.17	LOS, TEMP, SPACE HEATER, H/L PRESSURE, SOL., LIMIT SWITCHES	C211	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	FCV-FILTER No.1	JUNCTION BOX, FLEX TO SOLENOIDS, SPARES
PF2	2- 4"	3- 300 MCM, 1- 3/0 GRD (3)	1 1/2"	16- #12, 1- #12 GRD	MCC	WELL No.18, EPB3	LOS, TEMP, SPACE HEATER, H/L PRESSURE, SOL., LIMIT SWITCHES	C212	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	FCV-FILTER No.2	JUNCTION BOX, FLEX TO SOLENOIDS, SPARES
PF2A	2- 4"	3- 300 MCM, 1- 3/0 GRD (3)	1"	10- #12, 1- #12 GRD	EXISTING MCC (RELOCATED)	WELL No.18	LOS, TEMP, SPACE HEATER, HIGH PRESSURE (EXISTING-TEMPORARY)	C213	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	FCV-FILTER No.3	JUNCTION BOX, FLEX TO SOLENOIDS, SPARES
PF3	1 1/2"	3- #4, 1- #4 GRD	1"	12- #12, 1- #12 GRD	MCC	EPB2/RECYCLE PUMP No.1	LOS, H/L PRESSURE SWITCH, TEMP, SPACE HEATER	C214	1"	C.O.	1"	C.O.	EPB1	FCV-FILTER No.4 (FUTURE)	STUB UP AND CAP
PF4	1 1/2"	3- #4, 1- #4 GRD	1"	12- #12, 1- #12 GRD	MCC	EPB2/RECYCLE PUMP No.2	LOS, H/L PRESSURE SWITCH, TEMP, SPACE HEATER	C215	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	WORK LIGHT-FILTER AREA	PROVIDE SWITCH AND RECEPTACLE, SPARES (LP CRT. #12 AND #26)
PF5	3/4"	3- #12, 1- #12 GRD			AC1, DISCONNECT	MCC		C216	1"	C.O.	1"	4- #12, 1- #12 GRD	EPB1	WORK LIGHT-FILTER AREA	PROVIDE SWITCH AND RECEPTACLE, SPARES (LP CRT. #12 AND #26)
PF6	3/4"	3- #12, 1- #12 GRD			AC2, DISCONNECT	MCC		C217	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	LP CRT. #12 AND #26	
PF7	3/4"	3- #12, 1- #12 GRD			AIR COMPRESSOR, LCP	MCC		C218	1"	C.O.	1" (4)	TRANSDUCCER CABLE (7)	EPB1	J.B. AT BASE OF BWW TANK	BWW TANK LEVEL
PF7A	3/4"	3- #12, 1- #12 GRD			AIR COMPRESSOR, LCP	AIR COMPRESSOR MOTOR		C219	1"	NOT USED	1" (4)				
PF8	1"	3- #12, 1- #12 GRD	1"	12- #12, 1- #12 GRD	MCC	EPB2/WASTE FILTRATE PUMP	LOS, TEMP, SPACE HEATER, H/L PRESSURE SWITCH	C220	1"	C.O.	1"	4- #12, 1- #12 GRD	EPB1	WORK LIGHT - TANK AREA	PROVIDE SWITCH AND RECEPTACLE, LP CRT. #12 AND #26
PF9	1 1/2"	3- #6, 1- #6 GRD			MCC	CSS-LCP-1		C221	1"	C.O.	1"	4- #12, 1- #12 GRD	EPB1	KEY SWITCH/GATE	SPARES
PF10	1 1/2"	C.O.			MCC	CSS-LCP-2 (FUTURE)	FLUSH STUB UP	C222	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	GENERATOR	WATER JACKET HEATER
PF11	3/4"	3- #12, 1- #12 GRD			MCC	BLOWER-LCP		C223	1"	C.O.	1 1/2"	2- #8, 1- #8 GRD	EPB1	GENERATOR	SPACE HEATER
												2- #12, 1- #12 GRD	EPB1	GENERATOR	BATTERY-CHARGER 120V POWER
												2- #12, 1- #12 GRD	EPB1	GENERATOR	RECEPTACLES
C101	2"	C.O.	2"	60- #12, 1- #12 GRD	FCP	EPB1	CONDUCTORS FROM FCP TO FILTER AREA, SPARES (13)	C224	1"	C.O.	2"	2- #12, 1- #12 GRD	EPB1	PHONE CABLE	TELEPHONE PEDESTAL
C102	2 1/2" (4)	C.O.	2 1/2" (4)	4- METER CABLES (9)	FCP	EPB1	CABLES FROM FILTER AREA FLOW METERS (14)	C225	1"	C.O.	1"	6- #12, 1- #12 GRD	EPB1	WASTE MH MAG METER	WASTE MH MAG METER
C103	1"	C.O.	1"	8- #12, 1- #12 GRD	MCP	EPB1	BYPASS VALVE (15)								
C104	1"	C.O.	1"	C.O.	FCP	EPB2	SPARE								
C105	1"	C.O.	1"	C.O.	MCP	EPB2	SPARE								
C106	1" (4)	3C SHLD #16 BELDEN CABLE (6)	1"	6- #12, 1- #12 GRD	MCP	EPB2	SPARE								
C107	1"	C.O.	2"	C.O.	MCP	EPB3	SPARES								
C108	1"	C.O.	1 1/2" (4)	3- 3C SHLD #16 BELDEN CABLE (6)	MCP AND FCP	WELL No.17	PRESSURE TRANSMITTER AND FLOW METER (4-20 AND PULSE)								
C109	1"	C.O.	1 1/2" (4)	3- 3C SHLD #16 BELDEN CABLE (6)	MCP AND FCP, EPB3	WELL No.18	PRESSURE TRANSMITTER AND FLOW METER (4-20 AND PULSE)								
C110	1"	C.O.	1"	C.O.	MCP, EPB3	SOUTH AUTO, GATE	FUTURE CARD READER								
C111	1"	C.O.	1"	C.O.	MCP, EPB3	SOUTH GATE OPERATOR	FUTURE SCADA OPEN SIGNAL								
C112	1"	C.O.	1"	10- #12, 1- #12 GRD	MCP	GENERATOR	RUN, FAIL, SPARES								
C113	1"	C.O.	1"	6- #12, 1- #12 GRD	MCP	ATS	SWITCH NORMAL, EMERGENCY POSITION, SPARES								
C114	3/4"	6- #12, 1- #12 GRD			AIR COMPRESSOR LCP	FCP	LOW AIR, LOW OIL, SPARES								
C115	1" (4)	C.O.	1" (4)	TRANSDUCCER CABLE (7)	CL2 STORAGE TANK LEVEL	MCP									
C116	3/4"	C.O.	3/4"	4- #12, 1- #12 GRD	MCP	EPB2	CONTAINMENT LEAK								
C117	1"	C.O.	1" (4)	TRANSDUCCER CABLE (7)	PROBE IN CL2 TANK	EPB2, MCP	ULTRASONIC LEVEL TRANSDUCER								
C118	1"	C.O.	1"	8- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	WASTE FILTRATE VALVE								
C119	1"	C.O.	1" (4)	METER CABLE (6)	EPB2, MCP	EPB2, MCP	FLOW METER								
C120	1"	C.O.	1"	16- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	STATUS/ALARMS CSS-EQUIPMENT								
C121	1"	C.O.	1"	3C SHLD #16 BELDEN CABLE (6)	EPB2, MCP	EPB2, MCP	CL2 ANALYZER								
C122	3/4"	C.O.	3/4"	6- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	CL2 ANALYZER								
C123	3/4"	C.O.	3/4"	3C SHLD #16 BELDEN CABLE (6)	EPB2, MCP	EPB2, MCP	CL2 ANALYZER								
C124	3/4"	C.O.	3/4"	2- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	EMERGENCY SHOWER								
C125	1"	CAT 6 ETHERNET CABLE	1"	2- 3C SHLD #16 BELDEN CABLE (6)	EPB2, MCP	EPB2, MCP	FLOW SWITCH								
C126	1"	C.O.	1"	2- 3C SHLD #16 BELDEN CABLE (6)	EPB2, MCP	EPB2, MCP	CL2 TANK LEVEL AND BRINE TANK BRINE LEVEL, PLC CONN. TO CSS-LCP								
C127	3/4"	C.O.	3/4"	6- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	JUNCTION BOX BY BRINE TANK								
C128	2- 1"	C.O.	2- 1"	C.O.	EPB2, MCP	EPB2, MCP	PRESSURE TRANSDUCER WATER LEVEL, SALT LEVEL								
C129	3/4"	C.O.	3/4"	4- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	CONTACT SIGNAL TO MEASURE SALT LEVEL, SOLENOID								
C130	2"	C.O.	2"	4- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	WEST SIDE OF BUILDING								
C131	4"	C.O. (SPARE)	4"	CONDUCTORS	EPB2, MCP	EPB2, MCP	SOLENOID SHUT-OFF VALVE								
C132	3/4"	C.O.	3/4"	2- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	FOR PHONE LINE TO DIALER								
C133	2"	C.O.	2"	2- #12, 1- #12 GRD	EPB2, MCP	EPB2, MCP	FOR CONDUCTORS BETWEEN FCP AND MCP								
					EPB2, MCP	EPB2, MCP	FLOW SWITCH								
					EPB2, MCP	EPB2, MCP	AT S.E. CORNER OF SITE FOR FUTURE-TEL. CABLE								
C134	2"	C.O.	2"	50- #12, 1- #12 GRD	MCP	MCP	STATUS/CONTROL								
C135	2"	C.O.	2"	50- #12, 1- #12 GRD	MCP	MCP	STATUS/CONTROL								
C136	2"	C.O.	2"	50- #12, 1- #12 GRD	MCP	MCP	STATUS/CONTROL								

ABBREVIATIONS AND NOTES:

- POWER AND/OR CONTROL FEED DESIGNATION, NUMBER AND SIZE OF CONDUITS:  
1- 3/4" IS ONE 3/4" CONDUIT  
3/4" IS ONE 3/4" CONDUIT  
3- 3/4" IS THREE 3/4" CONDUITS
- NUMBER AND SIZE OF CONDUCTORS IN EACH CONDUIT, U.N.O.
- USE 90°C RATED CONDUCTORS.
- PROVIDE RIGID HDG, PVC COATED CONDUIT.
- BELDEN CABLE.
- SHLD. CABLE SHALL BE BELDEN OR EQUAL.
- CONTINUOUS CABLE FROM TRANSDUCER TO LEVEL MODULE IN CONTINUOUS GROUNDED CONDUIT (HDG, PVC COATED WITH 1- #12 GRD.).
- PROVIDE MANUFACTURER'S RECOMMENDED CABLE. CONTINUOUS FROM FLOW METER TO SIGNAL CONVERTER IN CONTROL PANEL, HDG, PVC COATED CONDUIT WITH 1- #12 GRD.
- PROVIDE MANUFACTURER'S RECOMMENDED CABLE.
- VERIFY CONDUCTOR SIZE AND QUANTITY WITH EQUIPMENT MANUFACTURER.

- TEMPORARY POWER FOR EXISTING WELL 18. CONDUCTORS BY SCE. CONDUCTORS TO BE REMOVED UPON PROJECT COMPLETION.
- CONSTRUCT PER UTILITY COMPANY REQUIREMENTS.
- INCLUDES CONDUCTORS FROM C201, C202, C203, C211, C212, C213.
- INCLUDES CONDUCTORS FROM C206, C207, C208, C209.
- INCLUDES CONDUCTORS FROM C205.
- 8- PAIR #16 AWG COPPER CONDUCTORS
- CONDUIT(S) AND CONDUCTOR(S) TO FCP OR MCP
- CONDUIT(S) AND CONDUCTOR(S) TO FILTER, WASTE FILTRATE, RECYCLE PUMP, AND SITE AREAS
- CONDUIT(S) AND CONDUCTOR(S) WITHIN BUILDING OR BUILDING AREA
- CONDUIT(S) AND CONDUCTOR(S) FOR SITE SECURITY SYSTEM
- NOT USED
- CONDUIT(S) AND CONDUCTOR(S) FOR TEMPORARY WELL OPERATION

- |               |   |         |  |
|---------------|---|---------|--|
| MF            | MAIN FEED                                 | CSS-LCP | CHEMICAL SYSTEM SUPPLIER'S LOCAL CONTROL PANEL                           |
| PF1           | POWER FEED No.1                           | MPCP    | METERING PUMP CONTROL PANEL  |
| MCC           | MOTOR CONTROL CENTER                      | LP CRT3 | CIRCUIT 3 FROM LP  |
| LP            | LIGHTING PANEL                            | CCP     | COMPRESSOR CONTROL PANEL   |
| EPB1          | ELECTRICAL PULL BOX No.1                  | AC-1    | AIR CONDITIONER No.1   |
| TB            | TERMINAL BLOCK                            | CSS     | CHEMICAL SYSTEM SUPPLIER   |
| MCP OR MCC-CP | MAIN CONTROL PANEL WITH RTU (PLANT SCADA) | FSS     | FILTER SYSTEM SUPPLIER   |
| LCP           | LOCAL CONTROL PANEL                       | RSP     | REMOTE SOLENOID PANEL  |
| FCP           | FILTER CONTROL PANEL                      | SSC     | SCADA SUBCONTRACTOR, ALSO CALLED THE INSTRUMENTATION/SCADA SUBCONTRACTOR |
| GF            | GENERATOR FEED                            | SSPB1   | SITE SECURITY SYSTEM PULL BOX 1  |

RECORD DRAWING

BY: *Jim C. Stewart* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



RECORD DRAWING	05/21/13	BCV
SYMBOL	REVISIONS	DATE BY



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jim C. Stewart*  
REGISTERED ENGINEER No. 20453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**ELECTRICAL POWER AND CONTROL CONDUIT/CONDUCTOR SCHEDULE**

DRAWING  
**E-5**  
58 OF 69 SHEETS  
11768  
R.C.S.D. PLAN No.

DWG. NO.: 05-987-19.54-05 FILE NO.: 05-987-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:44PM PLOT SCALE: 1=1

CONDUIT No. (1)	POWER		CONTROL		FROM	TO	REMARKS	CONDUIT No. (1)	POWER		CONTROL		FROM	TO	REMARKS
	SIZE (1)	CONDUCTORS (2)	SIZE (1)	CONDUCTORS (2)					SIZE (1)	CONDUCTORS (2)	SIZE (1)	CONDUCTORS (2)			
C301	3/4"	2- #12, 1- #12 GRD			AC1-RECEPTACLE	LP CRT. #19		C601							
C302	3/4"	2- #12, 1- #12 GRD			AC2-RECEPTACLE	LP CRT. #20		C602							
C303	3/4"	AC UNIT CABLE (9)			AC1	THERMOSTAT		C603							
C304	3/4"	AC UNIT CABLE (9)			AC2	THERMOSTAT									
C305	1"	4- #12, 1- #12 GRD			COMPRESSOR ROOM JB	LP CRT. #25 AND #40	FOR EXHAUST FAN AND BRINE BOOSTER PUMP								
C306			3/4"	8- #12, 1- #12 GRD	AIR COMPRESSOR LCP	AIR COMPRESSOR	PRES. ON/OFF, LOW AIR, LOW OIL								
C307			3/4"	2- #12, 1- #12 GRD	LP CRT. #33	SMART BOB JUNCTION BOX	JUNCTION BOX AT TANK								
C308			3/4"	2- #12, 1- #12 GRD	SMART BOB JUNCTION BOX	BRINE TANK SMART BOB2 REMOTE									
C309			3/4"	RS 485 CABLE	SMART BOB RSU	SMART BOB2 REMOTE									
C310			3/4"	1- 3C SHLD. #16 CABLE (5)	SMART BOB	JUNCTION BOX AT TANK	SALT LEVEL								
C311			3/4"	4- #12, 1- #12 GRD	SMART BOB RSU SWITCH	JUNCTION BOX NEXT TO BRINE TANK	SIGNAL FOR LEVEL MEASUREMENT								
C312			3/4"	1- 3C SHLD. #16 CABLE (5)	PRESSURE TRANSDUCER	JUNCTION BOX AT TANK	BRINE LEVEL								
C313	3/4"	3- #12, 1- #12 GRD	3/4"	4- #12, 1- #12 GRD	BLOWER No.1	BLOWER-LCP	CL2 STORAGE TANK VENTILATION, FLOW SWITCH								
C314	3/4"	3- #12, 1- #12 GRD	3/4"	4- #12, 1- #12 GRD	BLOWER No.2	BLOWER-LCP	CL2 STORAGE TANK VENTILATION, FLOW SWITCH								
C315		NOT USED													
C316		NOT USED													
C317			3/4"	3C SHLD. #16 BELDEN CABLE (6)	HARNESS ANALYZER	△ 6SS-L6P J-BOX	CSS EQUIPMENT △								
C318			3/4"	4- #12, 1- #12 GRD	HARNESS ANALYZER	△ 6SS-L6P J-BOX	CSS EQUIPMENT △								
C319	3/4"	6- #12, 1- #12 GRD			LP CRT. #8, #34, AND #36	CHLORINE, HARDNESS, ORP ANALYZERS									
C320	3/4"	3- #12, 1- #12 GRD			LP CRT. #35 AND #37	AIR DRYER									
C321	3/4"	2- #12, 1- #12 GRD			EXHAUST FAN	EXHAUST FAN CONTROL PANEL									
C322	3/4"	3- #12, 1- #12 GRD			METERING PUMP No.1	MPCP-1	POWER TO MOTOR								
C323	3/4"	3- #12, 1- #12 GRD			METERING PUMP No.2	MPCP-2	POWER TO MOTOR								
C324	3/4"	3- #12, 1- #12 GRD			METERING PUMP No.3	MPCP-3	POWER TO MOTOR								
C325			1"	10- #12, 1- #12 GRD	METERING PUMP No.1	MPCP-1	FLOW SWITCH, DIAPHRAM, MOTOR TEMP.								
C326			1"	10- #12, 1- #12 GRD	METERING PUMP No.2	MPCP-2	FLOW SWITCH, DIAPHRAM, MOTOR TEMP.								
C327			1"	10- #12, 1- #12 GRD	METERING PUMP No.3	MPCP-3	FLOW SWITCH, DIAPHRAM, MOTOR TEMP.								
C327A	1"	9- #12, 1- #12 GRD			METERING PUMP Nos.1, 2, AND 3	LP CRT. 3/5, 7/9, AND 11/13	RUN NEUTRAL (240V 1 PHASE)								
C328			1"	10- #12, 1- #12 GRD	MPCP-1	FCP	START/STOP, RUN, FAIL, READY								
C329			3/4"	C.O.	MPCP-1	FCP	FUTURE SPEED SIGNAL								
C330			1"	10- #12, 1- #12 GRD	MPCP-2	FCP	START/STOP, RUN, FAIL, READY								
C331			3/4"	C.O.	MPCP-2	FCP	FUTURE SPEED SIGNAL								
C332			1"	10- #12, 1- #12 GRD	MPCP-3	FCP	START/STOP, RUN, FAIL, READY								
C333			3/4"	C.O.	MPCP-3	FCP	FUTURE SPEED SIGNAL								
C334	3/4"	C.O.			FUTURE METERING PUMP No.4	FUTURE MPCP-4									
C335			1"	C.O.	FUTURE METERING PUMP No.4	FUTURE MPCP-4									
C336			1"	C.O.	FUTURE MPCP-4	FCP									
C337			3/4"	C.O.	FUTURE MPCP-4	FCP									
C338			1"	8- #12, 1- #12 GRD	LP CRT. #15, #17, AND #18	FCP	SPARES								
C339			1"	14- #12, 1- #12 GRD	LP CRT. #1, #16, #21, #38, & #14	MCP	SPARES								
C340			3/4"	4- #12, 1- #12 GRD	BRINE PUMP-LCP	△ 6SS-L6P J-BOX	CONTACTS FOR START/STOP PUMP								
C341			1"	10- #12, 1- #12 GRD	BLOWER-LCP	△ 6SS-L6P J-BOX	CONTACTS FOR START/STOP BLOWERS, STATUS								
C342			3/4"	SENSOR CABLE (9)	HYDROGEN GAS SENSOR	H2 GAS TRANSMITTER									
C343			3/4"	4- #12, 1- #12 GRD	H2 GAS TRANSMITTER	△ 6SS-L6P J-BOX	GAS LEAK SIGNAL AND FAULT SIGNAL △								
C344	2- 1"	C.O.			LP	FUTURE CHILLER	WEST SIDE BUILDING								
C345			3/4"	2- #12, 1- #12 GRD	JUNCTION BOX AT LAB ROOM	HYDROGEN GAS TRANSMITTER	CRT. 34								
C401			2"	△ ± C.O.	MCP	SSPB1	FUTURE CONDUCTORS								
C402			1"	△ ± C.O.	MCP	SSPB1	FUTURE CONDUCTORS								
C403		△ ± C.O.	2"	△ ± C.O.	SSPB1	SSPB2, 3, 4, AND 5	FUTURE CONDUCTORS								
C404		△ ± C.O.	2"	△ ± C.O.	SSPB5	SSPB6	FUTURE CONDUCTORS								
C405		△ ± C.O.	2"	△ ± C.O.	SSPB5	STUB UP AT WALL (SW CORNER)	FUTURE CONDUCTORS								
C406		△ ± C.O.	2"	△ ± C.O.	SSPB6	STUB UP AT WALL (SE CORNER)	FUTURE CONDUCTORS								
C346	△		3/4"	2- #10, 1- #12 GRD	LP CRT. 39/41	RECEPTACLE	240V POWER FOR FCP UPS								
C347	△		1 1/2"	32- #12, 1- #12 GRD	J-BOX	CSS-LCP	STATUS AND CONTROL								
C348	△		1 1/2"	3- 3C SHLD. #16 BELDEN CABLE (6) 1 CAT. 6 ETHERNET CABLE	J-BOX	CSS-LCP	STATUS AND CONTROL								

**ELECTRICAL PULL BOX SCHEDULE**

ELECTRICAL PB No. (5)	TYPE PULL BOX (1) (2)	COVER TYPE (3) (4)	LOCATION
EPB 1	TYPE 1	TRAFFIC COVER	ADJACENT TO FILTERS
EPB 2	TYPE 1	TRAFFIC COVER	EAST OF BWWT AND RECYCLE PUMPS
EPB 3	TYPE 1	TRAFFIC COVER	EAST OF WELL 18

**PULL BOX DESCRIPTION**

- TYPE 1 PRECAST CONCRETE PULL BOX, MINIMUM 4'-0"(W)x4'-0"(L) x DEPTH AS REQUIRED (MIN. 5'-0") WITH FLAT PANELS, FULL SIZE KNOCK-OUTS ON ALL SIDES SIZED TO ACCEPT CONDUITS AS SHOWN AND WITH BOTTOM SECTION. JENSEN MODEL K44X-FP OR EQUAL. PROVIDE BOLTED TWO PIECE COVER (HDG), PARKWAY OR TRAFFIC AS NOTED, JENSEN STYLE F OR EQUAL. INSTALL 3/4"x10'-0" LONG COPPERCLAD STEEL GROUND ROD AND CONNECT TO GROUND CONDUCTORS.
- TYPE 2 PRECAST CONCRETE PULL BOX, MINIMUM 6'-0"(W)x6'-0"(L) x DEPTH 7'-0" (MIN.) WITH FLAT PANELS, FULL SIZE KNOCK-OUTS ON ALL SIDES SIZED TO ACCEPT CONDUITS AS SHOWN WITH BOTTOM SECTION. JENSEN MODEL K66-FM OR EQUAL WITH VAULT OPENING 4'x4" TWO PIECE COVER (HDG), PARKWAY OR TRAFFIC AS NOTED. INSTALL 3/4"x10'-0" LONG COPPERCLAD STEEL GROUND ROD AND CONNECT TO GROUND CONDUCTORS.
- TYPE 3 PRECAST CONCRETE PULL BOX, MINIMUM 2'-6"(W)x4'-0"(L) x DEPTH AS REQUIRED (MIN. 3'-6", U.N.O.) WITH FLAT PANELS, FULL SIZE KNOCK-OUTS ON ALL SIDES SIZED TO ACCEPT CONDUITS AS SHOWN WITH BOTTOM SECTION. JENSEN MODEL K304B-FP OR EQUAL. PROVIDE BOLTED TWO PIECE COVER (HDG), PARKWAY OR TRAFFIC AS NOTED, JENSEN STYLE FOR EQUAL. INSTALL 3/4"x10'-0" LONG COPPERCLAD STEEL GROUND ROD AND CONNECT TO GROUND CONDUCTORS.
- TYPE 4 PRECAST CONCRETE PULL BOX, MINIMUM 2'-0"(W)x2'-0"(L) x 36" DEEP WITH FLAT PANELS, FULL SIZE KNOCK-OUTS ON ALL SIDES SIZED TO ACCEPT CONDUITS AS SHOWN WITH BOTTOM SECTION. JENSEN MODEL K242A-FP OR EQUAL. PROVIDE BOLTED ONE PIECE COVER (HDG), PARKWAY OR TRAFFIC AS NOTED. INSTALL 3/4"x10'-0" LONG COPPERCLAD STEEL GROUND ROD AND CONNECT TO GROUND CONDUCTORS.
- NOTES:  
 (1) PLACE BOTTOM OF PULL BOX ON 12" GRADED 3/4" CRUSHED ROCK COMPACTED TO 95% RELATIVE COMPACTION. KNOCK OUT SUMP BOTTOM TO DRAIN.  
 (2) ALL SIZES SHOWN ARE MINIMUM. CONTRACTOR TO PROVIDE LARGER AND DEEPER PULL BOX AS NECESSARY TO ACCOMMODATE CONDUITS REQUIRED. CONDUITS MAY ENTER ANY OR ALL SIDES OF PULL BOX AS NECESSARY. U.N.O. CONTRACTOR IS RESPONSIBLE FOR LAYOUT CONFIGURATION OF DUCT BANKS AND COORDINATION OF PULL BOX SIZES.  
 (3) PATCH PULL BOX WALL WITH NON-SHRINK GROUT AROUND CONDUIT PENETRATIONS THE FULL THICKNESS OF PULL BOX WALL.  
 (4) PROVIDE FULL SIZE REMOVABLE HOT DIP GALVANIZED CHECKERED PLATE COVER.  
 (5) MIN. NUMBER OF PULL BOXES REQUIRED, CONTRACTOR TO ADD ADDITIONAL PULL BOXES AS NEEDED.

**ABBREVIATIONS AND NOTES:**

- |  |   |               |   |         |  |
|--|---|---------------|---|---------|--|
| (1) POWER AND/OR CONTROL FEED DESIGNATION, NUMBER AND SIZE OF CONDUITS:<br>1- 3/4" IS ONE 3/4" CONDUIT<br>3/4" IS ONE 3/4" CONDUIT<br>3- 3/4" IS THREE 3/4" CONDUITS | (11) TEMPORARY POWER FOR EXISTING WELL 18. CONDUCTORS BY SCE. CONDUCTORS TO BE REMOVED UPON PROJECT COMPLETION. | MF            | MAIN FEED   | CSS-LCP | CHEMICAL SYSTEM SUPPLIER'S LOCAL CONTROL PANEL                           |
| (2) NUMBER AND SIZE OF CONDUCTORS IN EACH CONDUIT, U.N.O.  | (12) CONSTRUCT PER UTILITY COMPANY REQUIREMENTS.  | PF1           | POWER FEED No.1   | MPCP    | METERING PUMP CONTROL PANEL  |
| (3) USE 90°C RATED CONDUCTORS.   | (13) INCLUDES CONDUCTORS FROM C201, C202, C203, C211, C212, C213.   | MCC           | MOTOR CONTROL CENTER  | LP CRT3 | CIRCUIT 3 FROM LP  |
| (4) PROVIDE RIGID HDG, PVC COATED CONDUIT.   | (14) INCLUDES CONDUCTORS FROM C206, C207, C208, C209.   | LP            | LIGHTING PANEL  | CCP     | COMPRESSOR CONTROL PANEL   |
| (5) BELDEN CABLE.  | (15) INCLUDES CONDUCTORS FROM C205.   | EPB1          | ELECTRICAL PULL BOX No.1  | AC-1    | AIR CONDITIONER No.1   |
| (6) SHLD. CABLE SHALL BE BELDEN OR EQUAL.  |   | TB            | TERMINAL BLOCK  | CSS     | CHEMICAL SYSTEM SUPPLIER   |
| (7) CONTINUOUS CABLE FROM TRANSDUCER TO LEVEL MODULE IN CONTINUOUS GROUNDED CONDUIT (HDG, PVC COATED WITH 1- #12 GRD.).  |   | MCP OR MCC-CP | MAIN CONTROL PANEL WITH RTU (PLANT SCADA)   | FSS     | FILTER SYSTEM SUPPLIER   |
| (8) PROVIDE MANUFACTURER'S RECOMMENDED CABLE. CONTINUOUS FROM FLOW METER TO SIGNAL CONVERTER IN CONTROL PANEL, HDG, PVC COATED CONDUIT WITH 1- #12 GRD.              |   | LCP           | LOCAL CONTROL PANEL   | RSP     | REMOTE SOLENOID PANEL  |
| (9) PROVIDE MANUFACTURER'S RECOMMENDED CABLE.  |   | FCP           | FILTER CONTROL PANEL  | SSC     | SCADA SUBCONTRACTOR, ALSO CALLED THE INSTRUMENTATION/SCADA SUBCONTRACTOR |
| (10) VERIFY CONDUCTOR SIZE AND QUANTITY WITH EQUIPMENT MANUFACTURER.   |   | GF            | GENERATOR FEED  | SSPB1   | SITE SECURITY SYSTEM PULL BOX 1  |
|  |   | C101          | CONDUIT(S) AND CONDUCTOR(S) TO FCP OR MCP   |         |  |
|  |   | C201          | CONDUIT(S) AND CONDUCTOR(S) TO FILTER, WASTE FILTRATE, RECYCLE PUMP, AND SITE AREAS |         |  |
|  |   | C301          | CONDUIT(S) AND CONDUCTOR(S) WITHIN BUILDING OR BUILDING AREA                        |         |  |
|  |   | C401          | CONDUIT(S) AND CONDUCTOR(S) FOR SITE SECURITY SYSTEM                                |         |  |
|  |   | C501          | NOT USED  |         |  |
|  |   | C601          | CONDUIT(S) AND CONDUCTOR(S) FOR TEMPORARY WELL OPERATION                            |         |  |

**RECORD DRAWING**

BY: *John C. Stewart* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED



SYMBOL	REVISIONS	DATE	BY
△	RECORD DRAWING	05/21/13	BCV



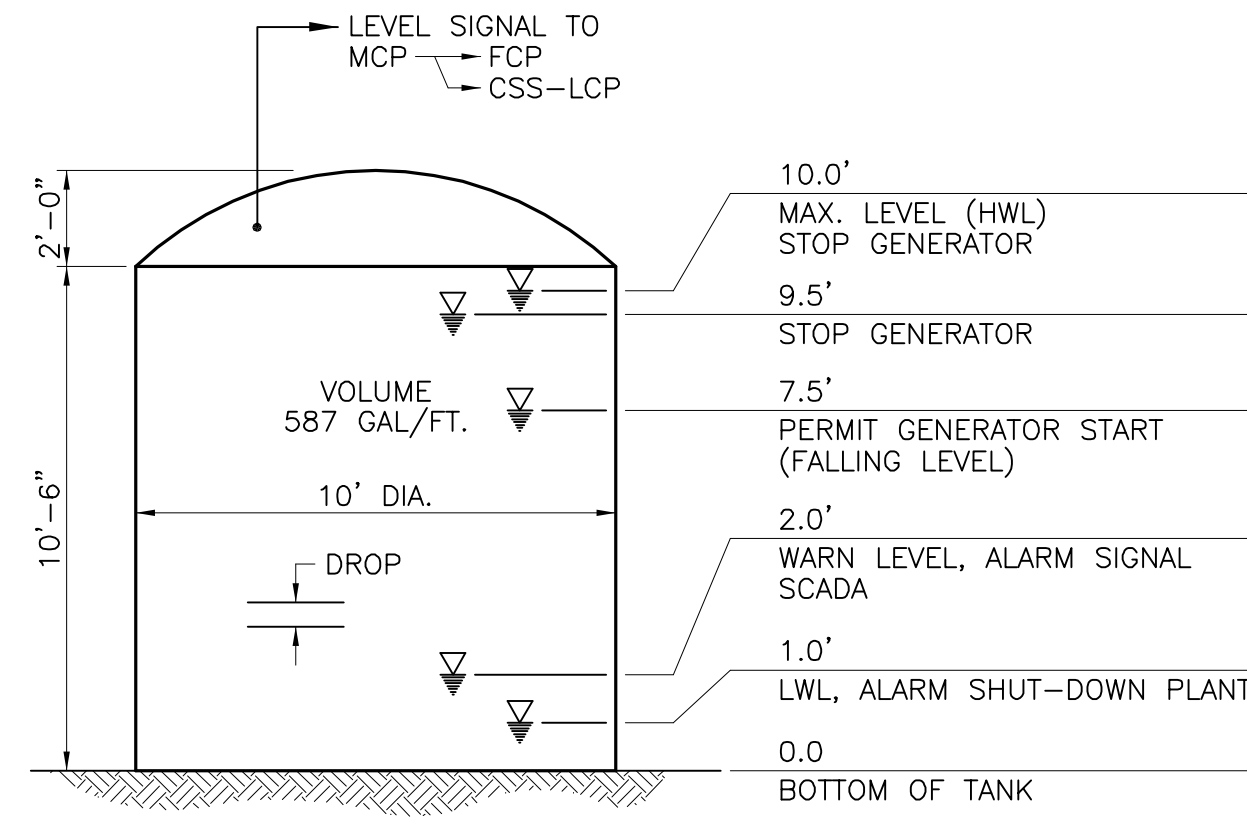
**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *John C. Stewart*  
 REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
F.L.D. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**ELECTRICAL POWER AND CONTROL  
 CONDUIT/CONDUCTOR SCHEDULE  
 AND ELECTRICAL PULL BOX SCHEDULE**

**DRAWING**  
**E-6**  
 59 OF 69 SHEETS  
 11769  
 R.C.S.D. PLAN NO.

DWG. NO.: re-987-19.54-46 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:45PM PLOT SCALE: 1"=1'

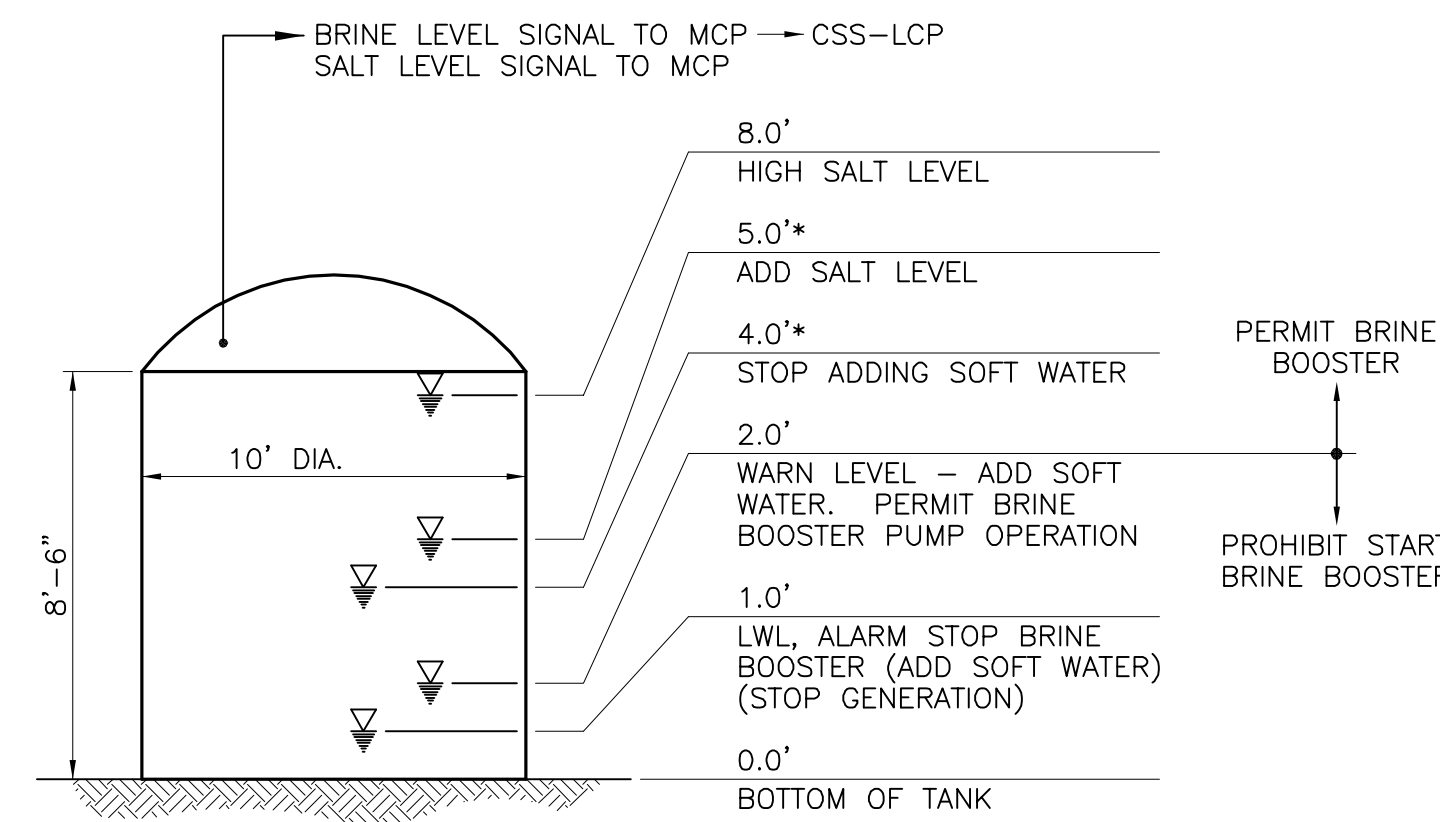


NOTES:

- ON-SITE GENERATOR PRODUCES 300#/DAY OF CL2 AT 0.8% SOLUTION= 4500 GPD SOLUTION= 190 GPH.
- MAX USAGE RATE IS 190 GPH= 6" PER 1.5 HOURS. MCP PROGRAM.
- 15 GALLONS OF SOLUTION= 1.0 POUNDS OF CL2.

**CHLORINE SOLUTION TANK**

N.T.S.

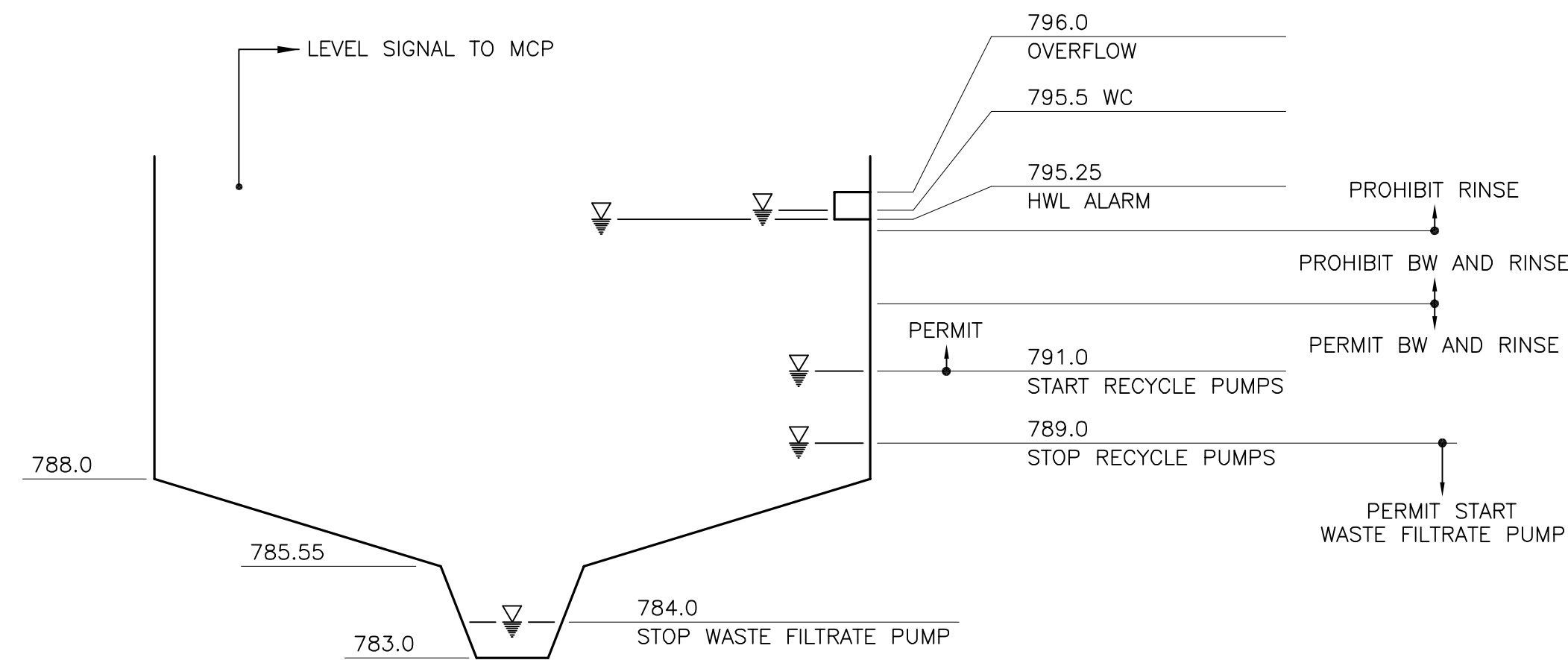


NOTE:

VERIFY ALL LEVELS WITH TANK SUPPLIER.

**BRINE TANK**

N.T.S.

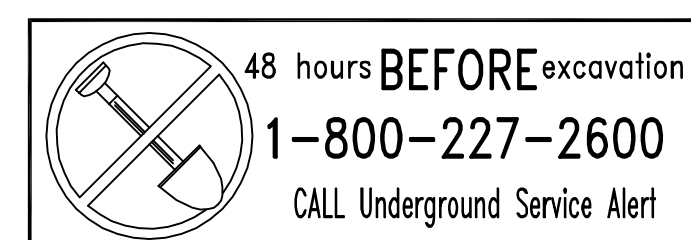


**BACKWASH WASTE TANK**

N.T.S.

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**

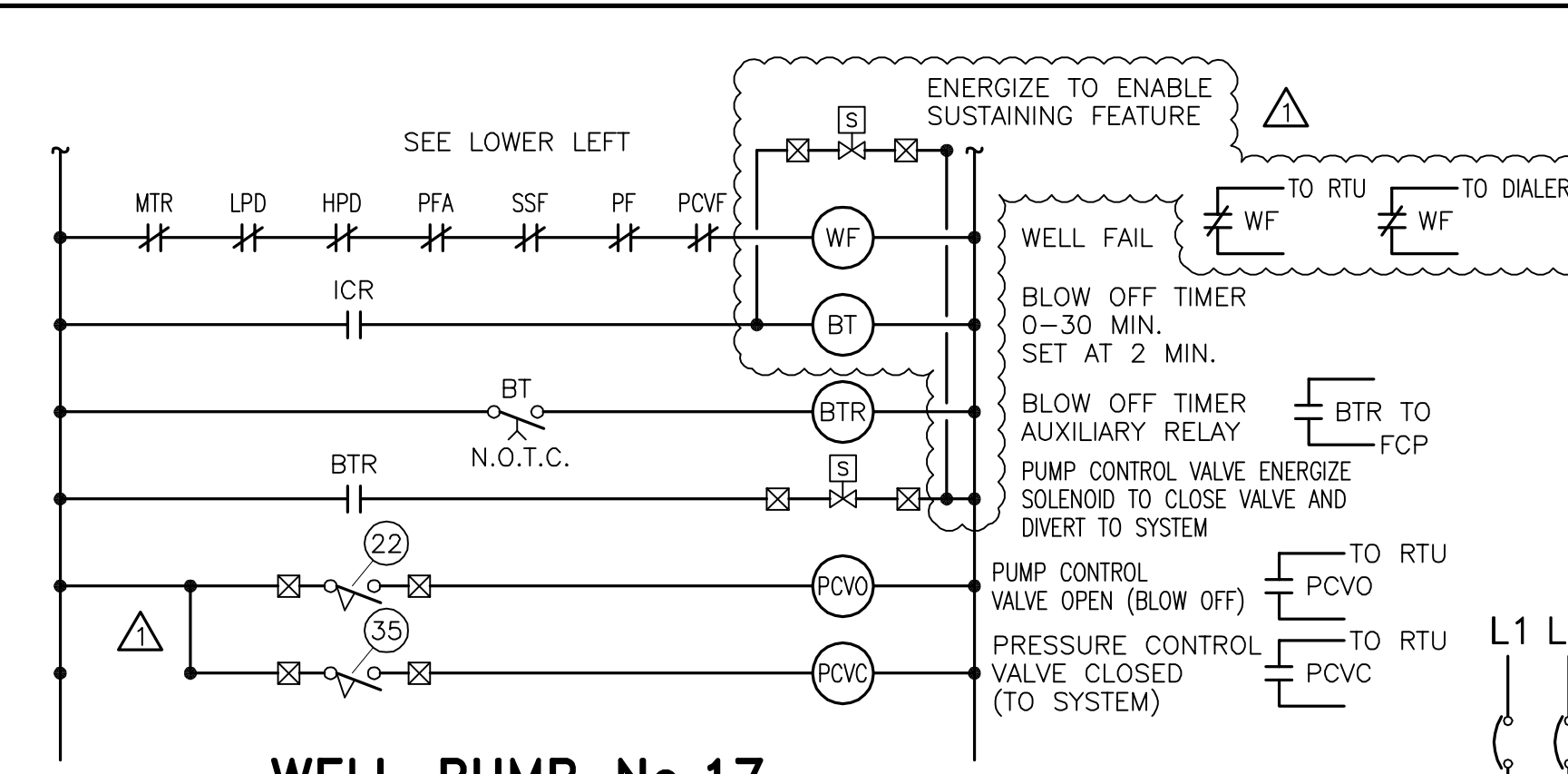
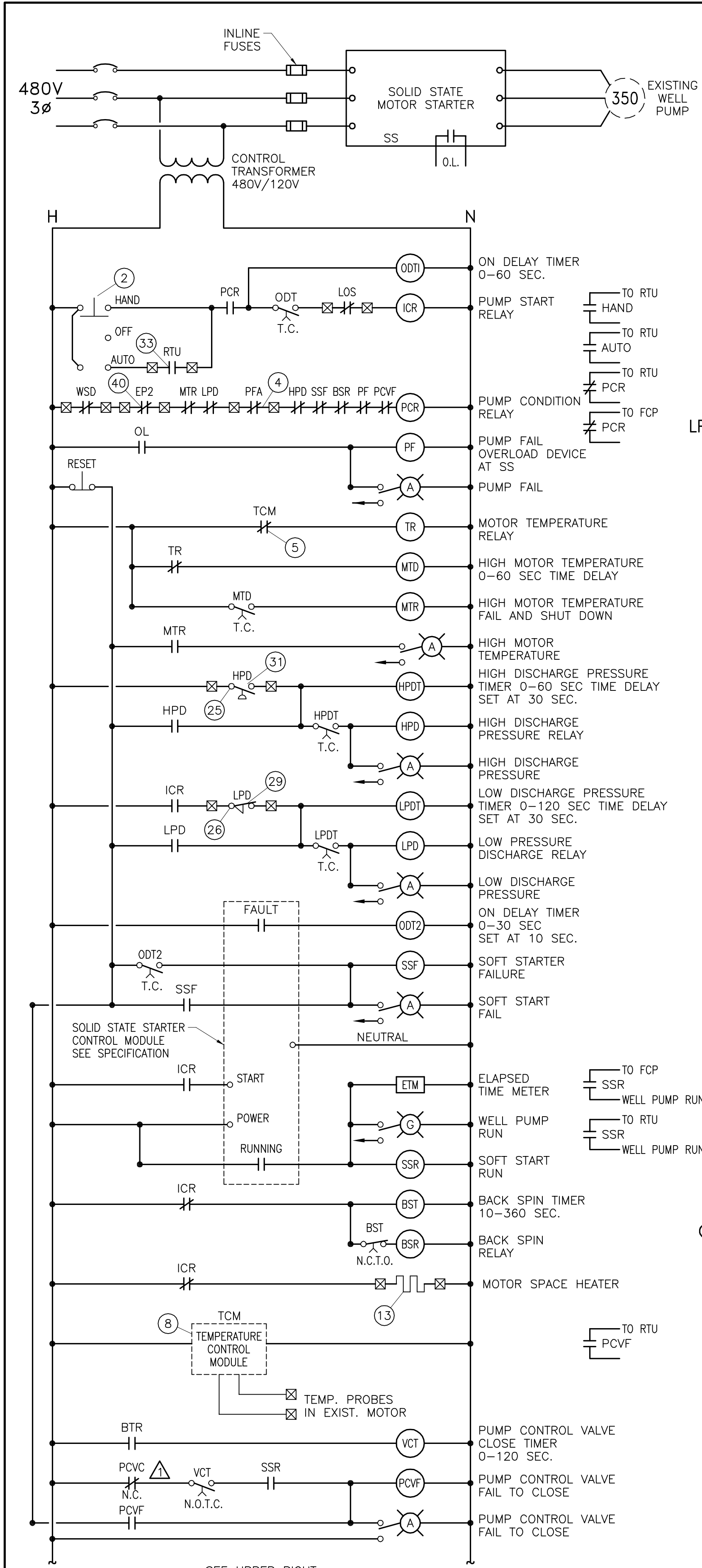
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**BWWT, CL2 STORAGE AND BRINE TANK LEVEL SCHEMATICS**

DRAWING  
**E-7**  
60 OF 69 SHEETS  
11770  
R.C.S.D. PLAN No.

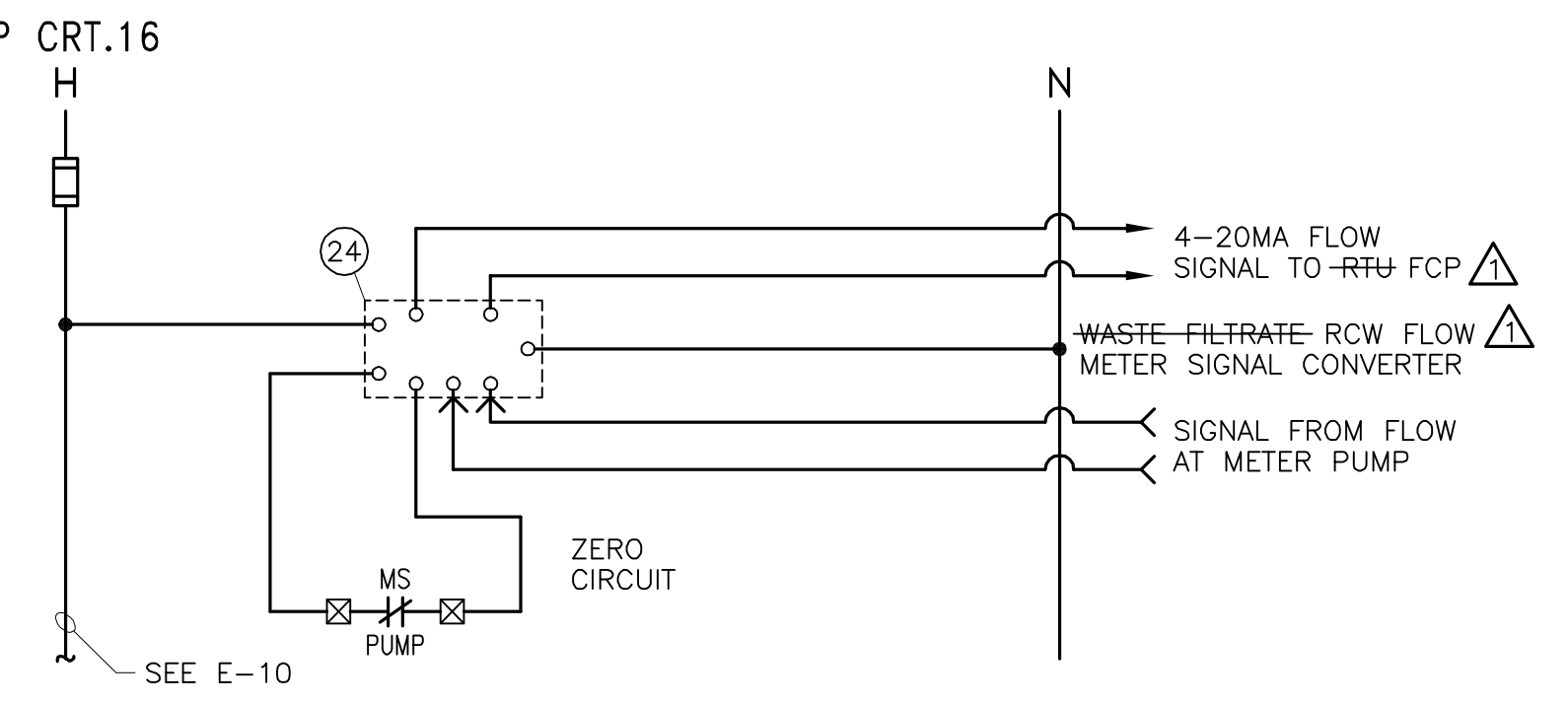
DWG. NO.: 05-587-19.54-01 FILE NO.: 05-587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:46PM PLOT SCALE: 1=1



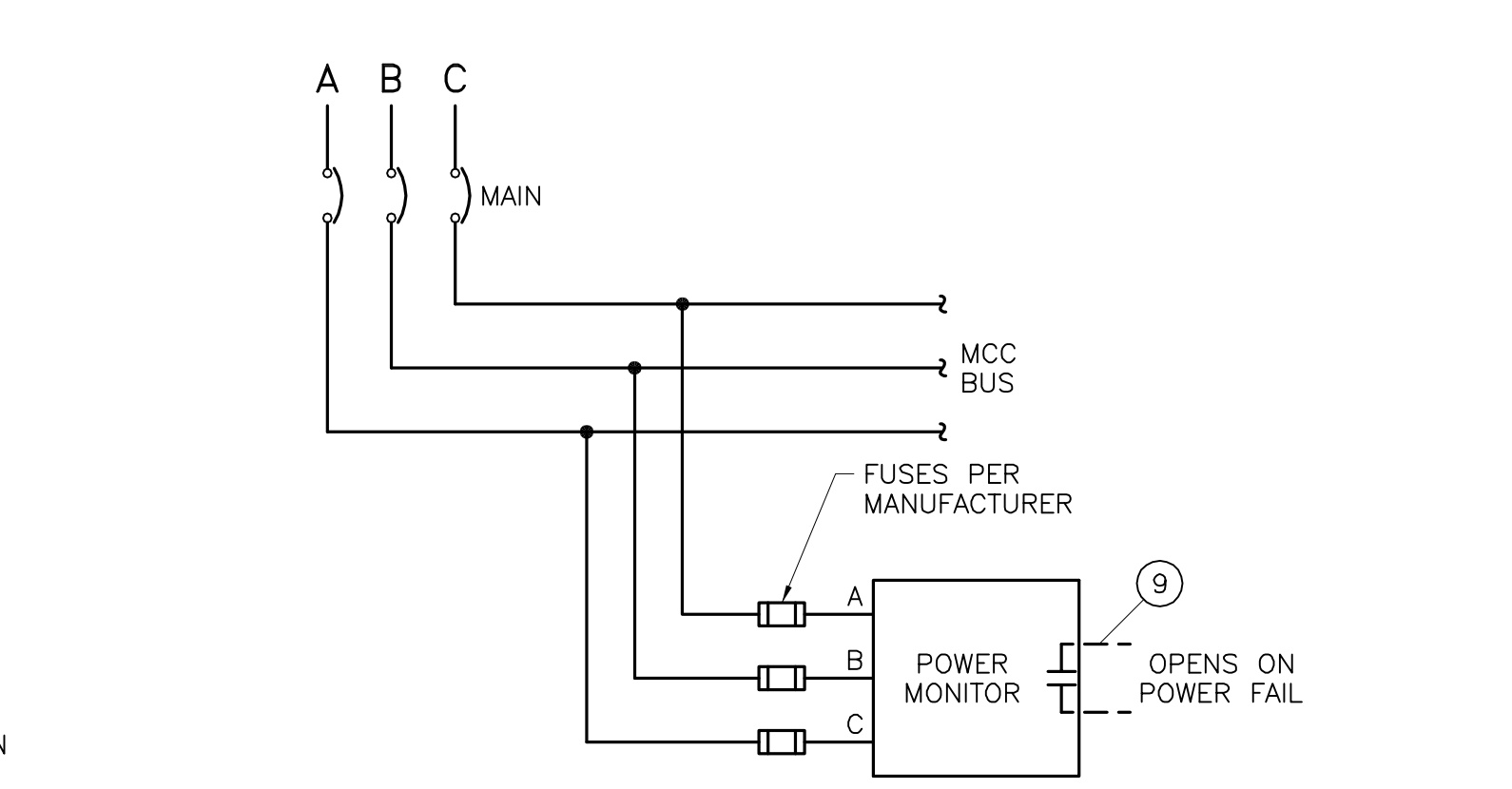
DWG. NO.: 100-987-19.54-08 FILE NO.: 100-987-19.54-08 DATE: 05/21/13 PLOT DATE: 05/21/13 PLOT TIME: 12:47PM PLOT SCALE: 1=1



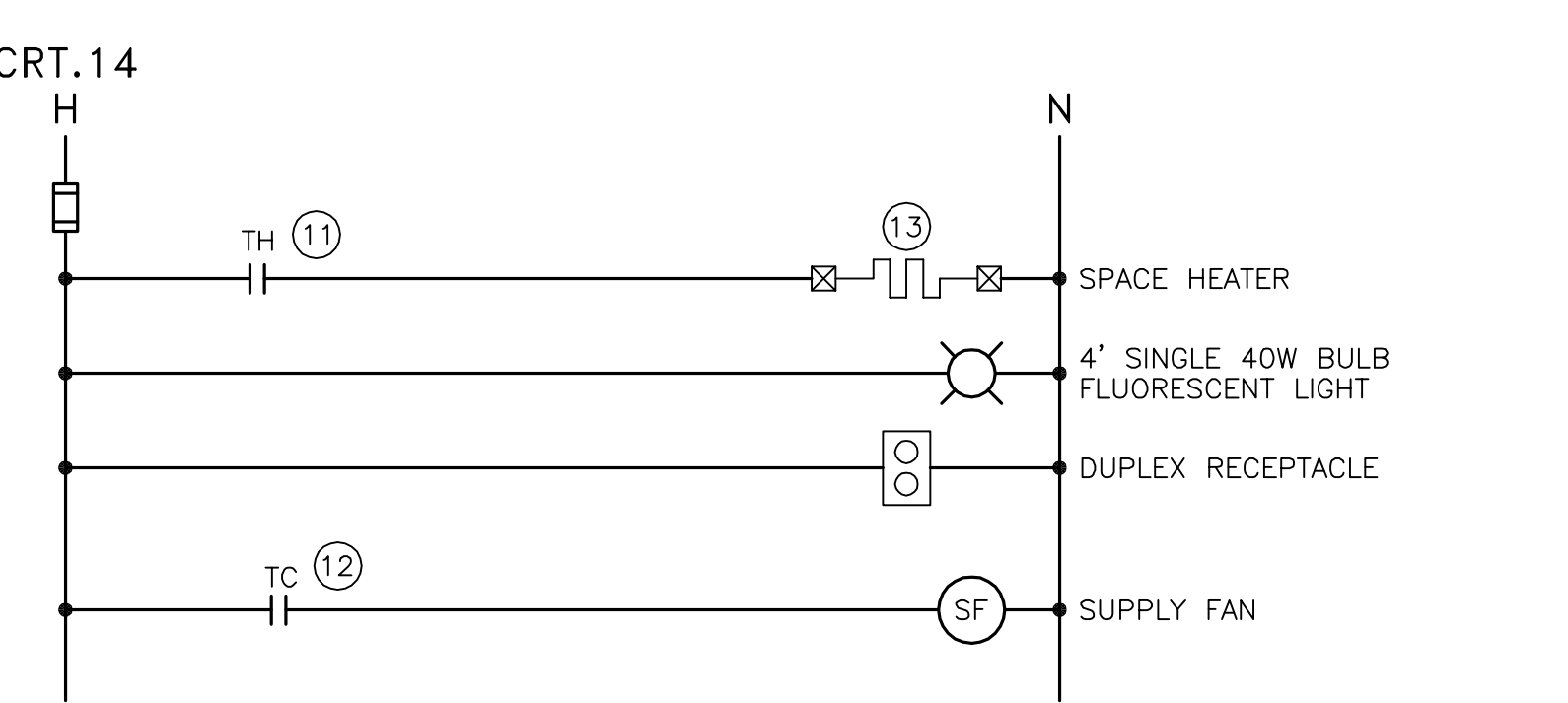
**WELL PUMP No.17**  
LOCATED IN MCC COMPARTMENT  
(TYP. FOR WELL PUMP No.18)



**RECYCLED WATER MAGMETER**  
LOCATED IN MCP



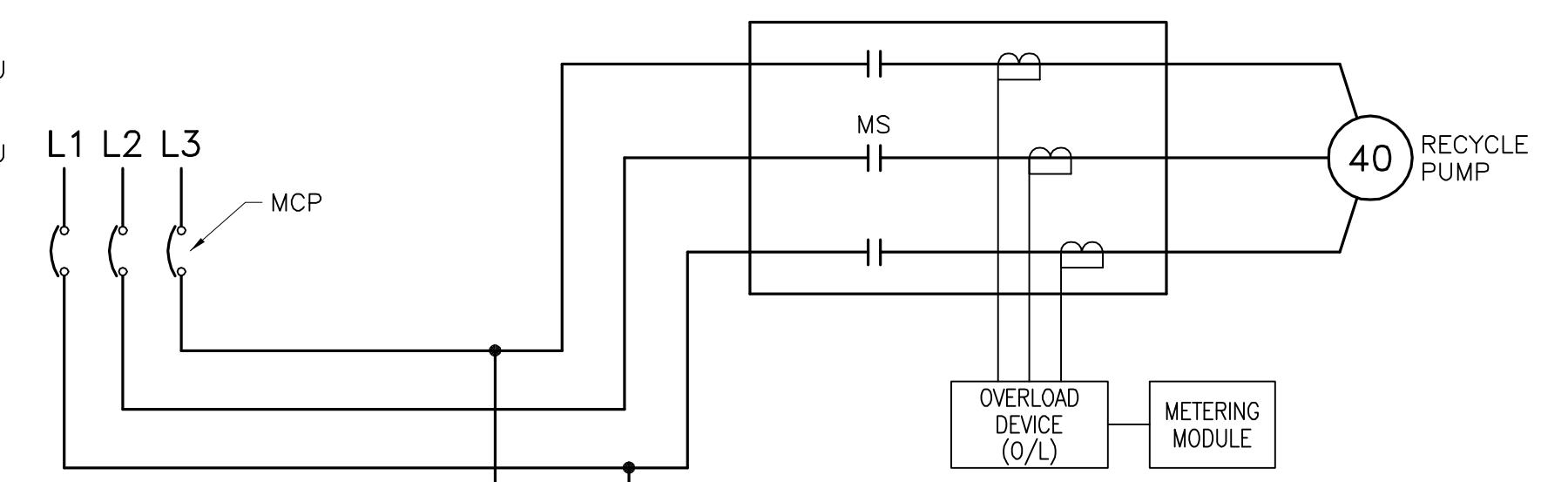
**3 PHASE POWER MONITOR RELAY**  
LOCATED IN MCC



**MCP SPACE HEATER, SUPPLY FANS, LIGHTS, AND RECEPTACLE**  
LOCATED IN MCP

**⑦ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWINGS E-8 THROUGH E-11:**

1. DRY CONTACT FROM FCP.
2. HOA SELECTOR SWITCH WITH AUXILIARY CONTACTS FOR HAND AND AUTO POSITIONS AS SHOWN.
3. CONTACT FROM ELECTRONIC OVERLOAD DEVICE.
4. CONTACT FROM POWER MONITOR AUXILIARY RELAY, OPEN ON FAIL.
5. CONTACT FROM TEMPERATURE CONTROL MODULE, N.C. OPEN ON TEMPERATURE FAIL. CONTROL MODULE FURNISHED TO BE COMPATIBLE WITH EXISTING MOTOR SENSORS.
6. CONTACT FROM RTU. OPEN CONTACT TO CLOSE VALVE UPON CL2 TANK LEAKING.
7. CONTACT FROM FCP FOR START/STOP METERING PUMP (TYPICAL FOR ALL METERING PUMPS).
8. TEMPERATURE CONTROL MODULE TO BE FURNISHED BY CONTRACTOR TO MATCH EXISTING TEMPERATURE MODULE AND COMPATIBLE WITH EXISTING MOTOR SENSORS.
9. CONTACT FROM POWER MONITOR, OPEN ON FAIL.
10. FROM FLOW SWITCH MODULE AT PUMP, N.O. CLOSURES UPON SENSING FLOW.
11. THERMOSTAT, HEATING.
12. THERMOSTAT, COOLING.
13. 150 WATT SPACE HEATER.
14. CONTACT FROM TEMPERATURE CONTROL MODULE, N.C. OPEN ON TEMPERATURE FAIL.
15. FROM METERING PUMP CONTROLLER.
16. TEMPERATURE CONTROL MODULE FURNISHED BY EQUIPMENT SUPPLIER TO MATCH TEMPERATURE PROBES.
17. INTRINSICALLY SAFE LEVEL RELAY WITH LOW VOLTAGE TRANSFORMER AND NO/NC CONTACT (TYP.), WARRICK SERIES 27 OR EQUAL. (1) CLOSE ON RISING LEVEL, OPEN ON FALLING LEVEL. (2) OPEN ON RISING LEVEL, CLOSE ON FALLING LEVEL.
18. HIGH DISCHARGE PRESSURE SWITCH (0 TO 150 PSI RANGE), FE. CLOSURES ON HIGH PRESSURE, INITIAL SETTING AT 15 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE. RESET WHEN PRESSURE DROPS 5 PSI.
19. LOW DISCHARGE PRESSURE SWITCH (0 TO 150 PSI RANGE), FE. CLOSURES ON LOW PRESSURE, INITIAL SETTING AT 5 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE. RESET WHEN PRESSURE INCREASES 5 PSI.
20. HIGH DISCHARGE PRESSURE SWITCH (0 TO 300 PSI RANGE), RECYCLE. CLOSURES ON HIGH PRESSURE, INITIAL SETTING AT 180 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE.
21. LOW DISCHARGE PRESSURE SWITCH (0 TO 300 PSI RANGE), RECYCLE. CLOSURES ON LOW PRESSURE, INITIAL SETTING AT 130 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE.
22. PUMP CONTROL VALVE OPEN LIMIT SWITCH. SET TO CLOSE AT 50% OPEN.
23. ULTRASONIC LEVEL CONTROL MODULE, FLUSH PANEL MOUNT IN MCP.
24. FLOW SIGNAL CONVERTER PANEL MOUNT IN MCP.
25. HIGH PRESSURE SWITCHES SHALL AUTO-RESET WHEN PRESSURE DROPS 10 PSI BELOW THE ADJUSTABLE SET POINT.
26. LOW PRESSURE SWITCHES SHALL AUTO-RESET WHEN PRESSURE INCREASES 10 PSI ABOVE THE ADJUSTABLE SET POINT.
27. FROM DIAPHRAGM LEAK MODULE AT PUMP. CLOSURES UPON SENSING LEAK.
28. CONTRACTOR TO CONNECT OTHER ALARM CONDITIONS TO DIALER AS REQUESTED BY OWNER.
29. LOW DISCHARGE PRESSURE SWITCH (0 TO 300 PSI RANGE). CLOSURES ON LOW PRESSURE. INITIAL SETTING AT 130 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE.
30. CONTACT FROM CSS-LCP FOR START/STOP PUMP.
31. HIGH DISCHARGE PRESSURE SWITCH (0 TO 300 PSI RANGE). CLOSURES ON HIGH PRESSURE. INITIAL SETTING AT 180 PSI. ADJUST BASED ON ACTUAL FIELD PERFORMANCE.
32. DRY CONTACT FROM RTU.
33. DRY CONTACT FROM RTU TO START/STOP WELL.
34. LIMIT SWITCHES AND SOLENOID VALVE MOUNTED TO PNEUMATICALLY OPERATED WASTE FILTRATE VALVE FOR OPEN/CLOSE AND POSITION.
35. PUMP CONTROL VALVE CLOSED LIMIT SWITCH (CLOSE AT VALVE CLOSE) AND OPEN AT VALVE 30% OPEN.
36. CURRENT ISOLATOR TO AMPLIFY AND DUPLICATE 4-20MA SIGNAL, MOUNT IN MCP.
37. CONTACTS FROM ATS.
38. EMERGENCY GENERATOR CONTROL MODULE. ADD RELAYS AND ADJUST AS NECESSARY IF N.C. CONTACTS PROVIDED.
39. ADD AUXILIARY RELAYS AS NECESSARY TO PROVIDE REQUIRED NUMBER OF CONTACTS.
40. EMERGENCY POWER RELAYS TO INTERRUPT OPERATION OF EQUIPMENT DURING OPERATION OF EMERGENCY POWER.
41. SELECTOR SWITCH FOR EQUIPMENT USE DURING OPERATION OF EMERGENCY POWER. PROVIDE LABEL "PERMIT TO OPERATE ON EMERGENCY POWER".
42. 24 VDC POWER SUPPLY TO BE PROVIDED BY THE RTU POWER SUPPLY SYSTEM.
43. SELECTOR SWITCH FOR CONTROL OF WASTE FILTRATE VALVE. LOCATED IN MCP.
44. LIMIT SWITCH ON RW BYPASS (RELIEF) VALVE, CLOSE WHEN VALVE IS 10% OR GREATER OPEN.
45. LIMIT SWITCH ON RW BYPASS (RELIEF) VALVE, CLOSE WHEN VALVE IS CLOSED.
46. THERMAL SENSOR SWITCH IN MOTOR, OPEN ON HIGH TEMPERATURE.
47. RUN CONTACT FROM VFD.
48. FAIL CONTACT FROM VFD.
49. DEPENDING UPON DETECTION MODULE PROVIDED MAY REQUIRE CONTINUOUS POWER.
50. PRESSURE TRANSDUCER/CONTROLLER, FLUSH DOOR MOUNTED IN MCP.



**RECYCLE PUMP No.1**  
LOCATED IN MCC COMPARTMENT  
TYP. FOR RCW PUMP No.2

**RECORD DRAWING**

BY: *John C. Stewart* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900

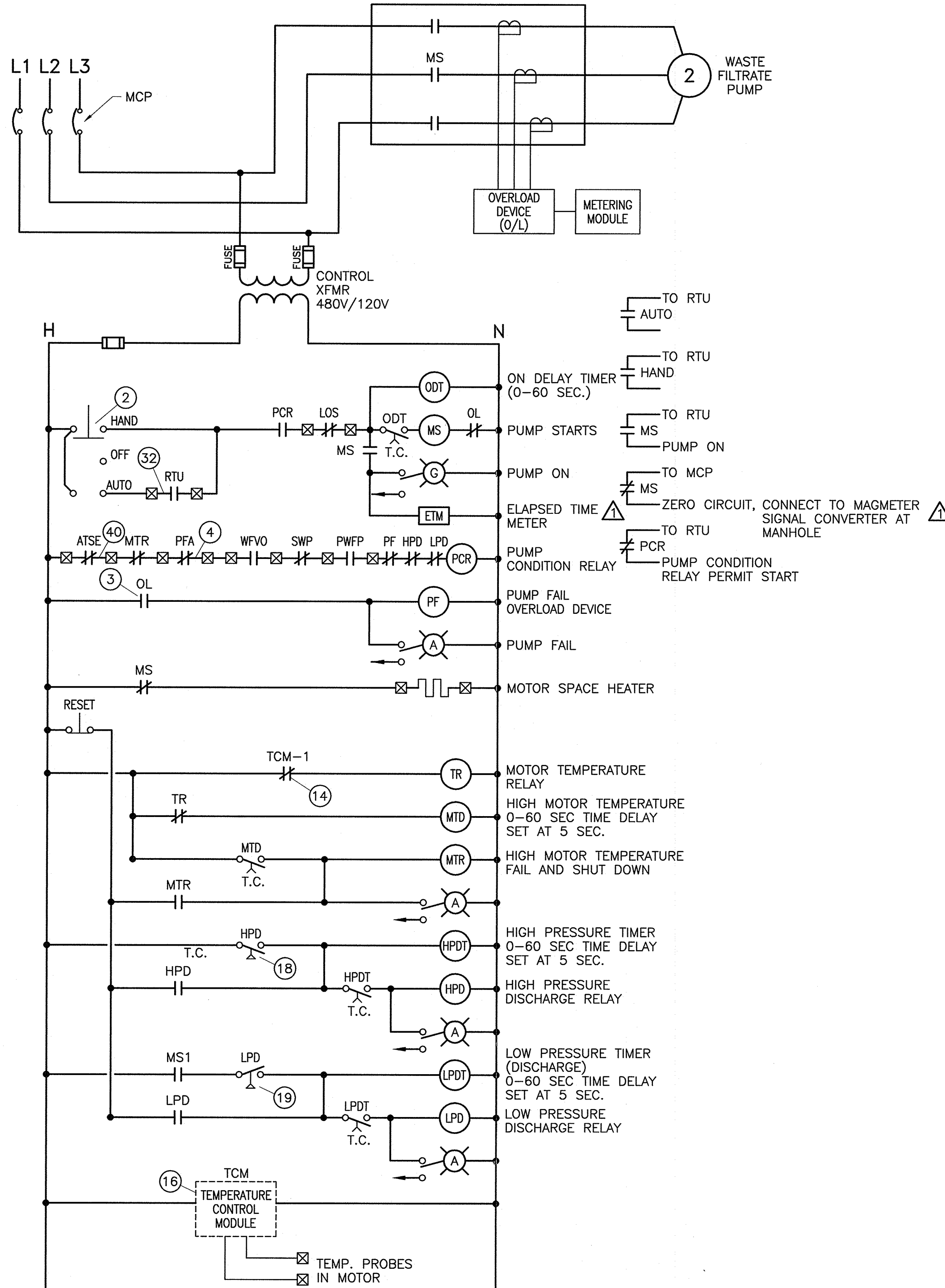
APPROVED BY: *John C. Stewart*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY

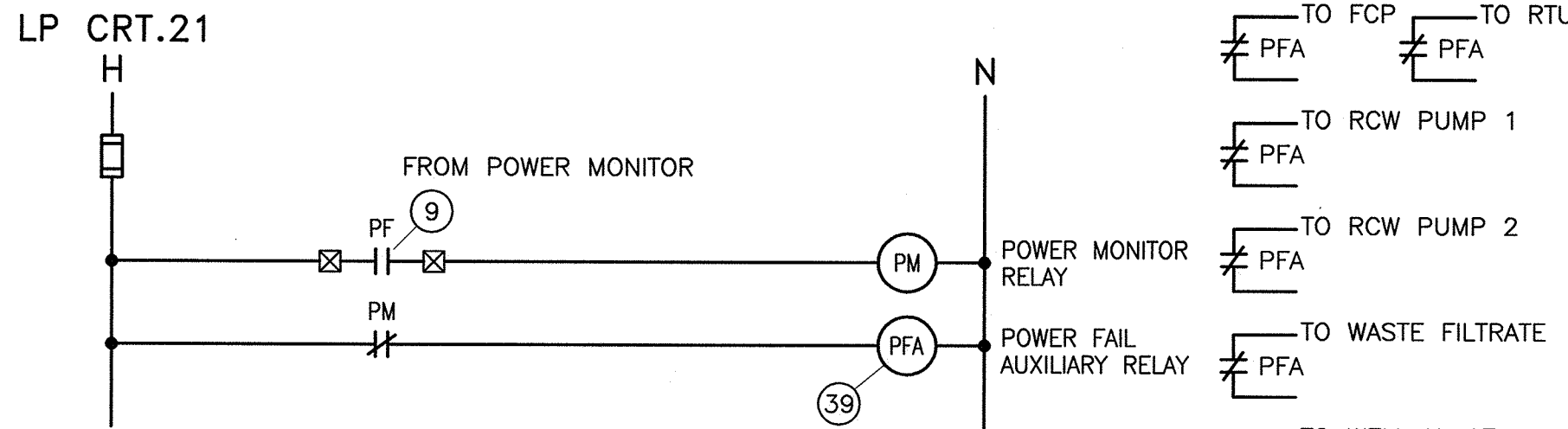
**CONTROL LADDER DIAGRAMS**

DRAWING  
**E-8**  
61 OF 69 SHEETS  
11771  
R.C.S.D. PLAN NO.



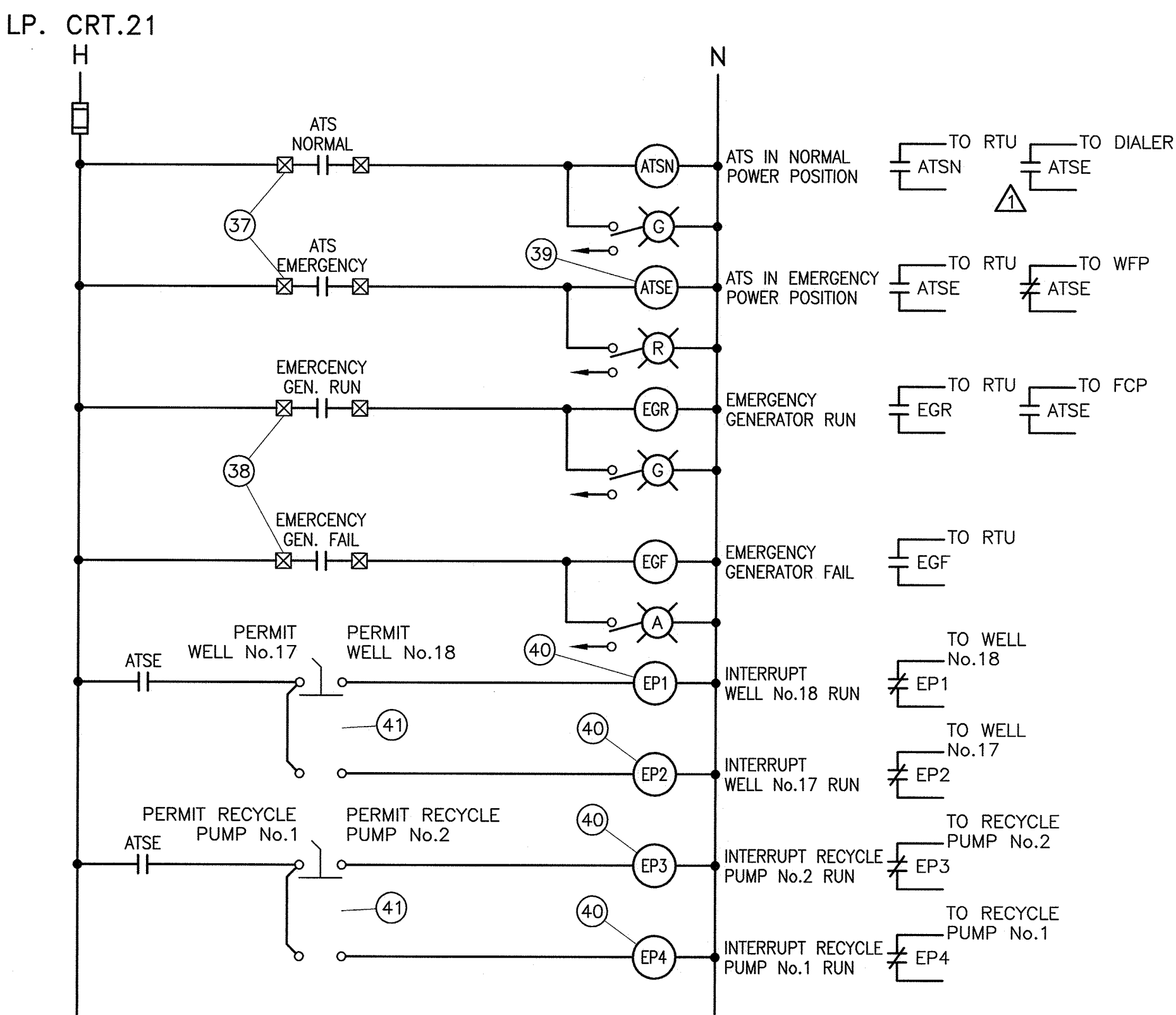
**WASTE FILTRATE PUMP (WFP)**

LOCATED IN MCC COMPARTMENT



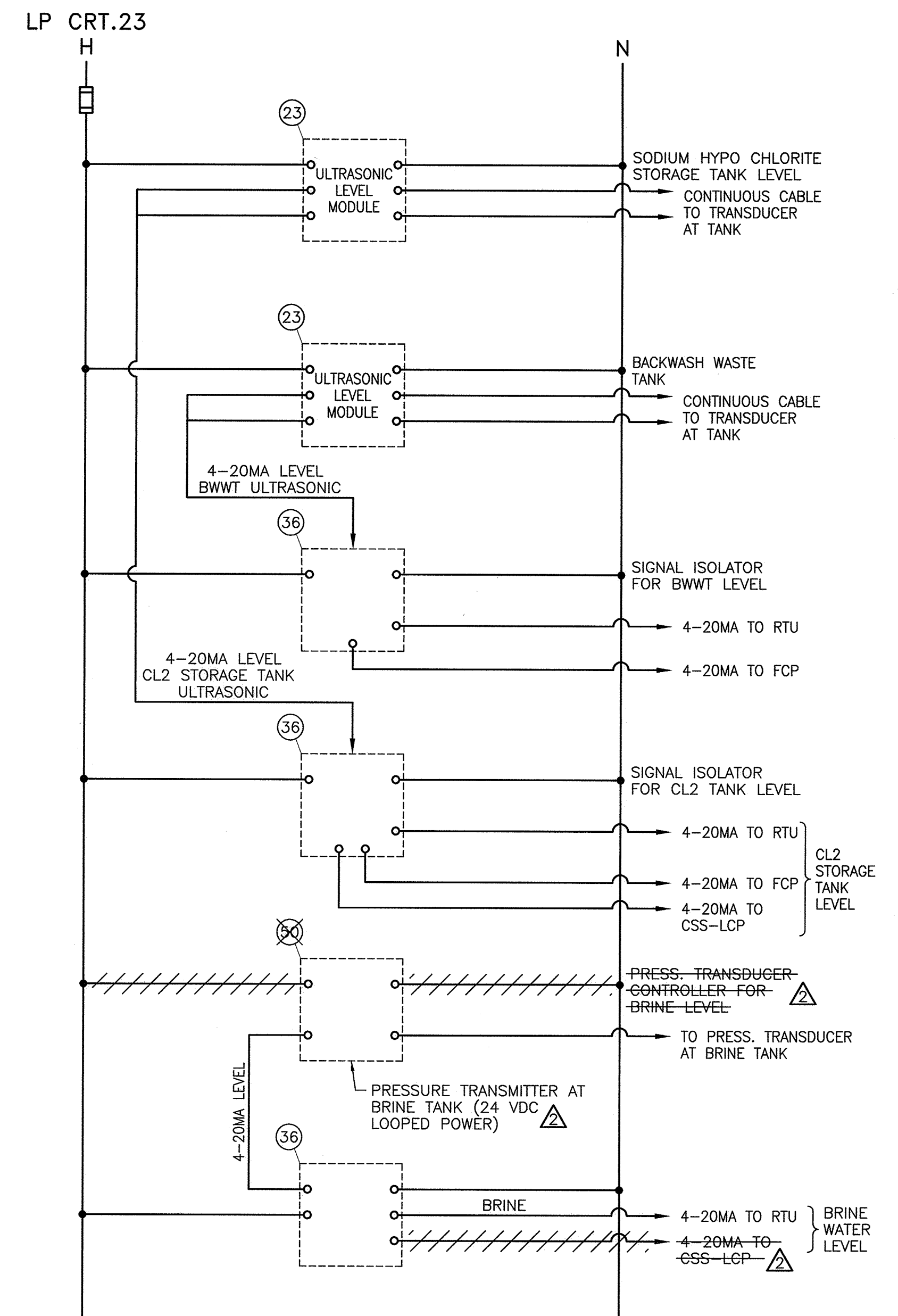
**POWER MONITOR AUXILIARY RELAYS**

LOCATED IN MCP



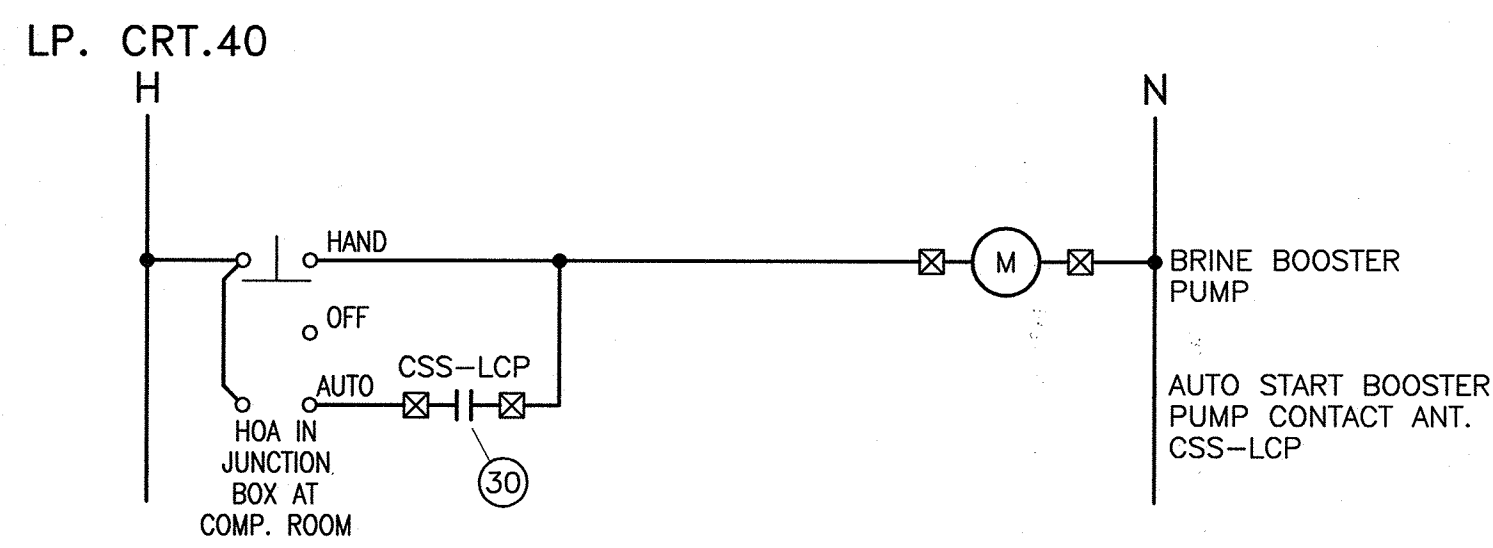
**ATS AND EMERGENCY POWER CONTROLS**

LOCATED IN MCP

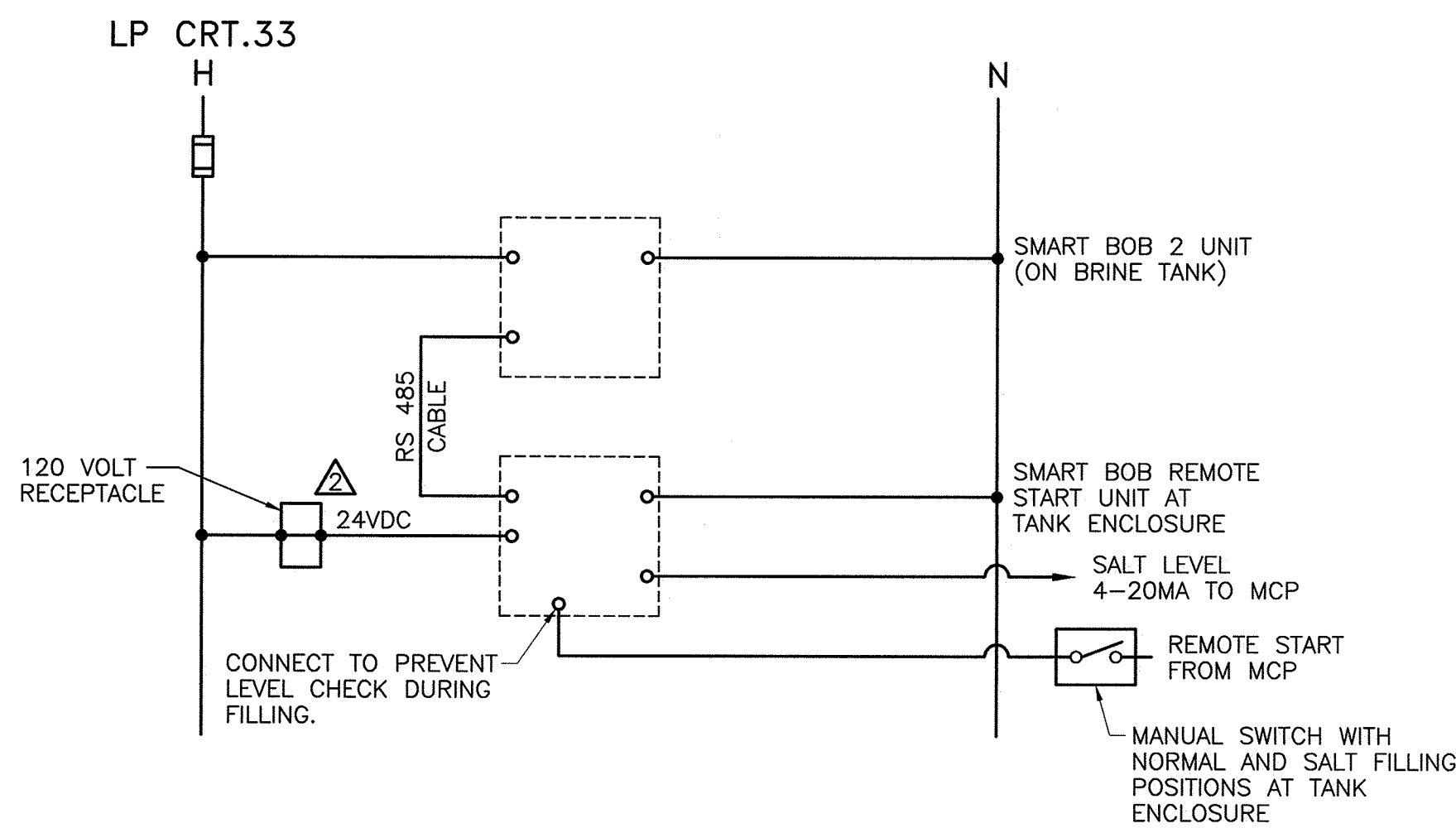


**BRINE, BWWT, AND CL2 STORAGE TANK LEVELS**

LOCATED AT MCP

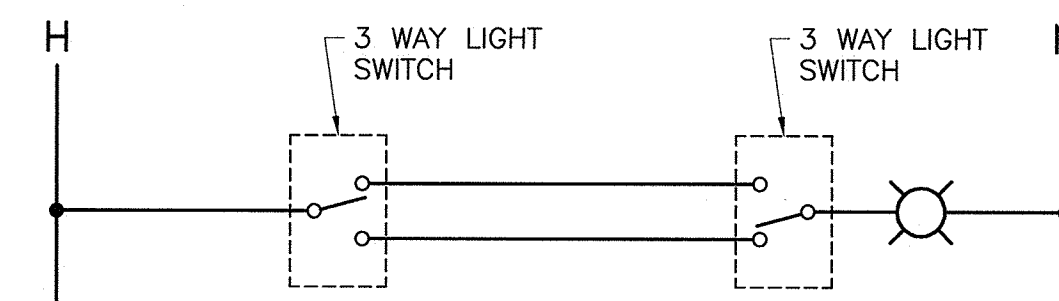


**BRINE BOOSTER PUMP**



**BRINE TANK SALT LEVEL**

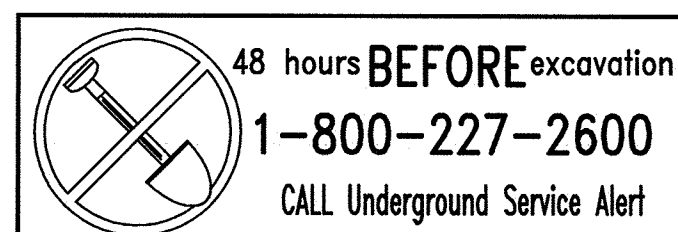
LOCATED AT TANK ENCLOSURE



**3 WAY LIGHT SWITCH CIRCUITS (TYP.)**

**RECORD DRAWING**

BY: *Ben C. Williams* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	CHLORINE GENERATOR PROJECT	02/13/14	BCV
Δ	RECORD DRAWING	05/21/13	BCV



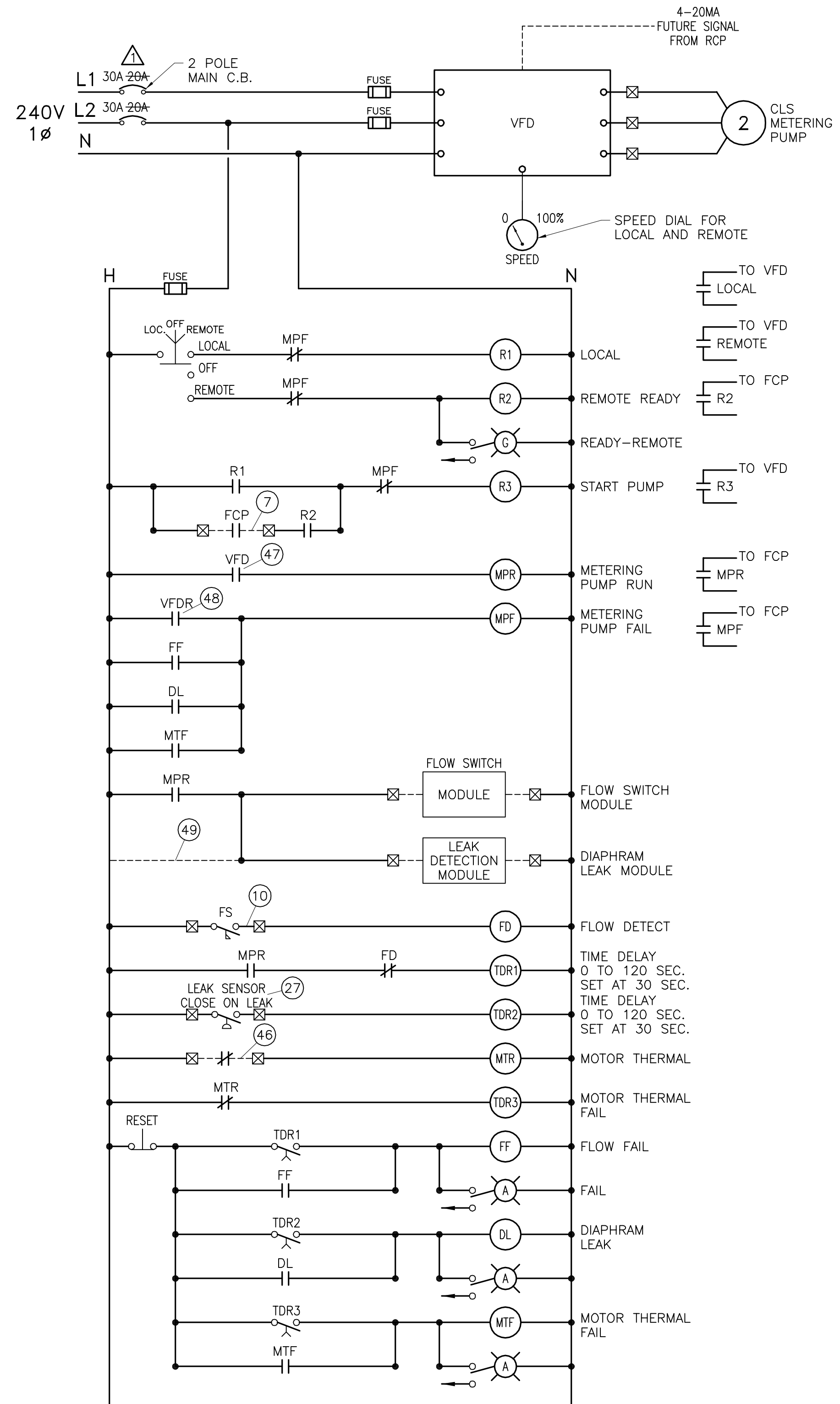
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. - Riverside, CA. 92501 - 951-684-6900  
APPROVED BY: *Jim C. Reynolds*  
REGISTERED ENGINEER No. 20453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**CONTROL LADDER DIAGRAMS**

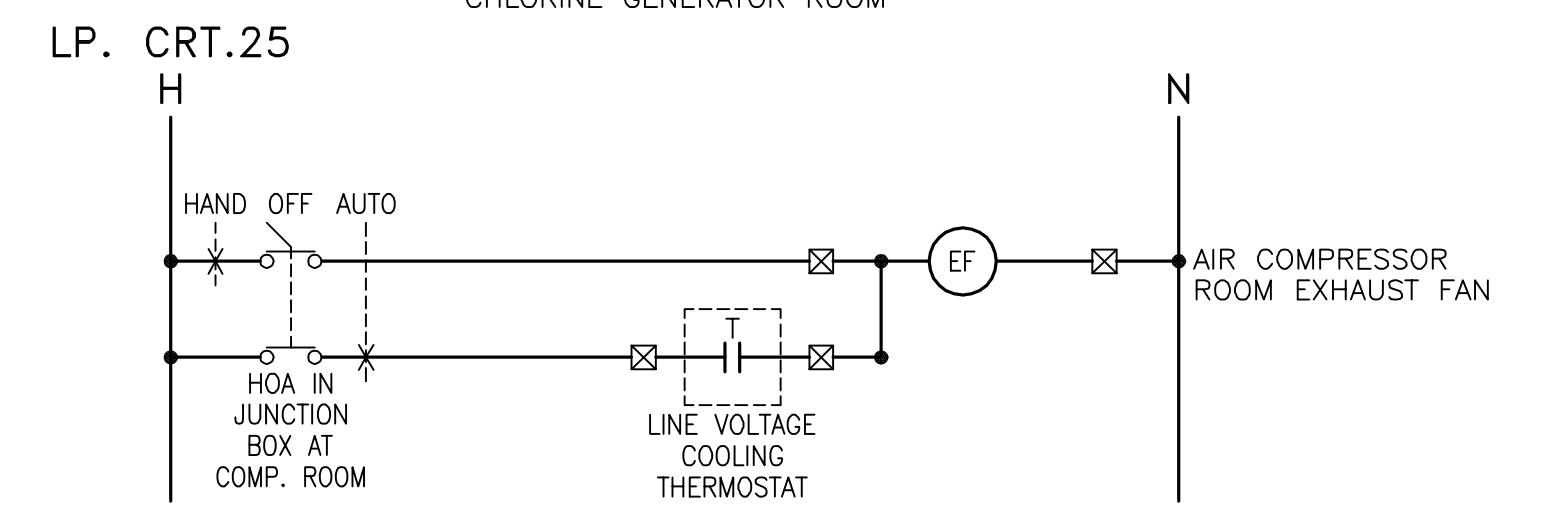
DRAWING  
**E-9**  
62 OF 69 SHEETS  
11772  
R.C.S.D. PLAN No.  
587-19.54

DWG. NO.: 05-587-19.54-9 FILE NO.: 587-19.54 UPDATE BY: MRN PROJ. ENG.: PES PLOT DATE: 02/14/14 PLOT TIME: 4:12PM PLOT SCALE: 1=1



**CL2 METERING PUMP No.1 LCP**

TYP. METERING PUMPS No.2 AND 3  
LOCATED IN METERING PUMP CONTROL PANEL MOUNTED IN  
CHLORINE GENERATOR ROOM



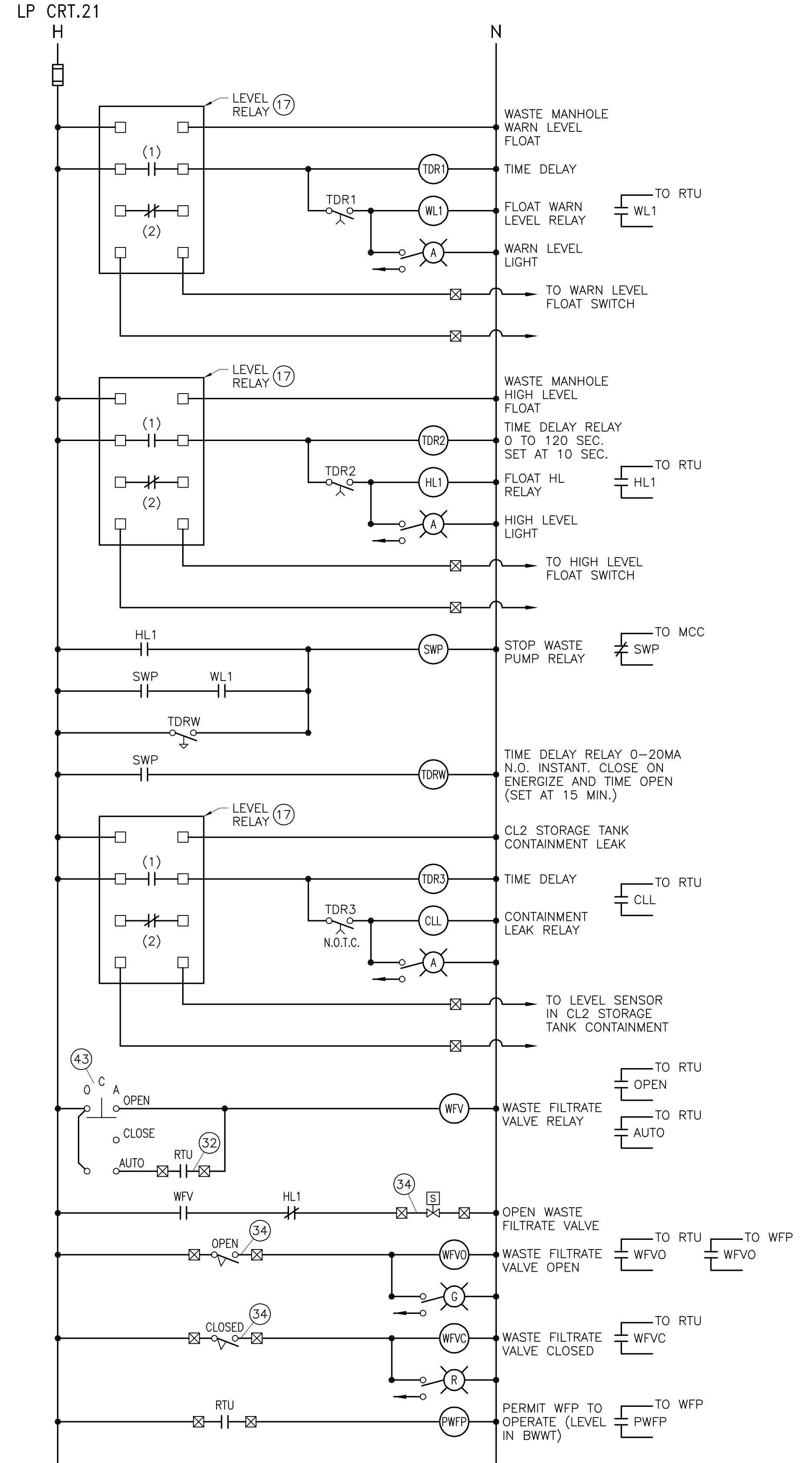
**EXHAUST VENTILATION**

LOCATED AT NEMA 12 PANEL IN AIR COMPRESSOR ROOM

**RECORD DRAWING**

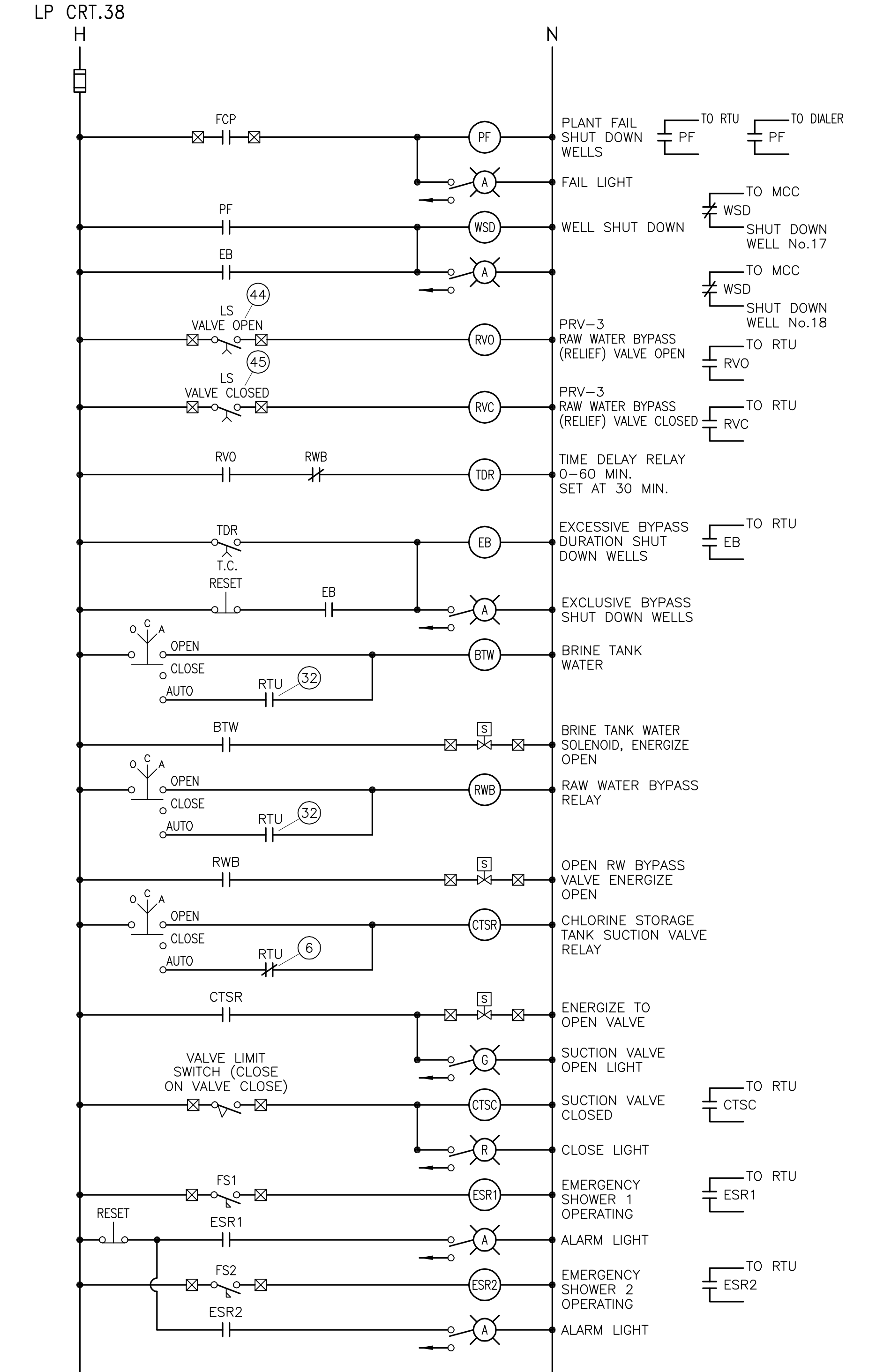
BY: *Jim C. Stewart* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert



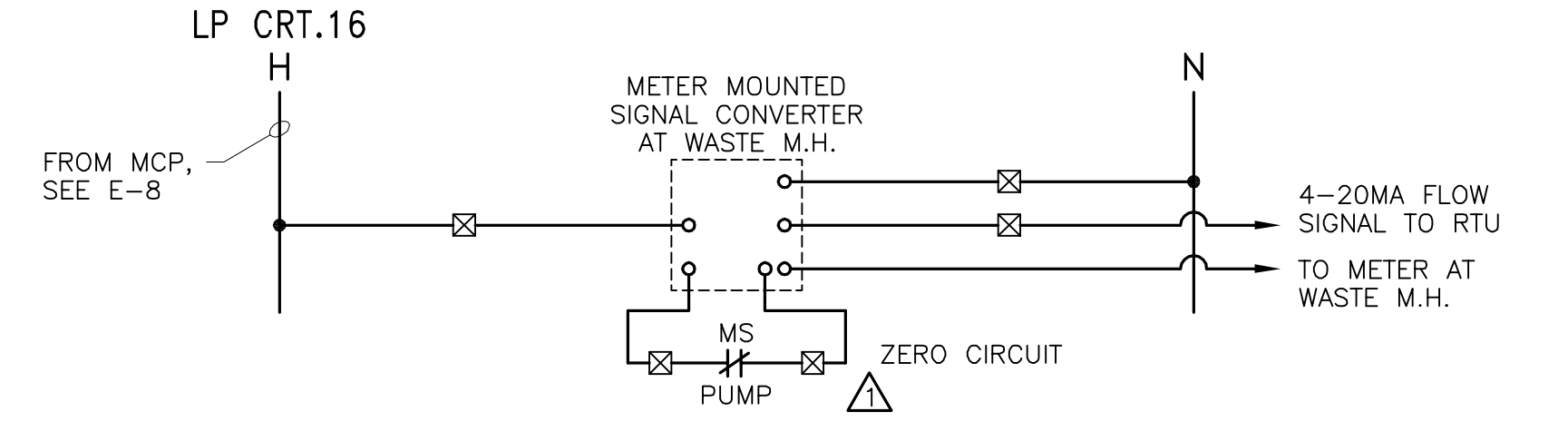
**WASTE M.H. LEVELS, WASTE FILTRATE VALVE, CL2 TANK LEAK AND WFP LEVEL CONTROLS**

LOCATED IN MCP



**RW BYPASS VALVE, WELL SHUT DOWN, AND PLANT FAIL HARD WIRE BACKUP FOR SCADA**

LOCATED IN MCP



**WASTE FILTRATE MAG METER**

LOCATED AT WASTE M.H.

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jim C. Stewart*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

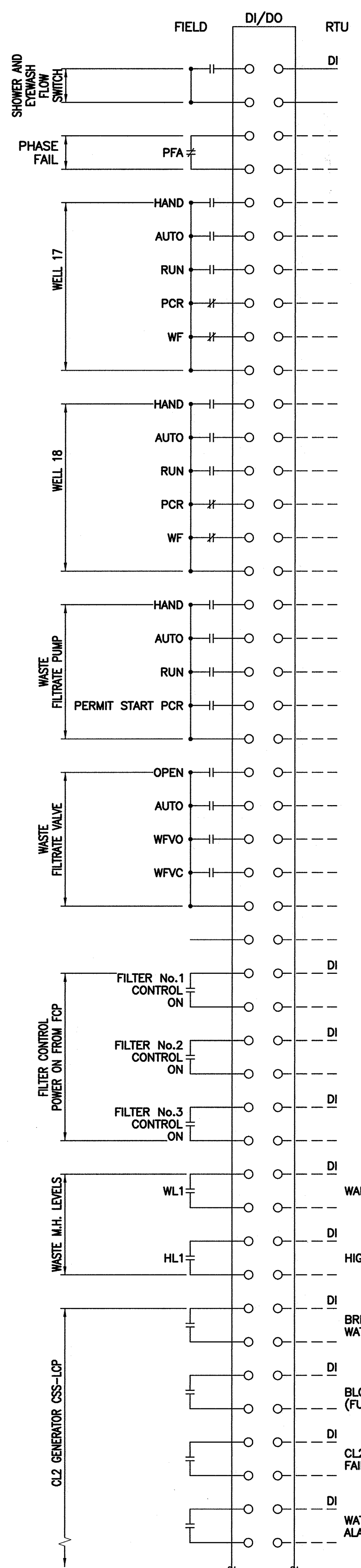
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**CONTROL LADDER DIAGRAMS**

DRAWING  
**E-10**  
63 OF 69 SHEETS  
11773  
R.C.S.D. PLAN No.

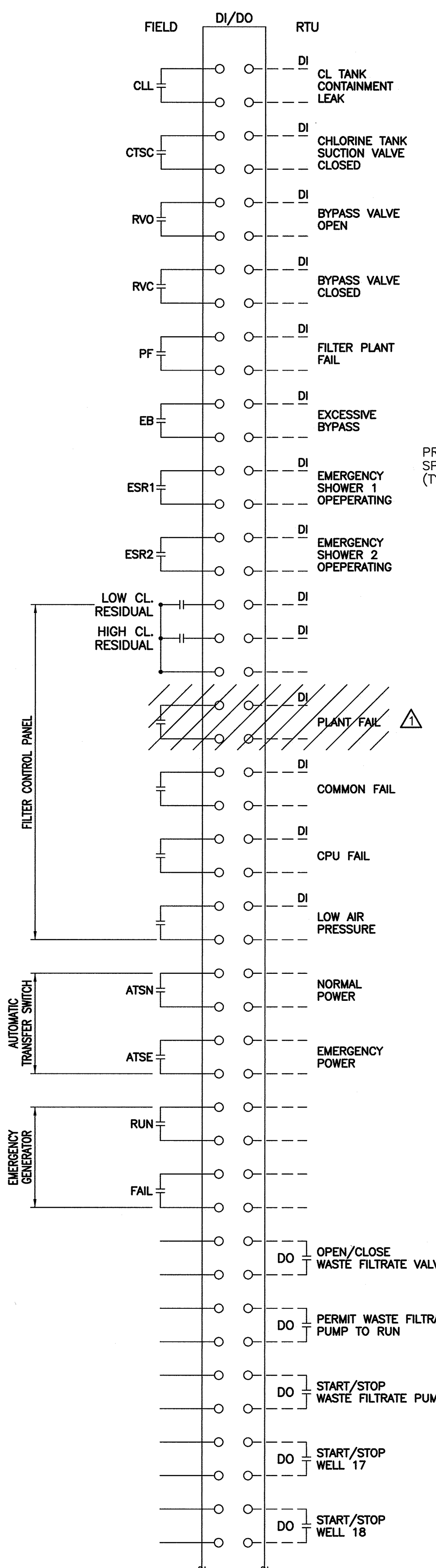
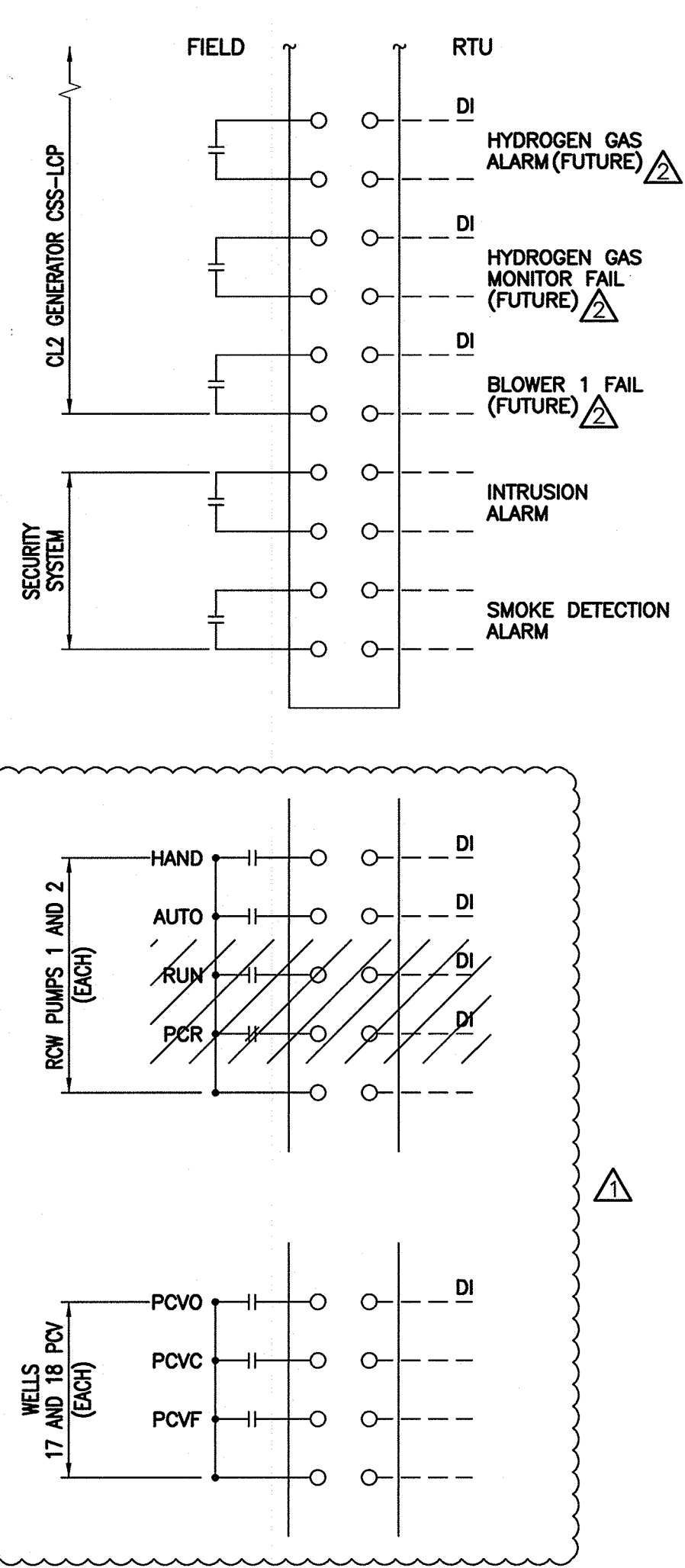
DWG. NO.: rc-90-18-54-e10 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 12:49PM PLOT SCALE: 1=1



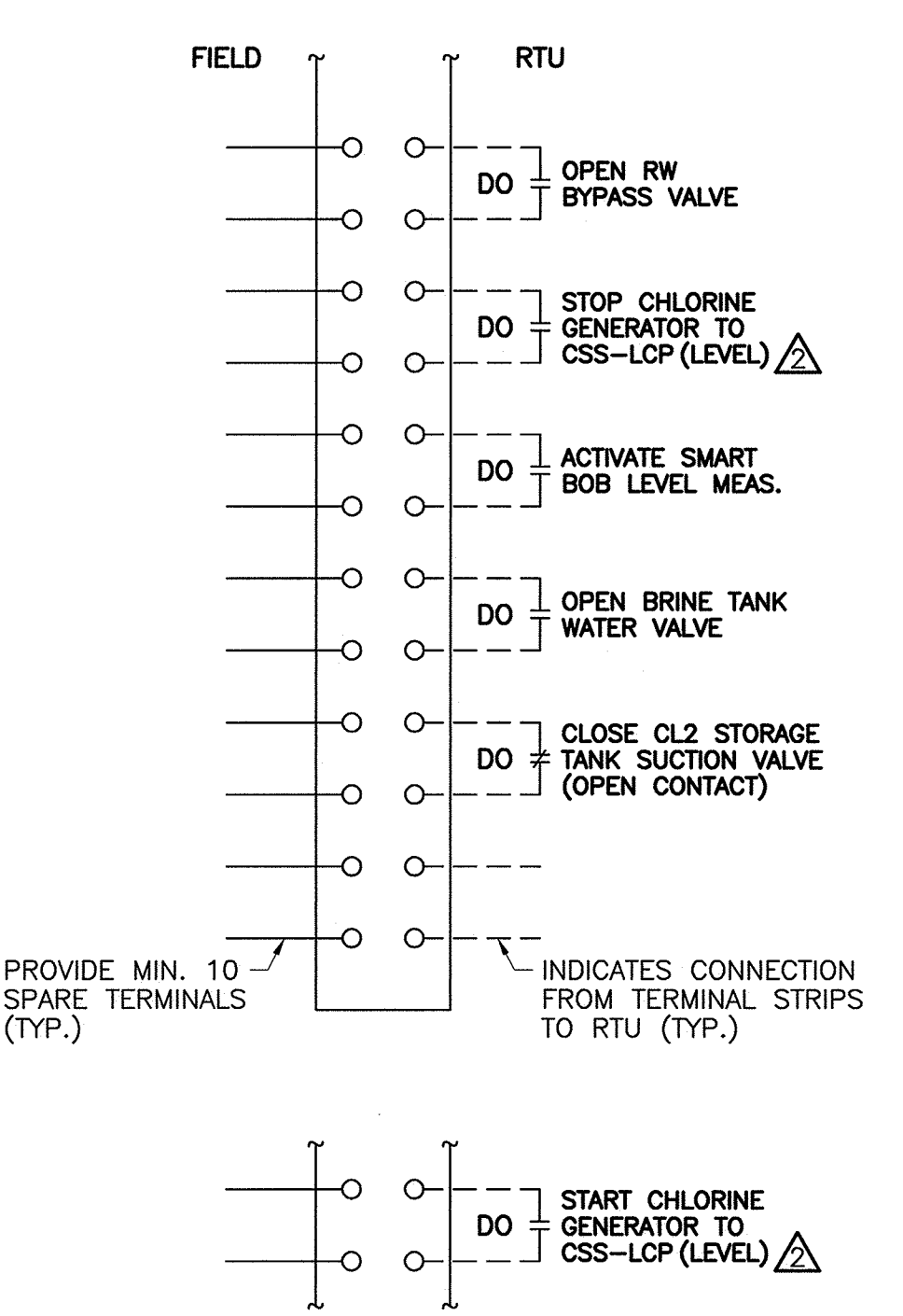
DWG. NO.: 05-87-19.54-11 FILE NO.: 587-19.54 UPDATE BY: MRN PROJ. ENG.: PES PLOT DATE: 02/18/14 PLOT TIME: 9:16AM PLOT SCALE: 1=1



**RTU TERMINAL STRIP**  
LOCATED IN MCP



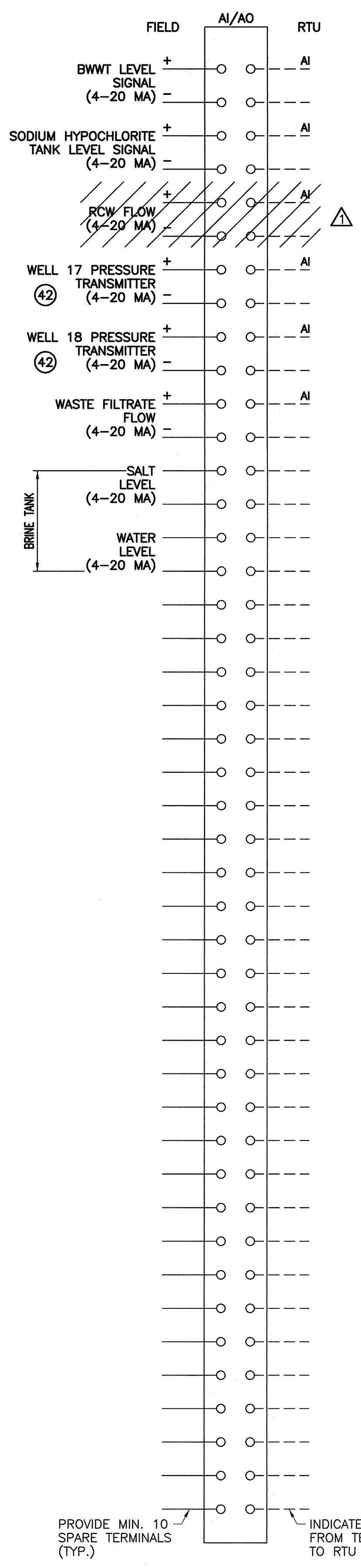
**RTU TERMINAL STRIP**  
LOCATED IN MCP



PROVIDE MIN. 10 SPARE TERMINALS (TYP.)

INDICATES CONNECTION FROM TERMINAL STRIPS TO RTU (TYP.)

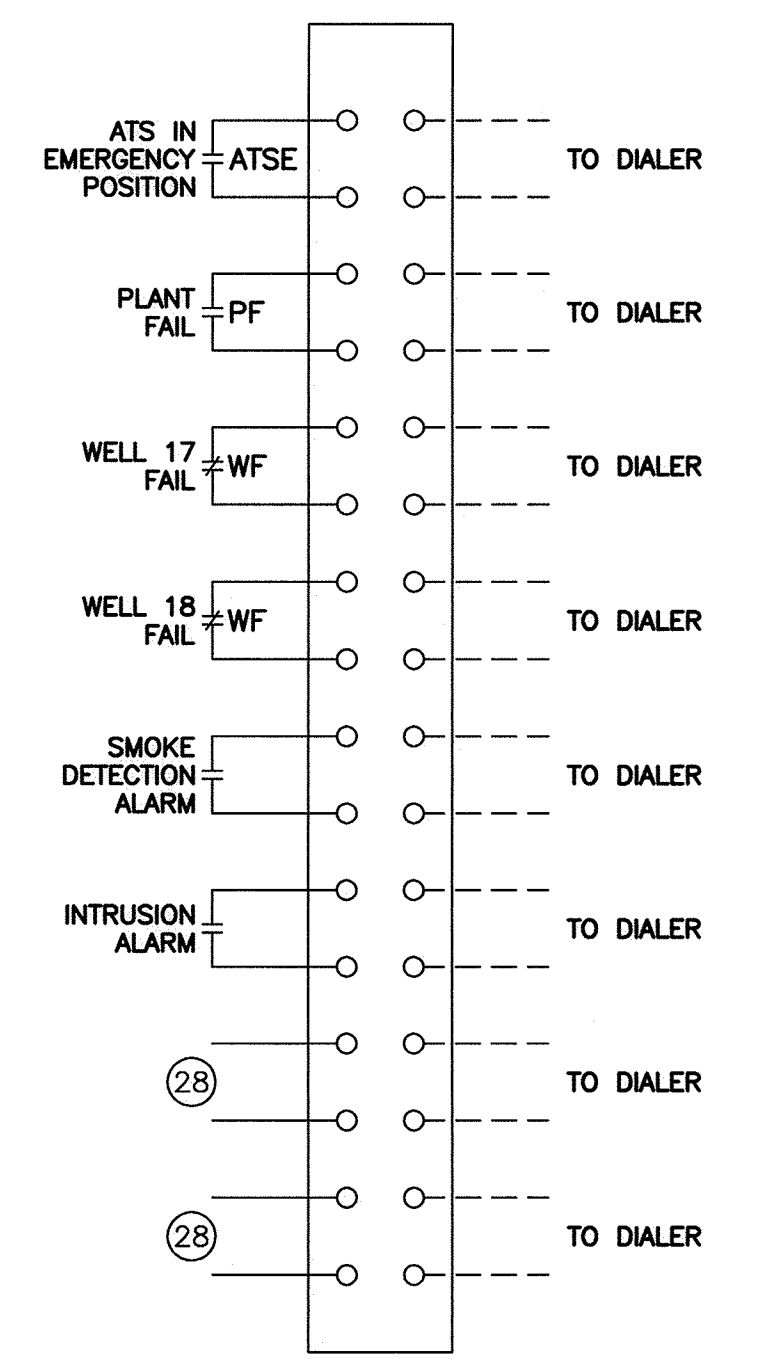
**RTU TERMINAL STRIP**  
LOCATED IN MCP



PROVIDE MIN. 10 SPARE TERMINALS (TYP.)

INDICATES CONNECTION FROM TERMINAL STRIPS TO RTU (TYP.)

**RTU TERMINAL STRIP**  
LOCATED IN MCP



**MCP TERMINAL STRIP**  
LOCATED IN MCP

**RECORD DRAWING**  
BY: *[Signature]* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
△	CHLORINE GENERATOR PROJECT	02/13/14	BCV
△	RECORD DRAWING	05/21/13	BCV



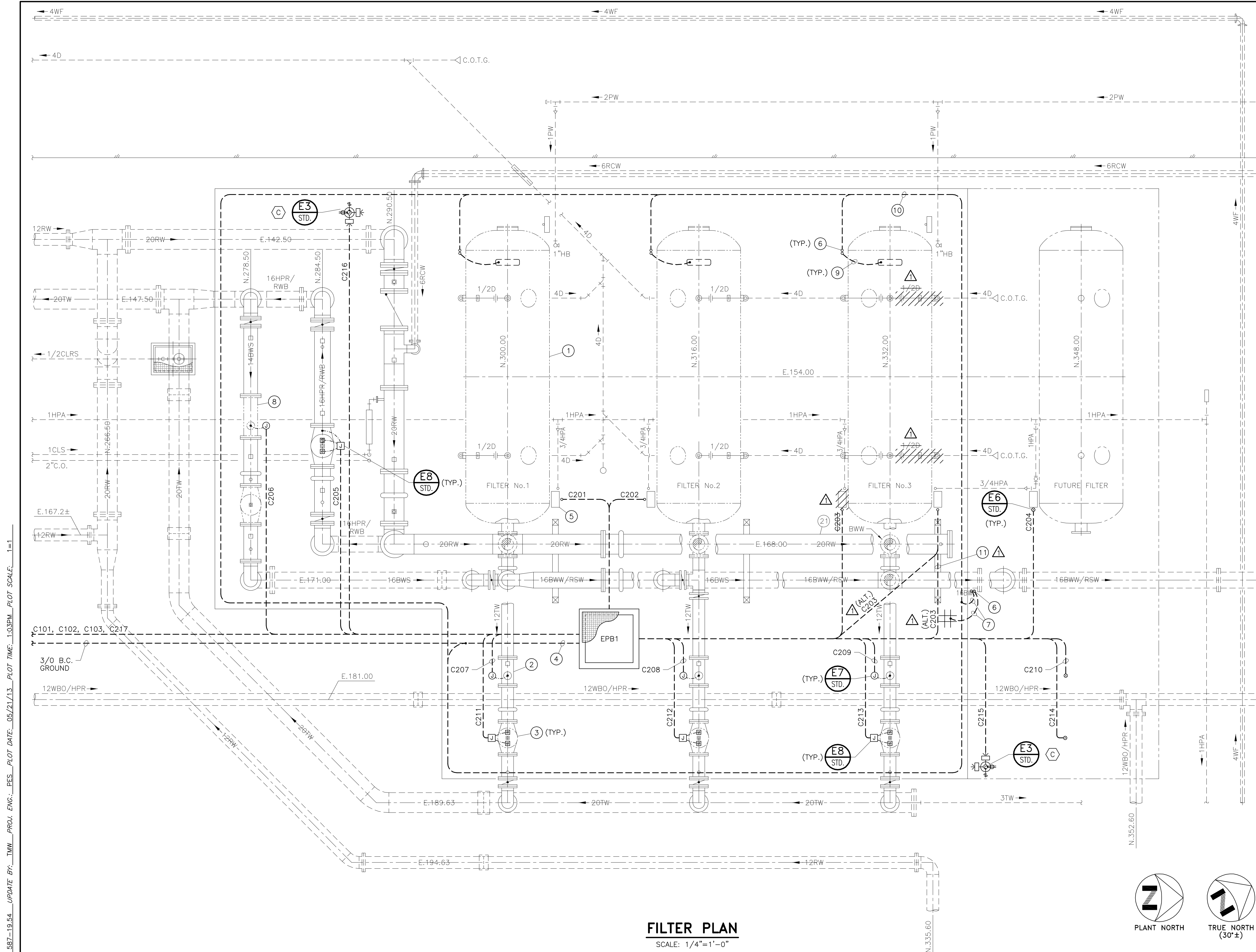
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *[Signature]*  
REGISTERED ENGINEER No. 20453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**RTU INTERCONNECT DIAGRAMS**

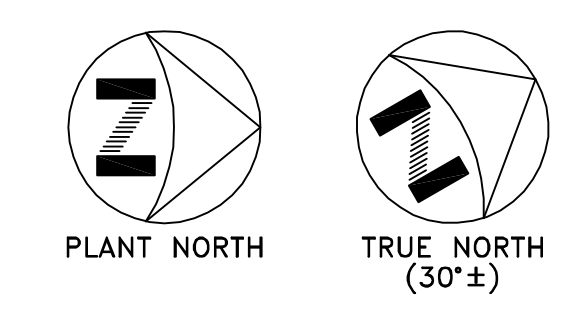
DRAWING  
**E-11**  
64 OF 69 SHEETS  
11774  
R.C.S.D. PLAN No.





- ① MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 1E-1:
1. FILTER VESSEL BY FILTER SYSTEM SUPPLIER (FSS), FILTRONICS MODEL FH-16 (3 TOTAL) PER SPECIFICATIONS. REFER TO MANUFACTURER'S SHOP DRAWINGS FOR VESSEL DETAILS AND INSTALLATION REQUIREMENTS.
  2. 12" PROPELLER FLOW METER BY FSS (3 TOTAL) PER SPECIFICATIONS.
  3. 12" RATE OF FLOW CONTROL VALVE BY FSS (3 TOTAL) PER SPECIFICATIONS.
  4. CONNECT #3/0 B.C. GROUND TO GROUND ROD IN EPB1.
  5. REMOTE SOLENOID VALVE PANEL WITH NEMA 4X ENCLOSURE BY FSS (3 TOTAL) PER SPECIFICATIONS.
  6. PROVIDE SOLID STATE DECOUPLER (SSD) MODEL 1.2KA BY DAIRYLAND ELECTRICAL INDUSTRIES. ATTACH TO 3" PIPE, 48" LONG WITH 24" ABOVE GRADE. CAP TOP OF PIPE.
  7. CAD WELD #4 INSULATED CONDUCTOR TO BOTTOM REBAR MAT AND CONNECT TO SSD. CAD WELD #4 INSULATED CONDUCTOR TO GROUND LOOP AND CONNECT TO SSD.
  8. 14" PROPELLER FLOW METER BY FSS (1 TOTAL) PER SPECIFICATIONS.
  9. ATTACH #6 INSULATED GROUND CONDUCTOR FROM SSD TO FILTER VESSEL AT ANCHOR BOLT AND CONNECT TO SSD. TYPICAL ALL FILTERS.
  10. #3/0 BC GROUND CONDUCTOR UNDER FILTER AND PIPING SLAB FOOTING FOR GROUND LOOP SYSTEM. PROVIDE 3" COVER OVER GROUND CONDUCTOR.
  11. RUN CONDUIT THROUGH CENTER OF PIPE SUPPORT FOUNDATION OR MINIMUM 3" CLEAR BELOW FOUNDATION.

**FILTER PLAN**  
SCALE: 1/4"=1'-0"



DWG. NO.: RE-80-18-34-11 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 1:03PM PLOT SCALE: 1=1

**RECORD DRAWING**  
BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



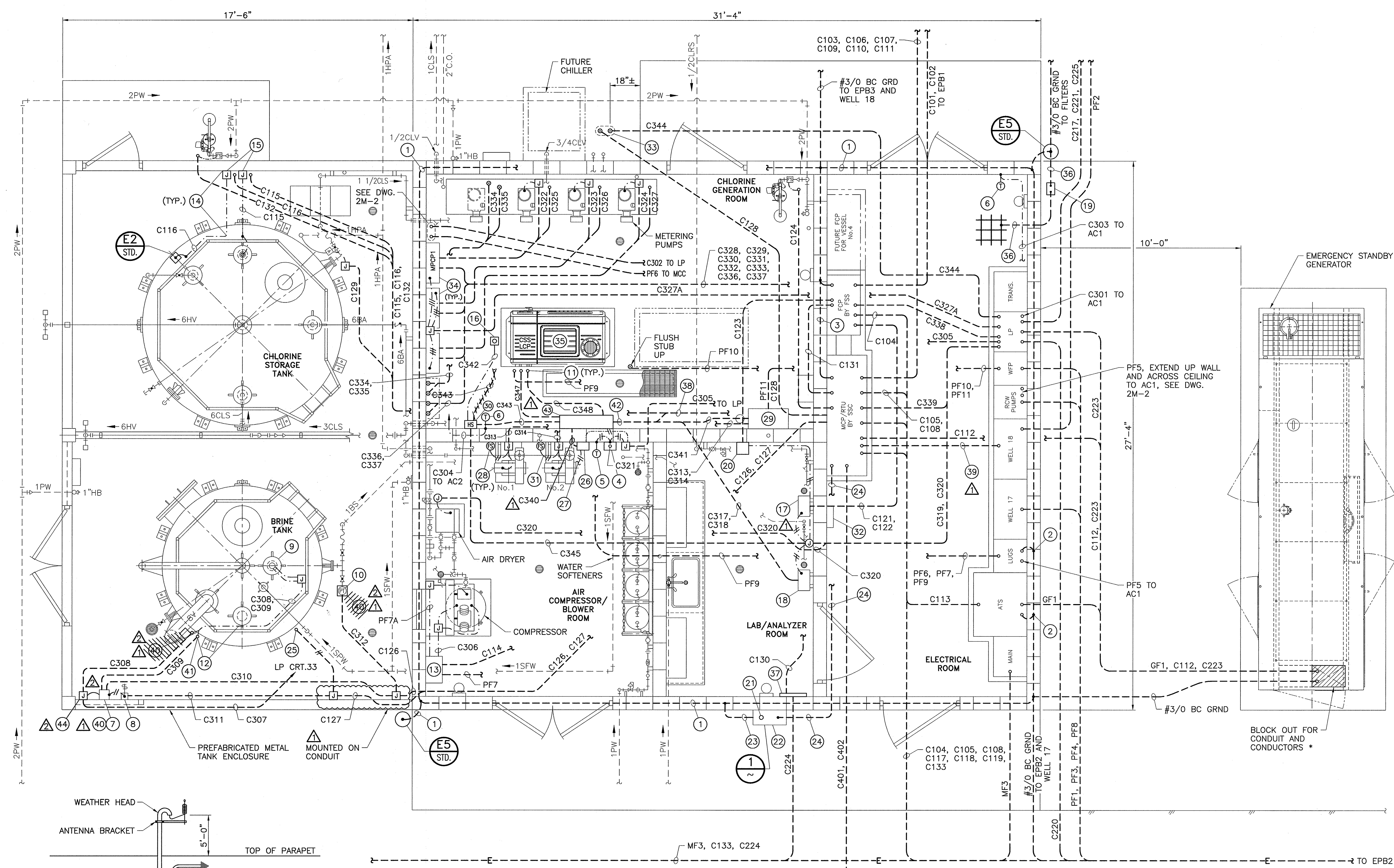
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

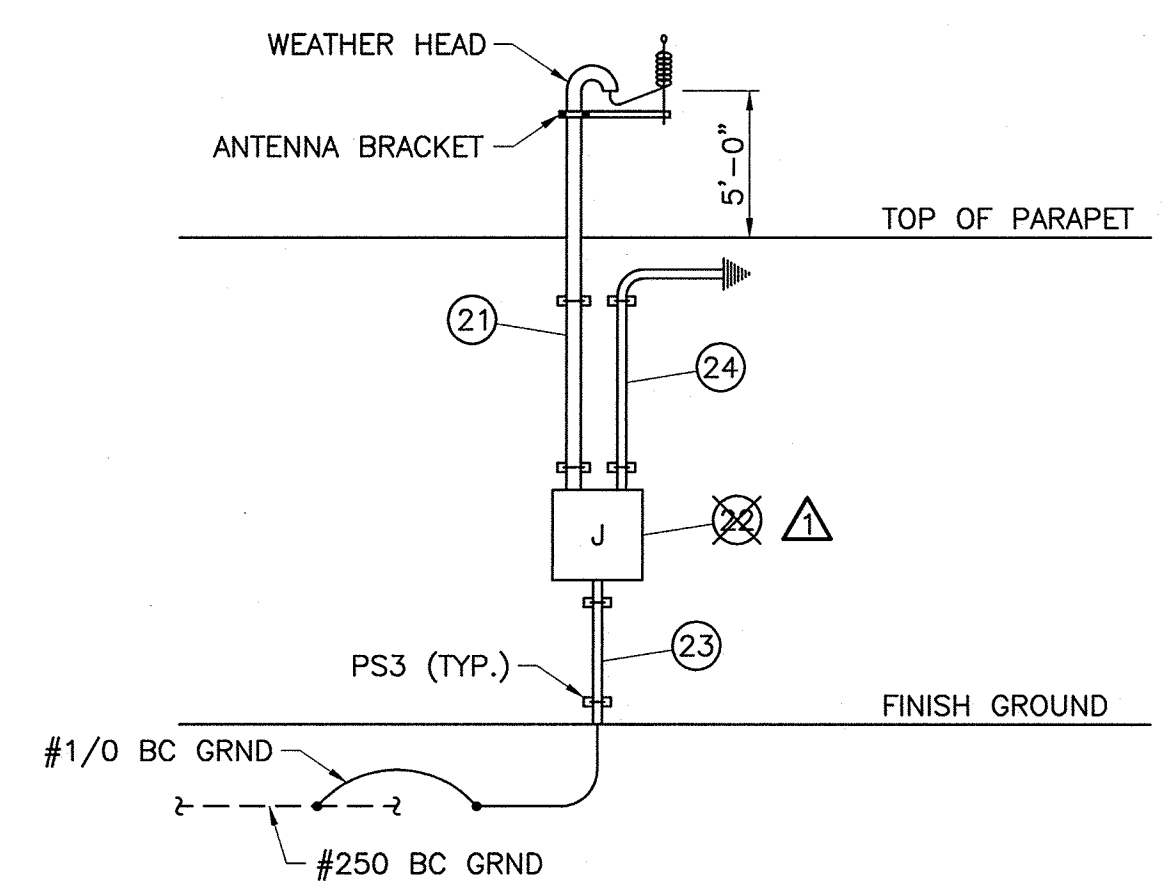
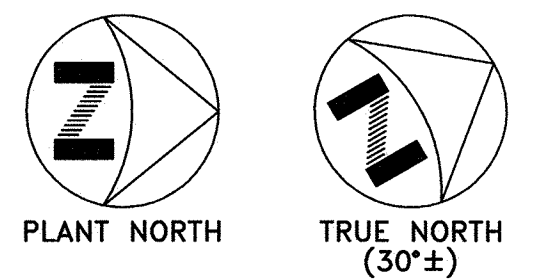
**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**FILTER ELECTRICAL PLAN**

DRAWING  
**1E-1**  
65 OF 69 SHEETS  
11775  
R.C.S.D. PLAN No.

DWG. NO.: 587-19.54... FILE NO.: 587-19.54... UPDATE BY: MRN... PROJ. ENG.: PES... PLOT DATE: 02/14/14... PLOT TIME: 4:48PM... PLOT SCALE: 1=1



**EQUIPMENT BUILDING FLOOR PLAN**  
 SCALE: 3/8"=1'-0"

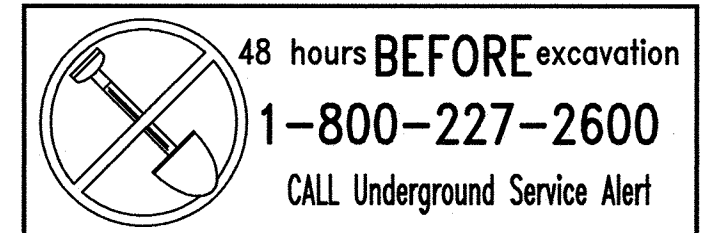


**DETAIL 1**  
 N.T.S.

- Ⓜ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 2E-1:**
- 250 MCM BC GROUND LOOP BELOW BUILDING FOUNDATION WITH 3" COVER 250 MCM BC FROM BOTTOM OF FOOTING. CADWELD CONNECTIONS TO GROUND ROD AND BC GROUNDS.
  - CONNECT 250 MCM BC TO MCC GROUND BUSS AND ATS GROUND.
  - CONNECT #3/0 BC GROUND FROM GROUND LOOP TO FCP AND MCP PANEL.
  - ROOF EXHAUST VENTILATOR CONTROL PANEL WITH HOA SELECTOR SWITCH. NEMA 12 ENCLOSURE, 6"x6"x4" MINIMUM.
  - WALL MOUNTED LINE VOLTAGE COOLING THERMOSTAT FOR EXHAUST FAN.
  - WALL MOUNTED AC UNIT THERMOSTAT.
  - SMARTBOB REMOTE STARTING UNIT.
  - SWITCH TO INTERRUPT MEASUREMENT WHEN FILLING BRINE TANK WITH SALT.
  - SMARTBOB2 REMOTE, MOUNTED ON PVC THREADED 6" REDUCING FLANGE FOR SALT LEVEL.
  - PRESSURE TRANSDUCER WITH INDICATOR FOR BRINE LEVEL.
  - CONNECT TO CSS-LCP PER MANUFACTURERS REQUIREMENTS. (STUB UP CONDUITS BETWEEN TRENCH WALL AND GENERATION UNIT AND ALONG SIDE OF GENERATION UNIT).
  - ATTACH CONDUIT TO PIPE SUPPORT AND HANDRAIL.
  - COMPRESSOR CONTROL PANEL BY FSS. MOUNT ON WALL AND CONNECT PANEL TO COMPRESSOR.
  - SUPPORT CONDUIT AT HANDRAIL AND WALL WITH STANDARD PIPE SUPPORT PS3.
  - JUNCTION BOX MOUNTED ON STEEL WALL GIRTS WITH PS3.
  - CEILING MOUNT HYDROGEN GAS SENSOR BY CSS PER CSS REQUIREMENTS.
  - CHLORINE ANALYZER BY FSS.
  - HARDNESS ANALYZER BY CSS.
  - PROVIDE SOLID STATE DECOUPLER (SSD) MODEL 1.2KA BY DAIRYLAND INDUSTRIES. ATTACH TO BUILDING WALL 12" ABOVE FINISH GRADE WITH 2- 3/8" STAINLESS STEEL ANCHORS.
  - ORP ANALYZER BY FSS. CONNECT ORP PROBE TO ANALYZER.
  - 2" RIGID ALUMINUM CONDUIT WITH WEATHER HEAD AND RADIO ANTENNA CABLE. EXTEND CONDUIT 5' ABOVE TOP OF PARAPET WALL. ATTACH CONDUIT TO MASONRY BLOCK WITH PS3 TYPE SUPPORTS AT TOP AND 6" O.C. MAXIMUM.
  - RADIO LIGHTNING ARRESTOR PANEL, HOFFMAN PANEL, C-5D20208 WITH GP2020 BACK PANEL AND LOCKING HANDLE C-WHPTD. RADIO LIGHTNING ARRESTOR PANEL AND EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY SCADA SUBCONTRACTOR.
  - 1" PVC COATED SCH. 40 STEEL CONDUIT WITH #1 COPPER GROUND TO GROUND LOOP.
  - 1" RIGID ALUMINUM CONDUIT WITH RADIO ANTENNA CABLE FROM MCP TO PANEL.
  - CONNECT TO SOLENOID VALVE FOR ADD WATER TO BRINE TANK.
  - BRINE PUMP CONTROL PANEL WITH HOA SELECTOR SWITCH.
  - BRINE BOOSTER PUMP UNDER BLOWERS, CONNECT TO CONTROL PANEL.
  - BLOWER AND FLOW SWITCH BY CSS. FLOW SWITCH LOCATED IN DISCHARGE PIPE.
  - BLOWER 1 AND 2 LOCAL CONTROL PANEL, WALL MOUNT, MAXIMUM 24" WIDE, NEMA 4X 304 STAINLESS STEEL BY CSS.
  - HYDROGEN GAS SENSOR TRANSMITTER BY CSS, WALL MOUNT.
  - PROVIDE EYS SEAL FITTING IN CONDUIT BETWEEN FLOW SWITCH AND JUNCTION BOX.
  - SECURITY SYSTEM PANEL, SEE DRAWING 2E-2.
  - STUB UP CONDUIT FOR FUTURE CHILLER.
  - METERING PUMP CONTROL PANEL (MPCP), WALL MOUNT, NEMA 4X 24"Hx 24"Wx8"D, 304 STAINLESS STEEL.
  - CHLORINE ONSITE GENERATION UNIT BY CSS.
  - CADWELD #4 INSULATED CONDUCTORS TO BOTTOM REBAR MAT AND GROUND ROD AND CONNECT TO SSD.
  - TELEPHONE BACKBOARD PER AT&T REQUIREMENTS.
  - C115, C116, C120, C125, C129, C132.
  - C134, C135, AND C136.
  - TEMPORARY PLASTIC JUNCTION BOX WITH CONDUCTORS COILED INSIDE.
  - STUB UP AND CAP.
  - C120, C125, C317, C318, AND C341.
  - 6"x6"x36" NEMA 4X TYPE 316 STAINLESS STEEL WIRE TROUGH.
  - SPLICE 120 VOLT POWER CONDUCTORS AND PROVIDE 120 VOLT RECEPTACLE IN J-BOX FOR SMARTBOB REMOTE STAT UNIT DC POWER SUPPLY AND PROVIDE LIQUID-TIGHT FLEX CONDUIT TO SMARTBOB REMOTE START UNIT ENCLOSURE.

**RECORD DRAWING**

BY: *B. C. Vill* DATE: 05/21/13  
 KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	CHLORINE GENERATOR PROJECT	02/13/14	BCV
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
 3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
 APPROVED BY: *Jim C. Reynolds*  
 REGISTERED ENGINEER No. 20463 DATE 2/15/11

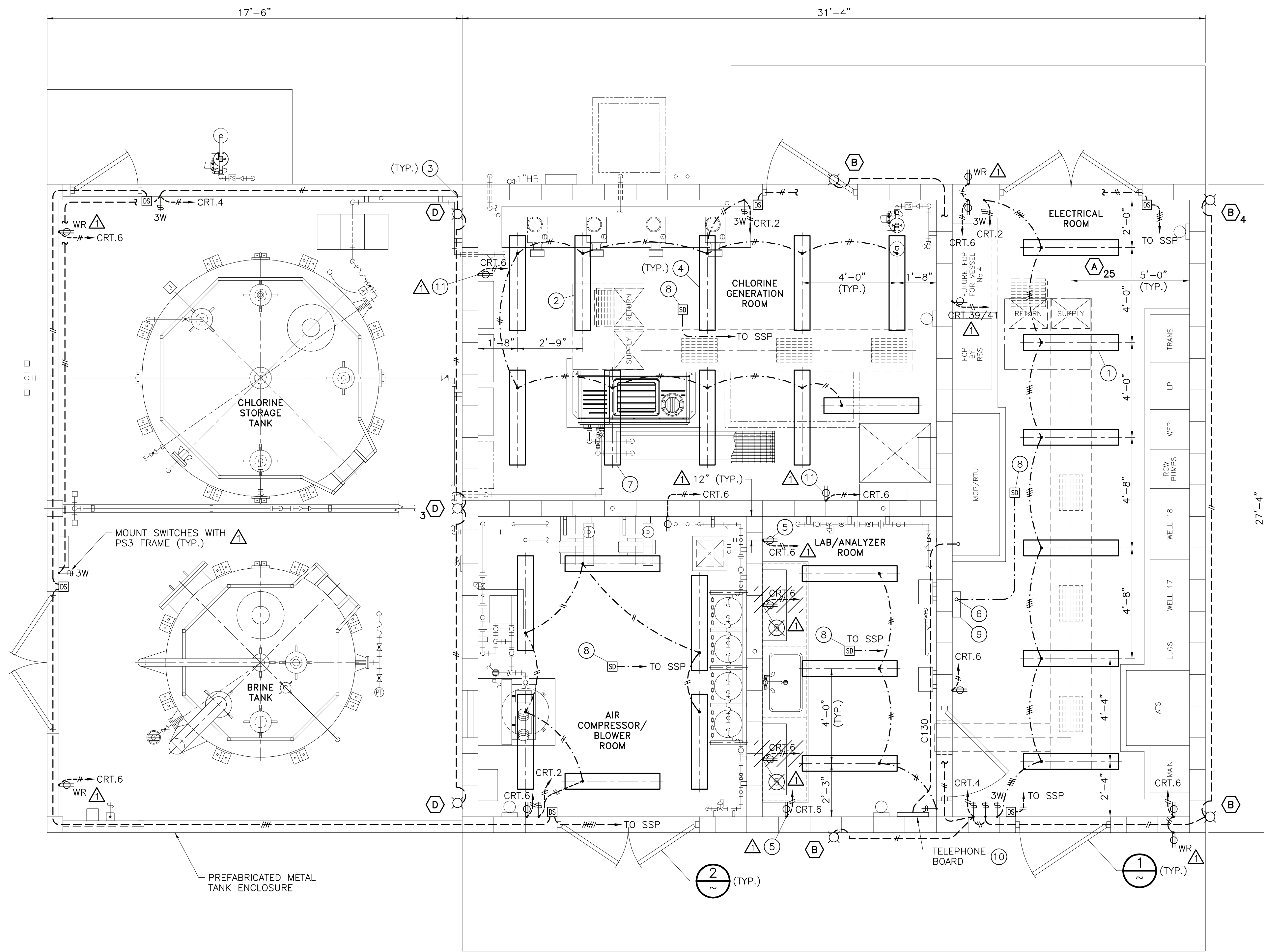
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
 WELLS No.17 AND No.18  
 IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING ELECTRICAL PLAN**

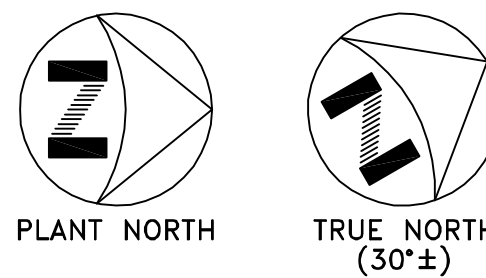
DRAWING  
**2E-1**  
 66 OF 69 SHEETS  
 11776  
 R.C.S.D. PLAN No.



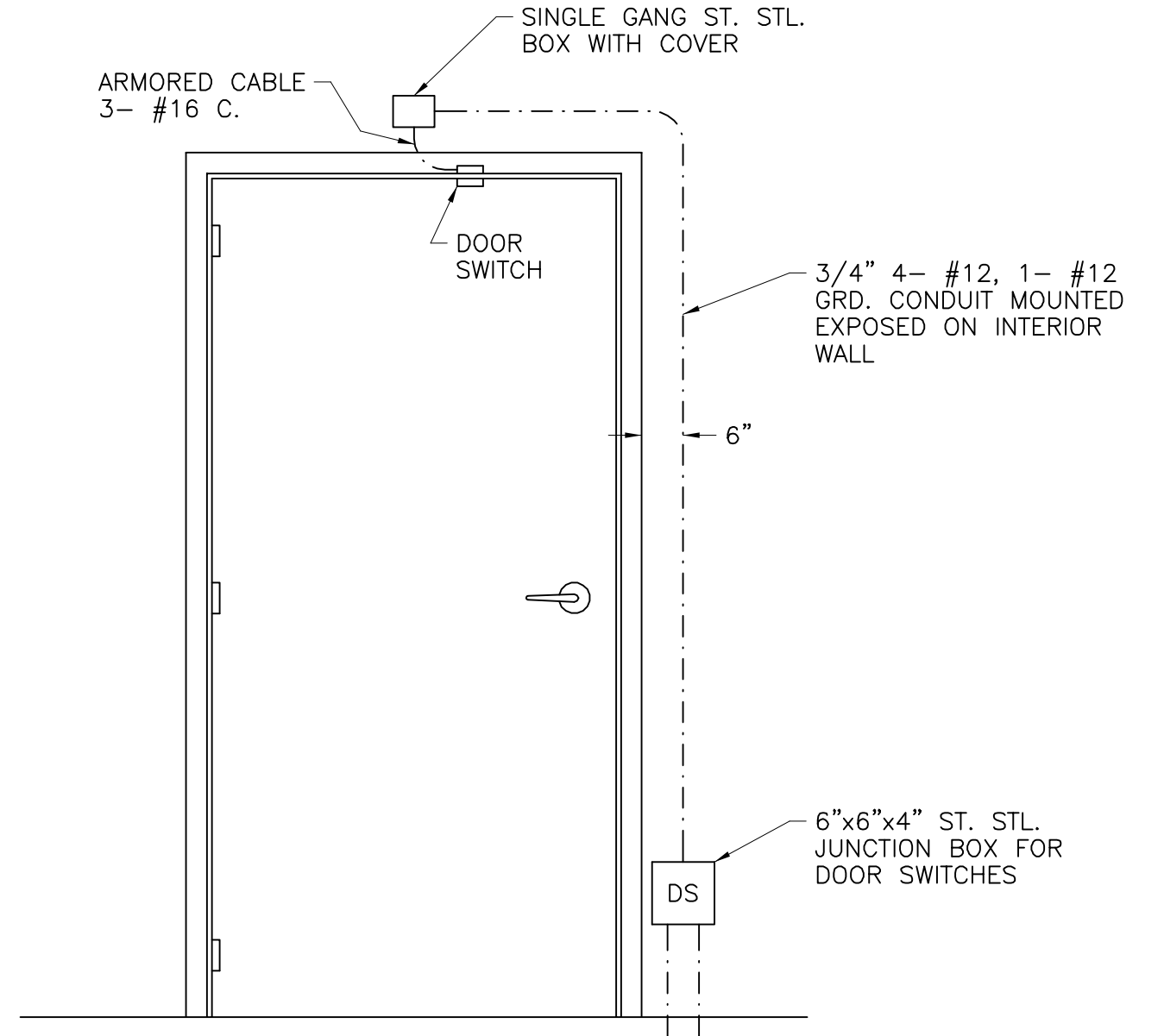
DWG. NO.: RC-90-18-54-702 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 1:49PM PLOT SCALE: 1=1



**EQUIPMENT BUILDING FLOOR PLAN**  
SCALE: 3/8"=1'-0"

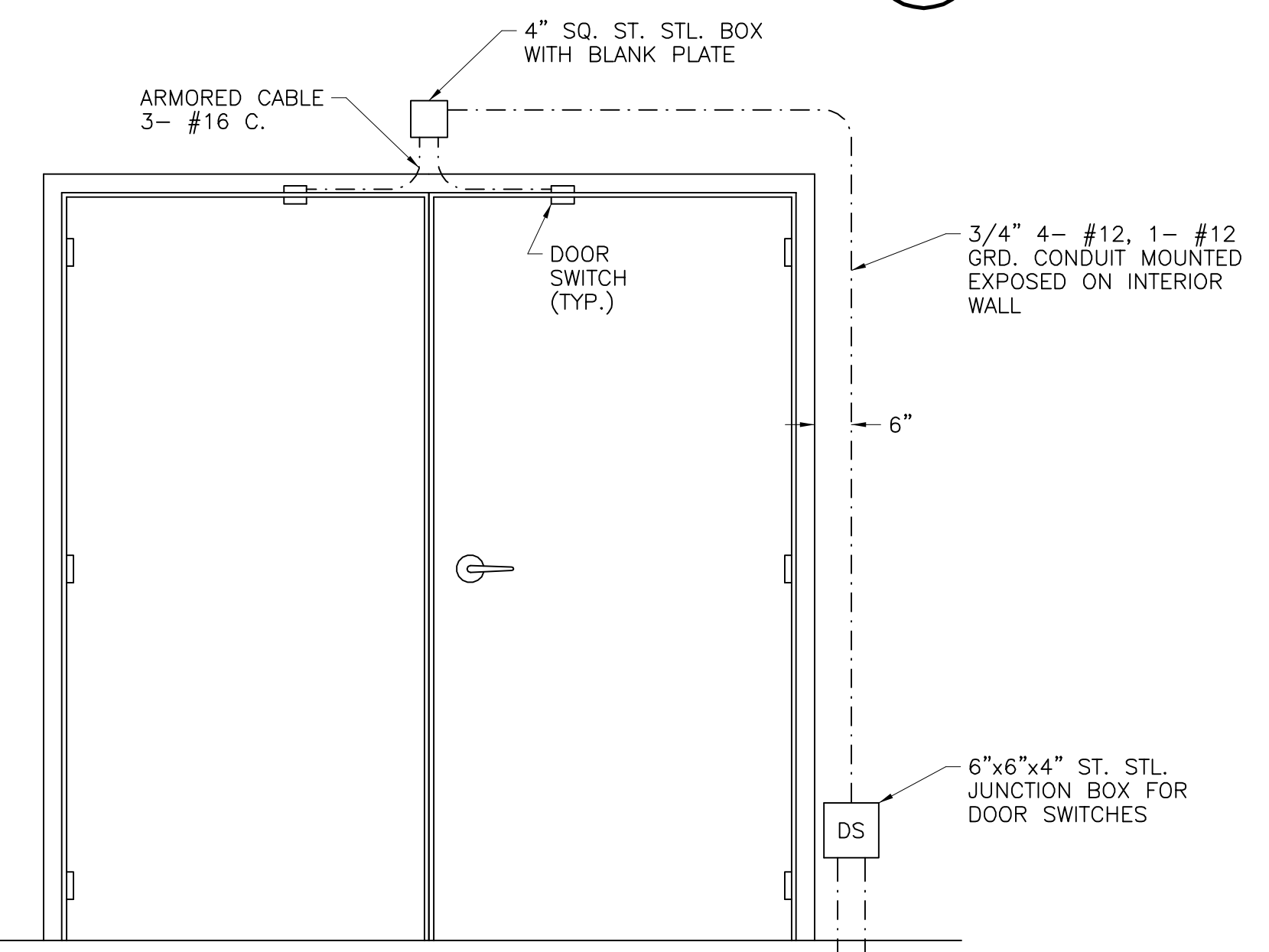


- Ⓜ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 2E-2:**
- MOUNT LIGHT FIXTURES BELOW AIR CONDITIONER DUCTING USING STRUT SUPPORTING DUCT. SEE SECTION F, DRAWING 2M-4.
  - MOUNT LIGHT FIXTURE ADJACENT TO AIR CONDITIONER RETURN DUCT TO PREVENT BLOCKING AIR FLOW INTO DUCT.
  - PROVIDE CAST METAL DEVICE BOX RECESSED INTO WALL WITH FLEX CONDUIT TO LIGHT FIXTURE.
  - MOUNT LIGHT FIXTURES BELOW AIR CONDITIONER DUCTING HEIGHT.
  - MOUNT RECEPTACLES 12"± ABOVE COUNTER TOP.
  - CONNECT LP POWER TO SECURITY SYSTEM PANEL PER MANUFACTURERS REQUIREMENTS.
  - ADJUST LIGHT FIXTURE LOCATION TO AVOID INTERFERENCE WITH CHLORINE GENERATOR PIPING.
  - SMOKE DETECTOR MOUNTED ON 4"x4" SURFACE MOUNT BOX ANCHORED TO CEILING. PROVIDE 3/4" C. WITH CONDUCTORS PER SMOKE DETECTOR MANUFACTURERS RECOMMENDATION TO SSP.
  - NEMA 1 SECURITY SYSTEM PANEL (SSP), (APPROXIMATELY 15"Hx13"Wx4"D). WALL MOUNT 5'-6" ABOVE FINISH FLOOR.
  - MOUNT TELEPHONE BACKBOARD PER AT&T REQUIREMENTS.
  - PROVIDE RECEPTACLE WITH NEMA 3R RAIN TIGHT OCAL COVER.



**SINGLE DOOR SECURITY SYSTEM INTERIOR DETAIL**

N.T.S.



**DOUBLE DOOR SECURITY SYSTEM INTERIOR DETAIL**

N.T.S.

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
**1-800-227-2600**  
CALL Underground Service Alert

SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



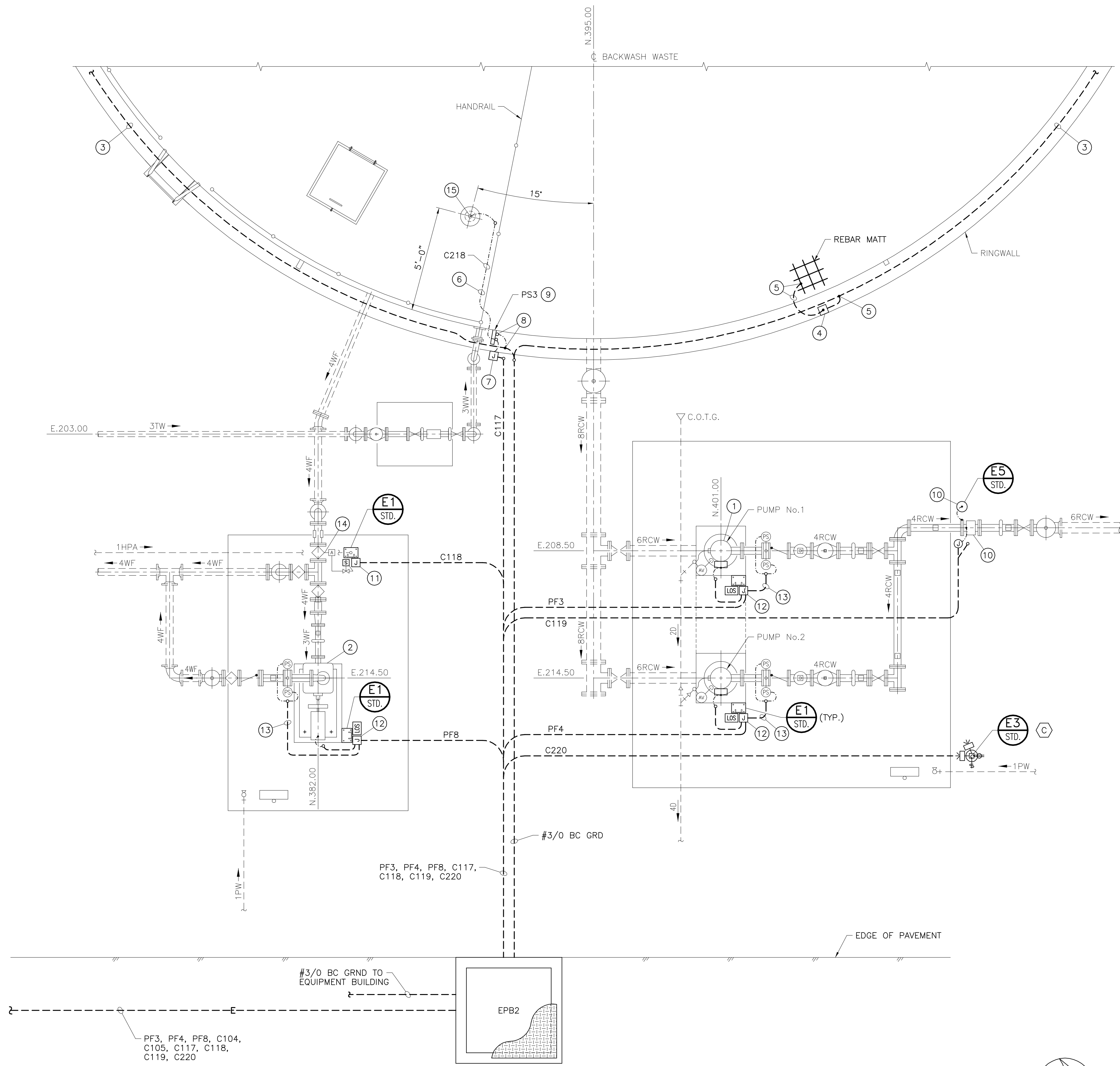
**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	JGS
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EQUIPMENT BUILDING LIGHTING PLAN**

DRAWING  
**2E-2**  
67 OF 69 SHEETS  
11777  
R.C.S.D. PLAN No.

DWG. NO.: RE-90-18-34-31 FILE NO.: 587-19.54 UPDATE BY: TMW PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 1:50PM PLOT SCALE: 1=1



**PLAN**  
SCALE: 3/8"=1'-0"

- ⑦ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 3E-1:**
1. RECYCLED WATER (RCW) PUMP, VERTICAL TURBINE PUMPING UNIT (2 TOTAL).
  2. WASTE FILTRATE (WF) PUMP, SELF PRIMING PUMPING UNIT.
  3. 3/0 BC GROUND CONDUCTOR UNDER TANK CONCRETE RINGWALL FOR GROUND LOOP SYSTEM. PROVIDE 3" COVER OVER GROUND CONDUCTOR BELOW BOTTOM OF FOOTING.
  4. PROVIDE SOLID STATE DECOUPLER (SSD) MODEL 1.2 KA BY DAIRYLAND ELECTRICAL INDUSTRIES. ATTACH TO 3" HDG PIPE, 48" LONG WITH 24" ABOVE GRADE, CAP END OF PIPE.
  5. CADWELD #4 INSULATED CONDUCTOR TO TANK FOUNDATION REBAR AND CONNECT TO SSD. CONNECT INSULATED CONDUCTOR FROM SSD TO GROUND LOOP SYSTEM.
  6. SUPPORT CONDUIT FOR SONIC LEVEL TRANSDUCER FOR BWW TANK ON HANDRAIL.
  7. PROVIDE NEMA 4X STAINLESS STEEL JUNCTION BOX AT RINGWALL. MOUNT WITH PS3 SUPPORT.
  8. CONNECT (CADWELD) #4 B.C. GROUND TO #3/0 B.C. AND INSTALL IN 3/4" CONDUIT. EXTEND TO TANK ROOF AND CLAMP #4 B.C. TO HANDRAIL.
  9. INSTALL PS3 STRUT SUPPORTS ON TANK WALL USING TANK BOLTS AT 8' MAX. O.C.. ATTACH CONDUITS FOR GROUND AND ULTRASONIC CABLE TO STRUT SUPPORT.
  10. 4" MAGNETIC FLOW METER WITH FLANGED ENDS. PROVIDE GROUND WELL, CONNECT GROUND WELL ROD TO METER GROUNDING RING #10 CONDUCTOR.
  11. MOUNT SOLENOID VALVE PANEL AND JUNCTION BOX ON STANCHION.
  12. MOUNT JUNCTION BOX AND LOS ON STANCHION.
  13. 3/4" C, 4- #12, 1-#12 GROUND TO HIGH/LOW PRESSURE SWITCHES.
  14. WASTE FILTRATE AUTOMATIC VALVE.
  15. MOUNT ULTRASONIC LEVEL TRANSDUCER ON REDUCING FLANGE AT TANK OPENING.

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED

48 hours BEFORE excavation  
1-800-227-2600  
CALL Underground Service Alert

SYMBOL	REVISIONS	DATE	BY
▲	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

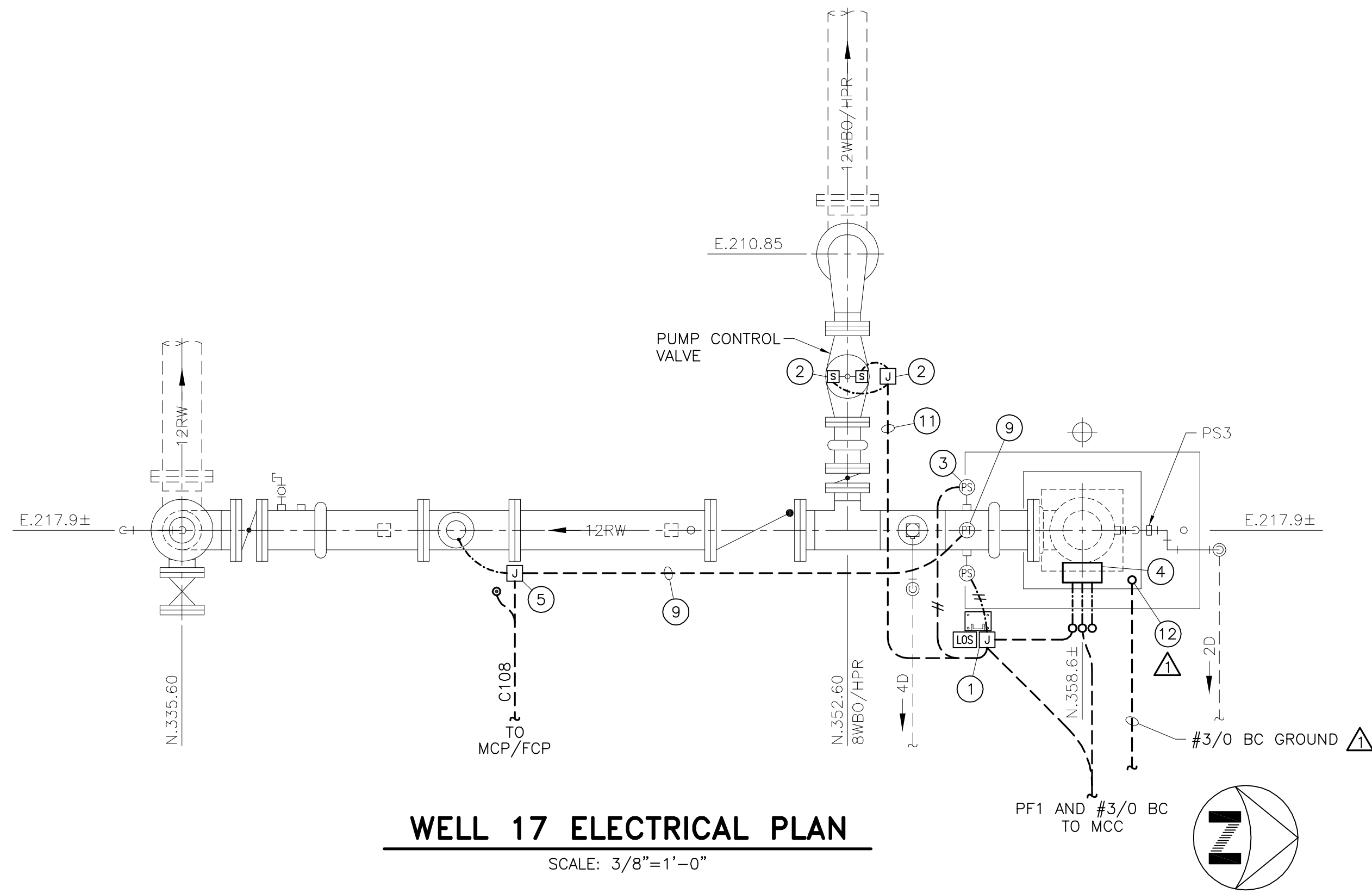
SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	TMW
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**RCW/WF PUMP STATION**  
**ELECTRICAL PLAN**

DRAWING  
**3E-1**  
68 OF 69 SHEETS  
11778  
R.C.S.D. PLAN No.



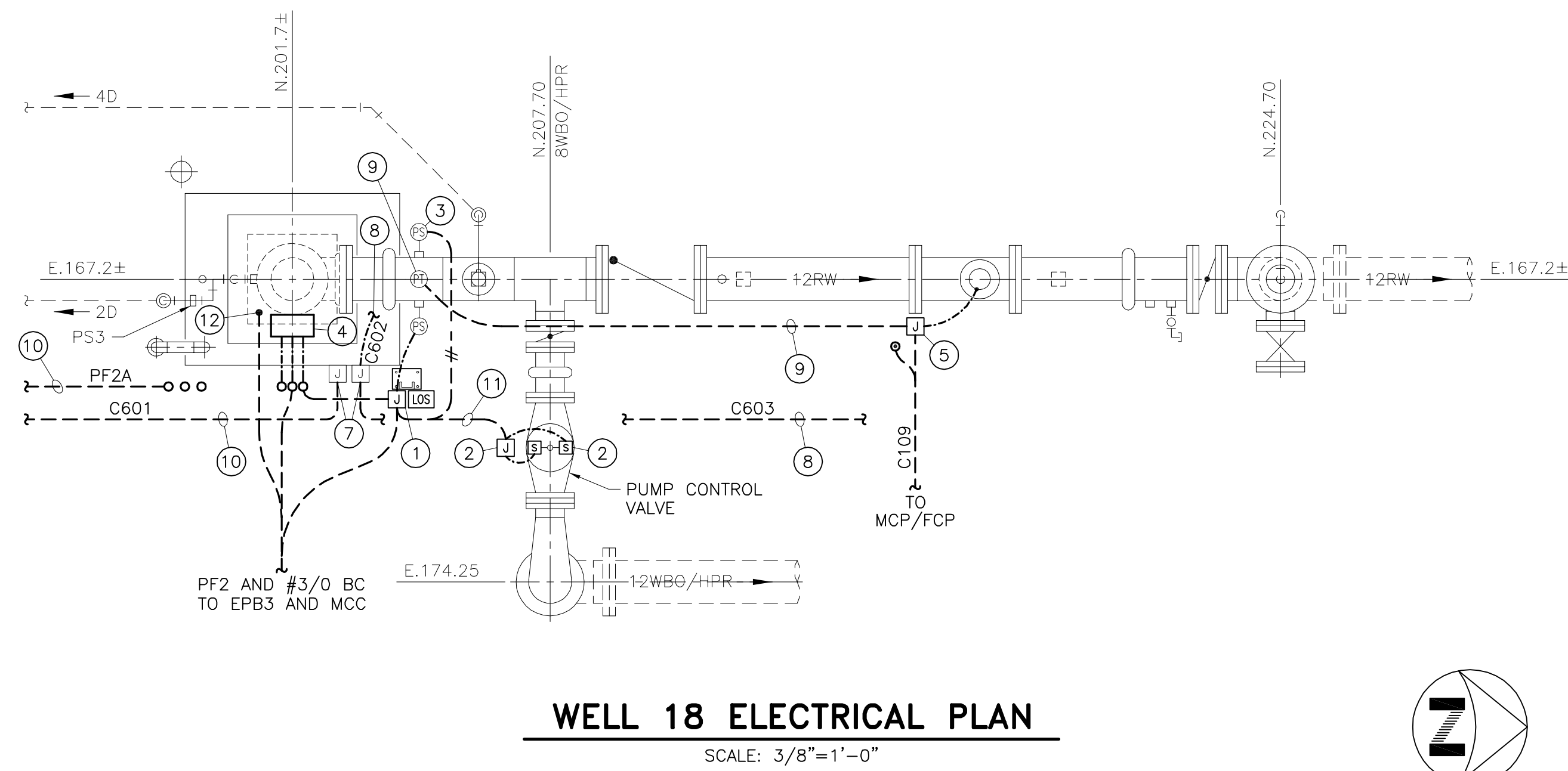
DWG. NO.: RE-90-18-54-41 FILE NO.: 587-19.54 UPDATE BY: TMM PROJ. ENG.: PES PLOT DATE: 05/21/13 PLOT TIME: 1:52PM PLOT SCALE: 1=1



**WELL 17 ELECTRICAL PLAN**  
SCALE: 3/8"=1'-0"

**⑦ MATERIAL, EQUIPMENT, AND WORK DESCRIPTIONS FOR DRAWING 4E-1:**

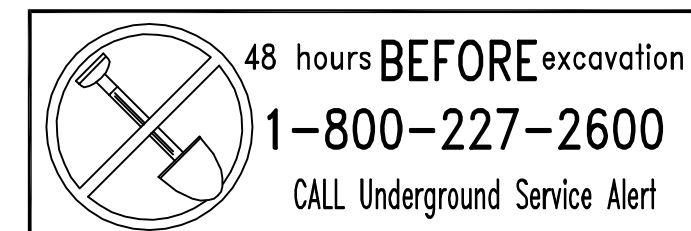
1. MOUNT LOS AND JUNCTION BOX ON STANCHION PER STANDARD DRAWING E1.
2. CONNECT TO 2- LIMIT SWITCHES AND 1- SOLENOID VALVE AT PUMP CONTROL VALVE. PROVIDE PS3 SUPPORT WITH CONCRETE PEDESTAL.
3. CONNECT FROM JUNCTION BOX TO PRESSURE SWITCHES.
4. EXISTING WELL MOTOR JUNCTION BOX. MODIFY AND PROVIDE CONNECTION FOR 2- 4" CONDUITS AND 1" CONDUIT FOR MOTOR CONTROLS (THERMAL AND SPACE HEATERS). ROTATE MOTOR ON WELL 17 FOR JUNCTION BOX LOCATION.
5. PROVIDE JUNCTION BOX AND PS3 SUPPORTS WITH CONCRETE PEDESTALS. CONNECT TO FLOW METER TRANSMITTER AND PRESSURE TRANSMITTER.
6. PF2A POWER AND CONTROL FROM EXISTING RELOCATED SERVICE SECTION AND MCC FOR TEMPORARY OPERATION OF EXISTING WELL 18 DURING PROJECT CONSTRUCTION. REMOVE CONDUCTORS AND CAP CONDUIT WHEN PERMANENT CONNECTION IS MADE VIA PF2 TO EXISTING WELL 18.
7. EXISTING JUNCTION BOXES TO BE USED FOR TEMPORARY OPERATION. REMOVE UPON FINAL CONNECTION TO EXISTING WELL 18.
8. CONNECT C602 AND C603 FROM EXISTING JUNCTION BOX TO EXISTING FLOW METER AND EXISTING PRESSURE TRANSMITTER. REMOVE CONDUCTORS AND CAP CONDUITS ABOVE GRADE WHEN PERMANENT CONNECTIONS ARE PERFORMED.
9. CONNECT TO PRESSURE TRANSMITTER WITH 3/4" WITH 3C #16 SHIELDED BELDON CABLE.
10. REFER TO SPECIFICATIONS APPENDIX D FOR CONTROL AND SIGNAL CONDUCTORS FOR WELL 18 TEMPORARY OPERATION. CONNECT C601 TO EXISTING JUNCTION BOX FOR FLOW AND PRESSURE SIGNALS.
11. 3/4" C., 6- #12, 1- #12 GROUND.
12. CONNECT TO GROUND LUG ON PUMP BASE.



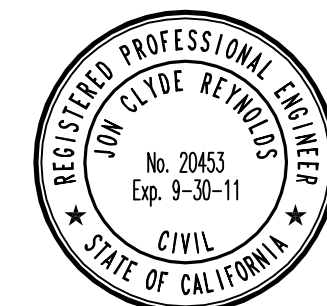
**WELL 18 ELECTRICAL PLAN**  
SCALE: 3/8"=1'-0"

**RECORD DRAWING**

BY: *Bob C. V...* DATE: 05/21/13  
KRIEGER & STEWART, INCORPORATED



SYM	REVISIONS	DATE	BY
Δ	RECORD DRAWING	05/21/13	BCV



**KRIEGER & STEWART** INCORPORATED  
3602 University Ave. • Riverside, CA. 92501 • 951-684-6900  
APPROVED BY: *Jon C. Reynolds*  
REGISTERED ENGINEER No. 28453 DATE 2/15/11

SCALE	AS NOTED
FLD. BK.	NA
DESIGN	JCR
DRAWN	TMM
CHECKED	PES

**RUBIDOUX COMMUNITY SERVICES DISTRICT**  
WELLS No.17 AND No.18  
IRON AND MANGANESE REMOVAL FACILITY  
**EXISTING WELLS 17 AND 18  
ELECTRICAL PLANS**

DRAWING  
**4E-1**  
69 OF 69 SHEETS  
11779  
R.C.S.D. PLAN No.

**APPENDIX D**

**RECORD DRAWINGS FOR  
PFAS TREATMENT PROJECT AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)  
PREPARED BY HAZEN & SAWYER  
DATED OCTOBER 10, 2020**

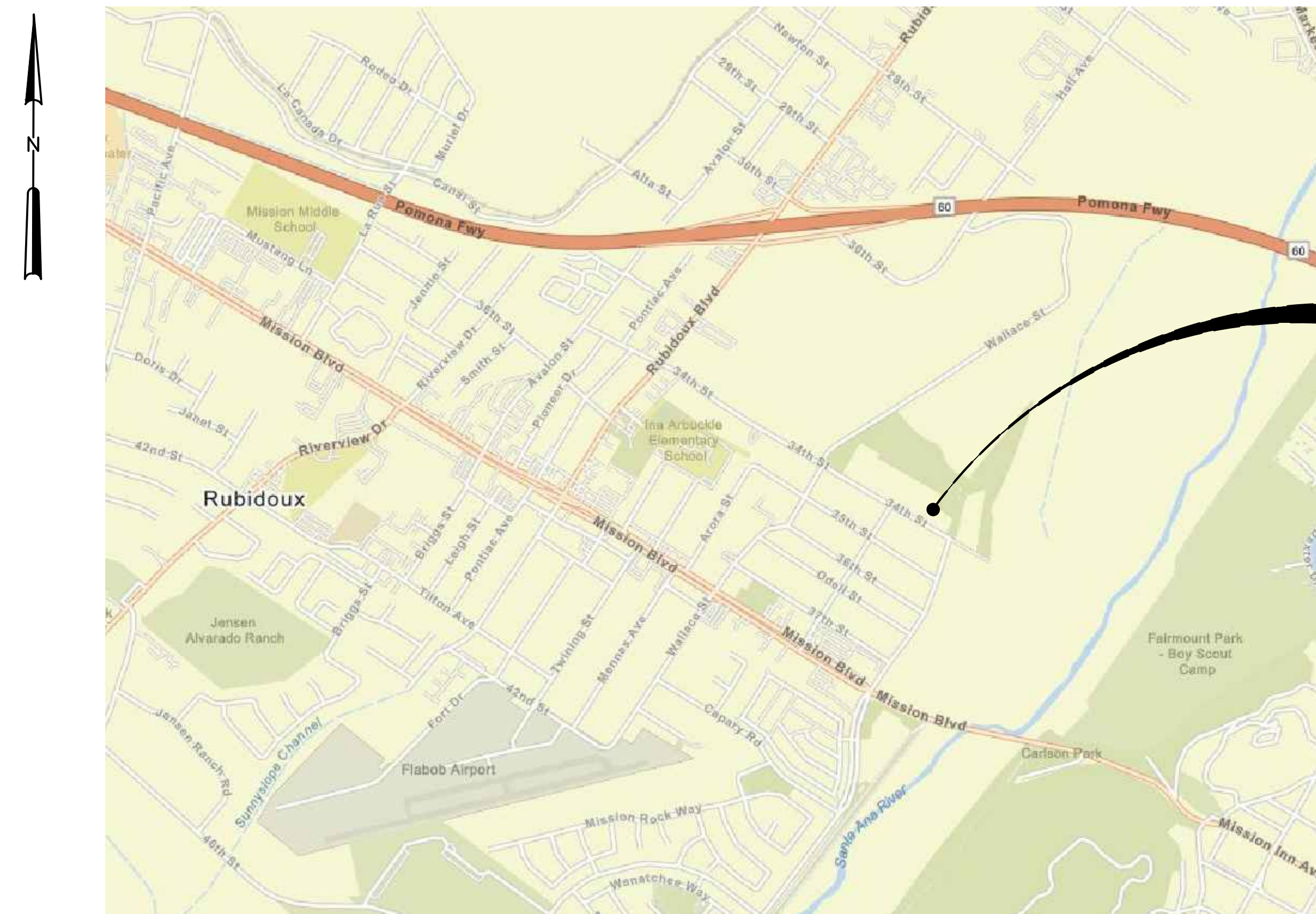


# RUBIDOUX COMMUNITY SERVICES DISTRICT JURUPA VALLEY, CA



## PFAS TREATMENT PROJECT AT MN PLANT #2 (LELAND THOMPSON WATER TREATMENT FACILITY)

HAZEN PROJECT NO. 20168-000  
OCTOBER 2020



PROJECT  
LOCATION  
5245 34TH STREET,  
JURUPA VALLEY, CA

LOCATION MAP  
NOT TO SCALE

### Hazen

HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

THIS DRAWING WAS  
ORIGINALLY APPROVED  
FOR CONSTRUCTION,  
SEALED, AND SIGNED ON  
10-23-2020 BY TORI  
YOKOYAMA, A LICENSED  
ENGINEER IN THE STATE  
OF CALIFORNIA, NO C71482



SHEET INDEX

SHEET NO.	DRAWING NO.	TITLE
<b>GENERAL</b>		
1	G-01	COVER SHEET
2	G-02	SHEET INDEX, LEGEND, ABBREVIATION
3	G-03	PROCESS FLOW DIAGRAM
4	G-04	HYDRAULIC PROFILE
<b>CIVIL</b>		
5	C-01	EXISTING CONDITIONS AND DEMOLITION PLAN
6	C-02	SITE LAYOUT PLAN
7	C-03	YARD PIPING PLAN
8	CD-01	DETAILS
<b>MECHANICAL</b>		
9	M-01	IX TREATMENT AREA ISOMETRIC
10	M-02	IX TREATMENT AREA PLAN
11	M-03	IX TREATMENT AREA ELEVATION AND SECTION
12	M-04	IX TREATMENT SECTIONS
13	M-05	CHEMICAL AND ANALYZER BUILDING PLAN AND SECTIONS
14	MD-01	STANDARD DETAILS 1
15	MD-02	STANDARD DETAILS 2
16	MD-03	STANDARD DETAILS 3
<b>STRUCTURAL</b>		
17	S-01	GENERAL NOTES
18	S-02	SPECIAL INSPECTION NOTES
19	S-03	PLAN AND SECTIONS
20	SD-01	DETAILS
21	SD-02	STANDARD DETAILS
<b>ELECTRICAL</b>		
22	E-01	LEGEND AND SYMBOLS
23	E-02	GENERAL NOTES AND ABBREVIATIONS
24	E-03	SITE PLAN
25	E-04	TREATMENT AREA PLAN
26	E-05	CHEMICAL AND ANALYZER BUILDING PLAN
27	E-06	CONTROL ONE LINE DIAGRAMS
28	E-07	CONDUIT AND WIRE SCHEDULE
29	ED-01	STANDARD DETAILS
<b>INSTRUMENTATION</b>		
30	I-01	SYMBOLS AND LEGEND
31	I-02	NETWORK ARCHITECTURE
32	I-03	PLANT OVERVIEW AND ION EXCHANGE P&ID
33	I-04	SODIUM HYPOCHLORITE DOSING SYSTEM
34	I-05	SODIUM BISULFITE DOSING SYSTEM
35	ID-01	STANDARD DETAILS 1
36	ID-02	STANDARD DETAILS 2

**BENCHMARK:**

FD, R.R. SPIKE, DN. 0.1' AT C/L INTERSECTION OF 34TH STREET AND DALY AVE. TGT NO. 2' PER R.C.S.D. 34TH ST. PPLN DWG. W-96-003 (REF. K&S W.O. 587-19.31) ELEV = 782.21 (NAVD 29)

**BASIS OF BEARINGS:**

BASIS OF BEARINGS IS THE CENTERLINE OF 34TH STREET BEING N.59°58'00"W. PER PARCEL MAP 10879 (PM 56/13)

BOUNDARY SHOWN HEREON WAS COMPILED FROM RECORD DATA PER PM 56/13 AND DEED RECORDED AS DOC# 260731 DATED 6/14/1999. RIV. CO.

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. QUIROZ
DRAWN BY:	R. SHNAYDERMAN
CHECKED BY:	I. MACKENZIE
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

ABBREVIATIONS

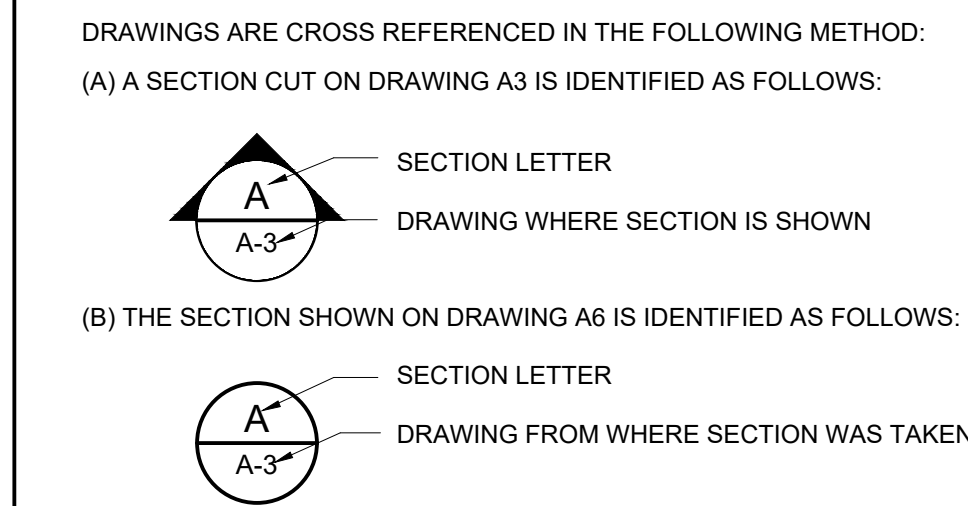
GENERAL	INSIDE FACE	SPECIFICATION
A/C AIR CONDITIONER	IF INCH	SQ SQUARE
AB ANCHOR BOLT	INCL INCLUDED	SSP SUBMERSIBLE SUMP PUMP
AD AREA DRAIN	INF INFLUENT	SST STAINLESS STEEL
ADH ADHESIVE	INSUL INSULATION	STA STATION OR STACK
ADJ ADJUSTABLE	IX ION EXCHANGE	STG STORAGE OR STOP GATE (LOG)
AFF AFF	INT INTERIOR	STR STIRRUP
AGGR AGGREGATE	INV INVERT	STL STEEL
ALT ALTERNATE	JCT JUNCTION	STRU STRUCTURAL
APPROX APPROXIMATE	JT JOINT	SUB SUBSTITUTE
AR AIR RECEIVER	L LENGTH/ANGLE	SUCT SUCTION
ARCH ARCHITECTURAL	LG LONG	
ASPH ASPHALT	LI LEVEL INDICATOR	
	LOD LIMIT OF DISTURBANCE	SUPT SUPERINTENDENT
B BORING	LPT LOW POINT	SUR SURFACE
B BASELINE	LWL LOW WATER LEVEL	SUSP SUSPENDED
BL BUILDING LINE		SWD SIDE WATER RESOURCES
BLDG BUILDING		STATE WATER RESOURCES CONTROL BOARD
BLK BLOCK	MAINT MAINTENANCE	SWPPP STORMWATER POLLUTION PREVENTION PLAN
BM BENCH MARK	MANUF MANUFACTURER	SYM SYMMETRICAL
BOC BACK OF CURB	MECH MECHANICAL	
BOM BOTTOM OF MASONRY	MET METAL	
BOT BOTTOM	MFR MANUFACTURER	
BRG BEARING	MG MILLION GALLONS	T&B TOP AND BOTTOM
BRI BRINE	MGD MILLION GALLONS PER DAY	T&G TONGUE AND GROOVE
BRK BRICK	MH MANHOLE	TBM TEMPORARY BENCH MARK
BT BOLT	MIN MINIMUM	TC TOP OF CURB
BW BACKWASH WASTE	MISC MISCELLANEOUS	TOC TOP OF CONCRETE
BWW BACKWASH WASTE		TOD TOP OF DECK
		TOP OF FOOTING
CASQA CALIFORNIA STORMWATER QUALITY ASSOCIATION	N NORTH	TOP OF MASONRY/MANHOLE
CE CONSTRUCTION EASEMENT	NA NOT APPLICABLE	TOS TOP OF SLAB/ TOP OF STEEL
CF CUBIC FEET/CARTRIDGE FILTER	NAD '83 NORTH AMERICAN DATUM OF 1983	TOW TOP OF WALL
CFM CUBIC FEET PER MINUTE	NAVD '88 NORTH AMERICAN VERTICAL DATUM OF 1988	TYP TYPICAL
CL CENTERLINE	NCPI NATIONAL CLAY PIPE INSTITUTE NUMBER	U/S UPSTREAM
CLR CLEAR/CHLORINE	NO NORMALLY OPEN	UTIL UTILITY
CMU CONCRETE MASONRY UNIT	NOI NOTICE OF INTENT	
CO CLEANOUT	NOM NOMINAL	W WEST OR WIDTH
COL COLUMN	NTS NOT TO SCALE	W/ WITH
CONC CONCRETE		WBO WELL BLOW OFF
CONST CONSTRUCTION	OC ON CENTER	WL WATER LEVEL
CONT CONTINUOUS, CONTINUATION	OD OUTSIDE DIAMETER OR OVERHEAD DOOR	
CONTR CONTRACTOR	OF OUTSIDE FACE	
CONTROL CONTROL POWER	OHE OVERHEAD ELECTRICAL	
TRANSFORMER TRANSFORMER	OPNG OPENING	
CTJ CONTROL JOINT	OPP OPPOSITE	
CY CUBIC YARD	ORF OIL REMOVAL FILTER	
	ORIG ORIGINAL	
DDW DIVISION OF DRINKING WATER DETAIL		
DET DETAIL		
DIA OR Ø DIA OR Ø		
DIAG DIAGONAL	P&ID PROCESS AND INSTRUMENTATION DIAGRAM	
DIM DIMENSION	PAC PACKAGED AIR CONDITIONING UNIT	
DISC DISCONNECT	PAR PARALLEL	
DISCH DISCHARGE	PC POINT OF CURVE OR PIECE OR PERSONAL COMPUTER	
DN DOWN	PCC POINT OF COMPOUND CURVE	
DOZ DOZEN	PCF POUNDS PER CUBIC FOOT	
DP DISTRIBUTION PANEL	PERF PERFORATED	
DS DISCONNECT SWITCH	PERP PERPENDICULAR	
D/S DOWNSTREAM	PF PROPELLER FAN	
DT DAY TANK	PI POINT OF INTERSECTION	
DWG(S) DRAWING(S)	PL PROPERTY LINE OR PLATE	
DWL DOWEL	PLC PROGRAMMABLE LOGIC CONTROLLER	
	PLMB PLUMBING	
EA EACH	PNL PANEL	
ECC ECCENTRIC	PP POWER PANEL OR POWER POLE	
EOP EROSION CONTROL PLAN	PREFAB PREFABRICATED	
EEW EMERGENCY EYE WASH	PROP PROPOSED	
EACH EACH FACE OR EXHAUST FAN	PRVN POWER ROOF VENTILATOR	
EFF EFFLUENT	PSF POUNDS PER SQUARE FOOT	
EL ELEVATION	PFAS PER AND POLYFLUOROALKYL SUBSTANCES	
ELEC ELECTRICAL	PSI POUNDS PER SQUARE INCH	
EKG EDGE OF GRAVEL	PSU POWER SUPPLY UNIT	
EOP EDGE OF PAVEMENT	PVMT PAVEMENT	
EPX EPOXY		
EQ EQUAL	QTY QUANTITY	
EQPT EQUIPMENT	QSD QUALIFIED SWPPP DEVELOPER	
ES/EEW EMERGENCY SHOWER AND EYEWASH	QSP QUALIFIED SWPPP PRACTITIONER	
EWS EYE WASH STATION		
EXIST EXISTING		
EXP EXPANSION		
EXT EXTERIOR		
FCO FLOOR CLEANOUT	RAD RADIUS	
FCU FAN COIL UNIT	RCSD RUBIDOUX COMMUNITY SERVICES DISTRICT	
FD FLOOR DRAIN	RECIR RECIRCULATION	
FDN FOUNDATION	RECT RECTANGULAR	
FEF FUME EXHAUST FAN	REF REFERENCE	
FH FIRE HYDRANT	REG REGISTER	
FIG FIGURE	REINF REINFORCING	
FIN FINISH	REQD REQUIRED	
FIX FIXTURE	REST RESTRAINED	
FLO FLOOR	RINSE RINSE	
FLEXC FLEXIBLE CONNECTION	RJ RESTRAINED JOINT	
FS FINISHED SURFACE	ROW OR ROW RIGHT OF WAY	
G GATE	S SOUTH OR SLOPE	
GA GAUGE	SAWPA SANTA ANA WATERSHED PROJECT AUTHORITY	
GAC GRANULAR ACTIVATED CARBON	SB SOIL BORING	
GAC INF GAC INFLUENT	SBF SODIUM BISULFITE FACILITY	
GAC EFF GAC EFFLUENT	SBL SURVEY BASELINE	
GAL GALLON	SBMP SODIUM BISULFITE METERING PUMP	
GALV GALVANIZED		
GC GENERAL CONTRACTOR	SCE SOUTHERN CALIFORNIA EDISON	
GEN GENERATOR	SCH SCHEDULE	
GPH GALLONS PER HOUR	SLICE SLICE GATE	
GPM GALLONS PER MINUTE	SLC SELECTIVE CATALYTIC REDUCTION	
GR GRADE	SLIDE SLIDE GATE	
GRTG GRATING	SECT SECTION	
	SERV SERVICE	
HCL HYDROCHLORIC ACID	SF SQUARE FEET	
HORIZ HORIZONTAL	SWG SWITCH GEAR	
HP HORSEPOWER OR HEAT PUMP	SH SODIUM HYDROXIDE SHEET(S)	
HPA HIGH PRESSURE AIR	SHT(S) SHEET(S)	
HPT HIGH POINT	SI SQUARE INCH	
HW HEADWALL	SIL SILENCER	
HWL HIGH WATER LEVEL	SIM SIMILAR	
HWP HEATING WATER PUMP	SMH STORM MANHOLE	
HWW HIGHWAY	SP SUMP PUMP	
HYD HYDRAULIC		
I&C INSTRUMENTATION AND CONTROLS		
ID INSIDE DIAMETER		

VALVES, FITTINGS, ETC.

SYMBOLS		LEGEND	
	BALL VALVE		FLEXIBLE HOSE
	BALL CHECK VALVE		SINGLE LINE DRAWINGS
	BUTTERFLY VALVE		DOUBLE LINE DRAWINGS
	CHECK VALVE		MECHANICAL COUPLING
	CONTROL VALVE		WELDED JOINT
	DIAPHRAGM VALVE		FLANGED JOINT
	FLUSHING CONNECTION		MECHANICAL PUSH-ON OR RESTRAINED JOINT
	GATE VALVE		HARNESSED FLANGED ADAPTER
	GLOBE VALVE		SLEEVE TYPE COUPLING
	MOTOR OPERATED VALVE		HARNESSED SLEEVE TYPE COUPLING
	PINCH VALVE		DISMANTLING JOINT
	PLUG VALVE		EXPANSION JOINT
	PRESSURE REDUCING VALVE		FIRE EXTINGUISHER
	PRESSURE RELIEF VALVE		ES/EEW
	PRESSURE RELIEF/VACUUM BREAKER VALVE		PARTITION TYPE
	QUICK CONNECT COUPLING		DOOR SCHEDULE
	SOLENOID VALVE		LOUVER TYPE
	STRAINER		LIGHT POLE
	UNION		WATER VALVE
	HOSE BIBB		POWER POLE
	REDUCER		STAND PIPE
	WALL PENETRATION		MAILBOX

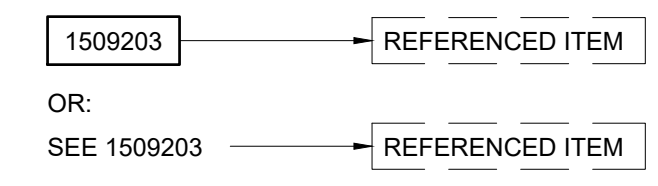
MATERIALS	
	GRADE OR EARTH
	ASPHALT PAVING
	CAST IRON
	STEEL
	INSULATION
	WATER SURFACE
	GRATING
	CHECKERED PLATE
	GLASS
	WOOD BLOCKING
	CONCRETE FILL OR GROUT
	CONCRETE MASONRY UNIT
	BRICK
	GRAVEL

SECTION AND DETAIL KEYING

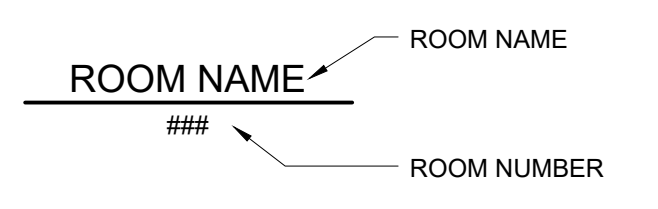


DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT DETAILS ARE IDENTIFIED BY A SQUARE WITH A NUMBER IN THE UPPER HALF.

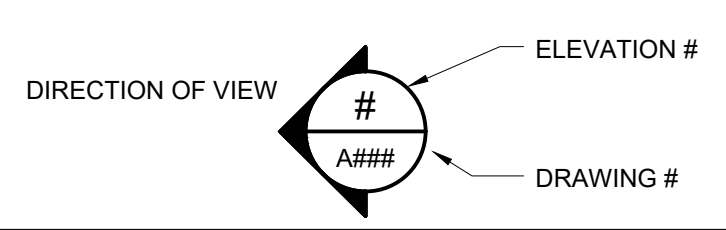
STANDARD DETAILS ARE REFERENCED BY A UNIQUE SEVEN DIGIT NUMBER AND ARE SHOWN ON THE CONTRACT DRAWINGS BY ONE OF TWO METHODS:



ROOM NAME LABEL



ELEVATION CALL OUT



LINETYPES

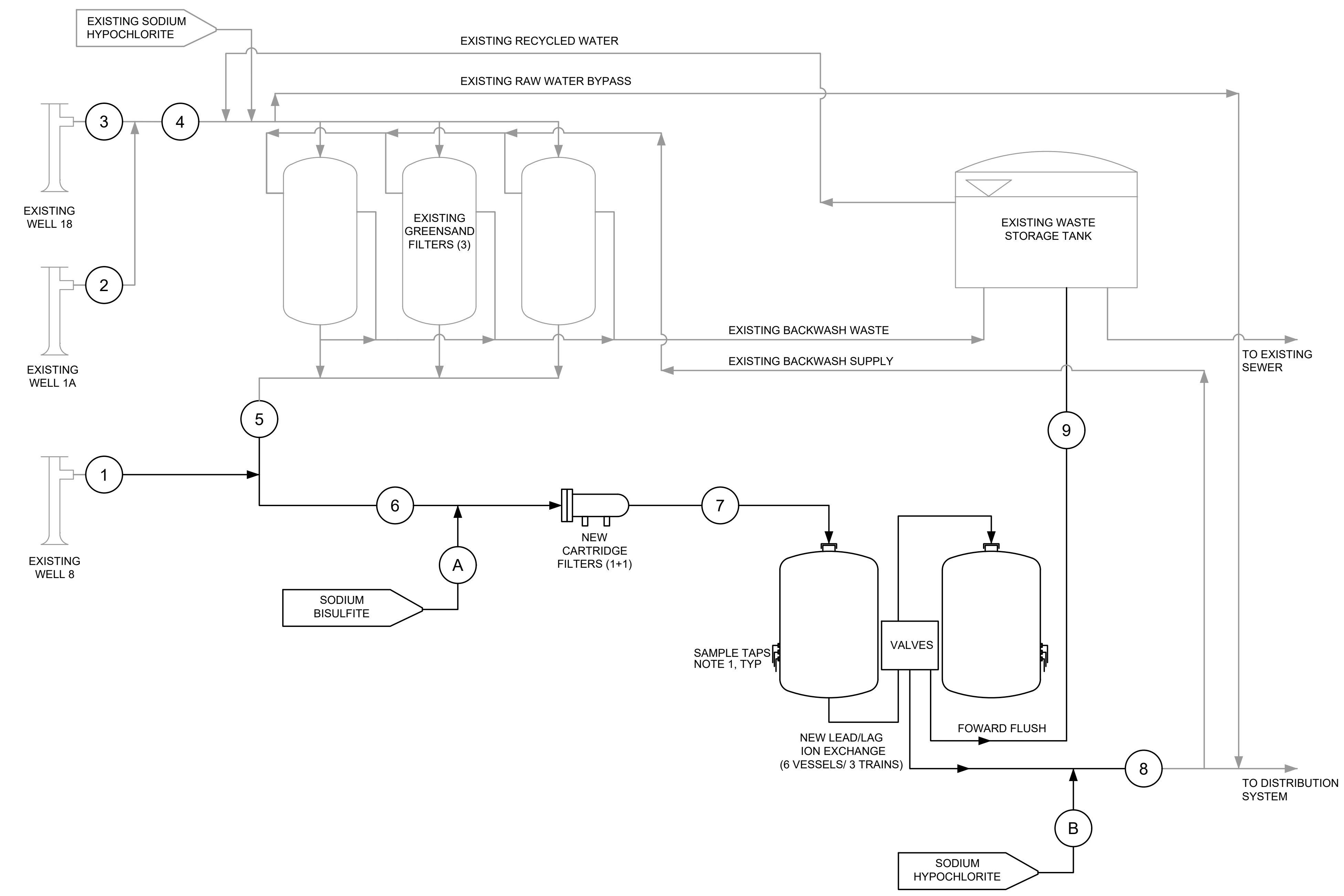
	PROPOSED ITEMS
	EXISTING ITEMS
	HIDDEN ITEMS
	DEMOLITION ITEMS
	CENTER LINE
	MATCH LINE
	FIBER OPTIC CABLE
	OVERHEAD ELECTRIC
	12" WATER
	3" GAS
	SANITARY SEWER
	18" WATER
	24" WATER
	12" RAW WATER
	ELECTRIC
	DRAINAGE
	BASIN LIMITS
	PROPERTY LINE
	CENTERLINE
	FENCE
	WATER
	STORM DRAIN
	TREE LINE

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 2 of 36

GENERAL SHEET INDEX, LEGEND, ABBREVIATION



**NOTES:**  
 1. BREAKTHROUGH MONITORING OF PFAS IS ACCOMPLISHED BY SAMPLING THE RESIN BED AT 25%, 50%, AND 75% DEPTHS THROUGH SAMPLING PORTS ON EXTERIOR OF ION EXCHANGE VESSELS PROVIDED BY IX EM.



	Well 8	Well 1A	Well 18	GSF In	GSF Out	CF In	IX In	Plant Effluent	Forward Flush
Node	1	2	3	4	5	6	7	8	9
	gpm	gpm	gpm	gpm	gpm	gpm	gpm / gpm per train	gpm	gallons/flush
Design Plant Flow Rate	1700	1500	1700	3200	3200	4900	4900 / 1633	4900	1633

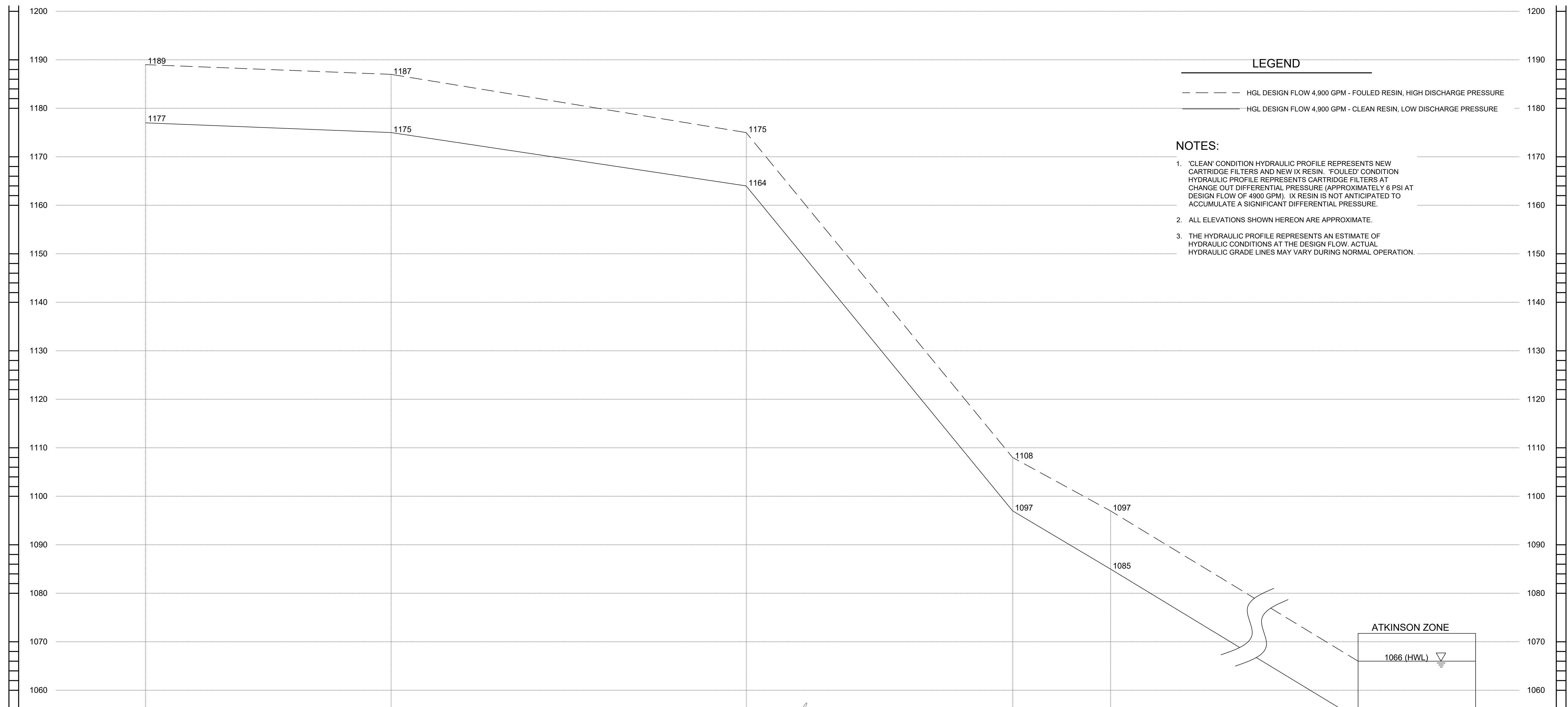
Node	Plant Flow Rate (gpm)	Chemical Doses	
		Sodium Bisulfite (25%)**	Sodium Hypochlorite (0.8%)**
		A	B
Design Dose (mg/L)	-	2.9	1.5
Max Feed Rate (gph)	4900	2.8	54
Min Feed Rate (gph)	1500	0.9	16.5

**Notes**  
 \* Forward flush used periodically after resin replacement only, for approximately 2-3 bed volumes. Waste tank recycle will not be used during the forward flush.

**Notes**  
 \*\* Percentage represents the strength of the chemical being dosed.

FILE: C:\Hazen\Hazen\Projects\2016\2016-000\2016-000-000.dwg  
 PLOT DATE: 10/23/2020 1:53 PM BY: AQUIROZ

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>PROJECT ENGINEER:</td><td>T. YOKOYAMA</td></tr> <tr><td>DESIGNED BY:</td><td>N. BOYLE</td></tr> <tr><td>DRAWN BY:</td><td>A. QUIROZ</td></tr> <tr><td>CHECKED BY:</td><td>I. MACKENZIE</td></tr> <tr><td>IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE</td><td style="text-align: center;">0 1/2" 1"</td></tr> </table>	PROJECT ENGINEER:	T. YOKOYAMA	DESIGNED BY:	N. BOYLE	DRAWN BY:	A. QUIROZ	CHECKED BY:	I. MACKENZIE	IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"	<p>THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482</p>	 HAZEN AND SAWYER 7700 IRVINE CENTER DRIVE, SUITE 200 IRVINE, CALIFORNIA 92618	RUBIDOUX COMMUNITY SERVICES DISTRICT JURUPA VALLEY, CA  PFAS TREATMENT PROJECT AT MN PLANT #2 (LELAND THOMPSON WATER TREATMENT FACILITY)	<p>GENERAL PROCESS FLOW DIAGRAM</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>DATE:</td><td>OCTOBER 2020</td></tr> <tr><td>HAZEN NO.:</td><td>20168-000</td></tr> <tr><td>CONTRACT NO.:</td><td></td></tr> <tr><td>DRAWING NUMBER:</td><td>SHEET 3 of 36</td></tr> </table>	DATE:	OCTOBER 2020	HAZEN NO.:	20168-000	CONTRACT NO.:		DRAWING NUMBER:	SHEET 3 of 36
PROJECT ENGINEER:	T. YOKOYAMA																						
DESIGNED BY:	N. BOYLE																						
DRAWN BY:	A. QUIROZ																						
CHECKED BY:	I. MACKENZIE																						
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"																						
DATE:	OCTOBER 2020																						
HAZEN NO.:	20168-000																						
CONTRACT NO.:																							
DRAWING NUMBER:	SHEET 3 of 36																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th>REV</th><th>ISSUED FOR</th><th>DATE</th><th>BY</th></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	REV	ISSUED FOR	DATE	BY									G-03										
REV	ISSUED FOR	DATE	BY																				



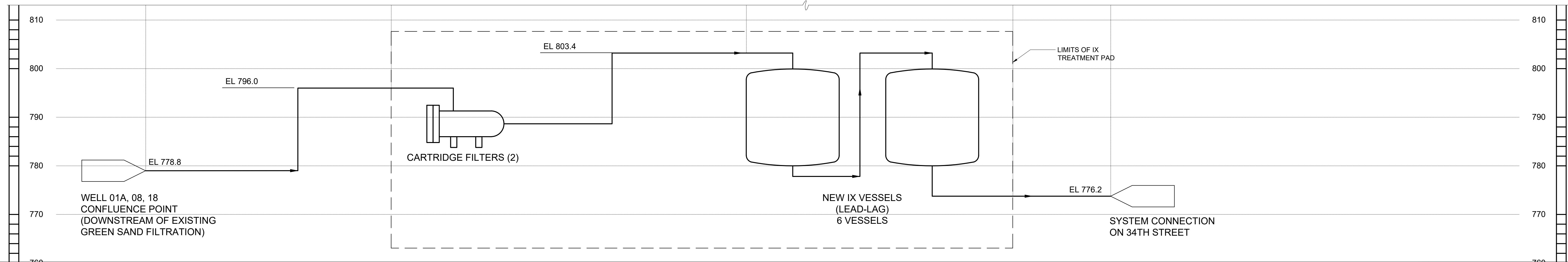
**LEGEND**

--- HGL DESIGN FLOW 4,900 GPM - FOULED RESIN, HIGH DISCHARGE PRESSURE

— HGL DESIGN FLOW 4,900 GPM - CLEAN RESIN, LOW DISCHARGE PRESSURE

**NOTES:**

1. 'CLEAN' CONDITION HYDRAULIC PROFILE REPRESENTS NEW CARTRIDGE FILTERS AND NEW IX RESIN. 'FOULED' CONDITION HYDRAULIC PROFILE REPRESENTS CARTRIDGE FILTERS AT CHANGE OUT DIFFERENTIAL PRESSURE (APPROXIMATELY 6 PSI AT DESIGN FLOW OF 4900 GPM). IX RESIN IS NOT ANTICIPATED TO ACCUMULATE A SIGNIFICANT DIFFERENTIAL PRESSURE.
2. ALL ELEVATIONS SHOWN HEREON ARE APPROXIMATE.
3. THE HYDRAULIC PROFILE REPRESENTS AN ESTIMATE OF HYDRAULIC CONDITIONS AT THE DESIGN FLOW. ACTUAL HYDRAULIC GRADE LINES MAY VARY DURING NORMAL OPERATION.



FILE: C:\MSHAZEN\PROJECTS\20170320\G04 Shared by AQUIROZ.dwg Date: 10/22/2020 11:34 AM  
 PLOT DATE: 10/22/2020 1:33 PM BY: AQUIROZ

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	T. YOKOYAMA
DRAWN BY:	A. QUIROZ
CHECKED BY:	I. MACKENZIE
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

GENERAL  
 HYDRAULIC PROFILE

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 4 of 36







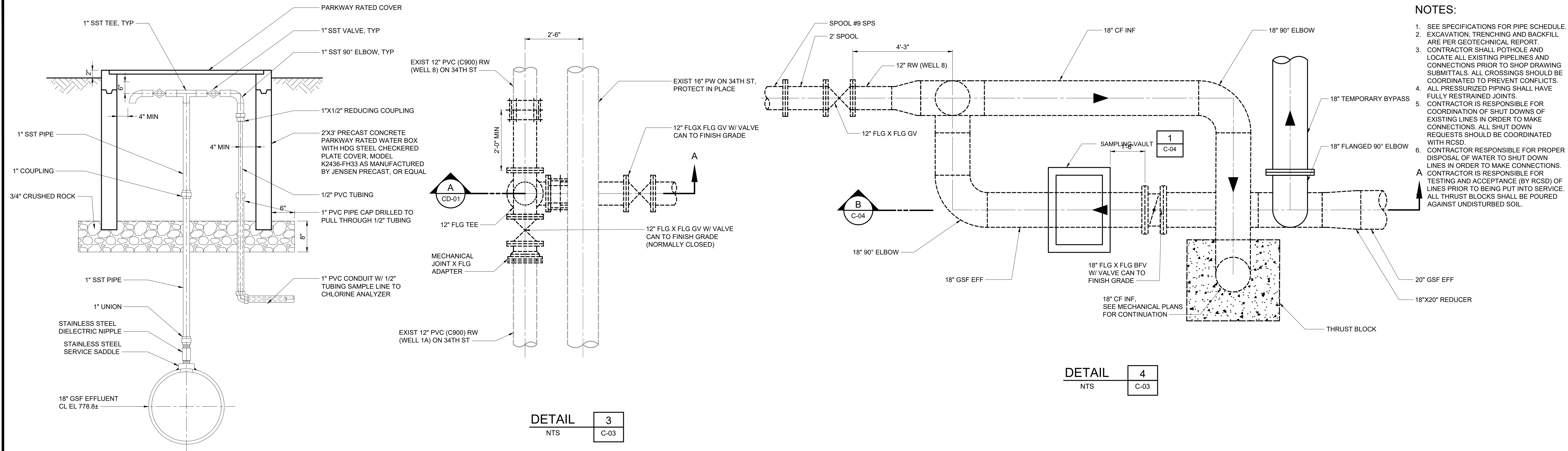






**NOTES:**

- SEE SPECIFICATIONS FOR PIPE SCHEDULE.
- EXCAVATION, TRENCHING AND BACKFILL ARE PER GEOTECHNICAL REPORT.
- CONTRACTOR SHALL POTHOLE AND LOCATE ALL EXISTING PIPELINES AND CONNECTIONS PRIOR TO SHOP DRAWING SUBMITTALS. ALL CROSSINGS SHOULD BE COORDINATED TO PREVENT CONFLICTS.
- ALL PRESSURIZED PIPING SHALL HAVE FULLY RESTRAINED JOINTS.
- CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF SHUT DOWNS OF EXISTING LINES IN ORDER TO MAKE CONNECTIONS. ALL SHUT DOWN REQUESTS SHOULD BE COORDINATED WITH RCSD.
- CONTRACTOR RESPONSIBLE FOR PROPER DISPOSAL OF WATER TO SHUT DOWN LINES IN ORDER TO MAKE CONNECTIONS. CONTRACTOR IS RESPONSIBLE FOR TESTING AND ACCEPTANCE (BY RCSD) OF LINES PRIOR TO BEING PUT INTO SERVICE. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED SOIL.

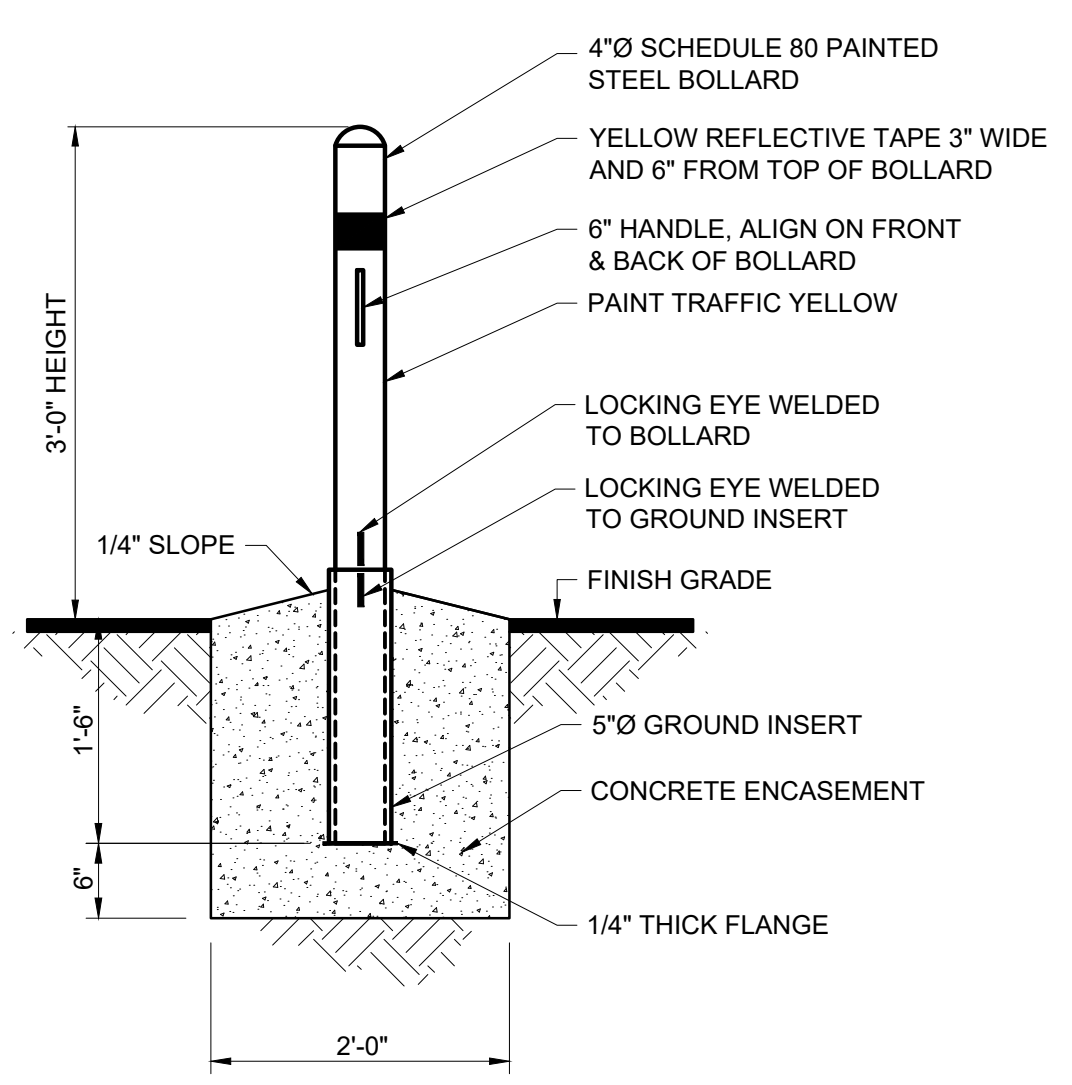


**SAMPLE VAULT**

DETAIL	1
NTS	C-02

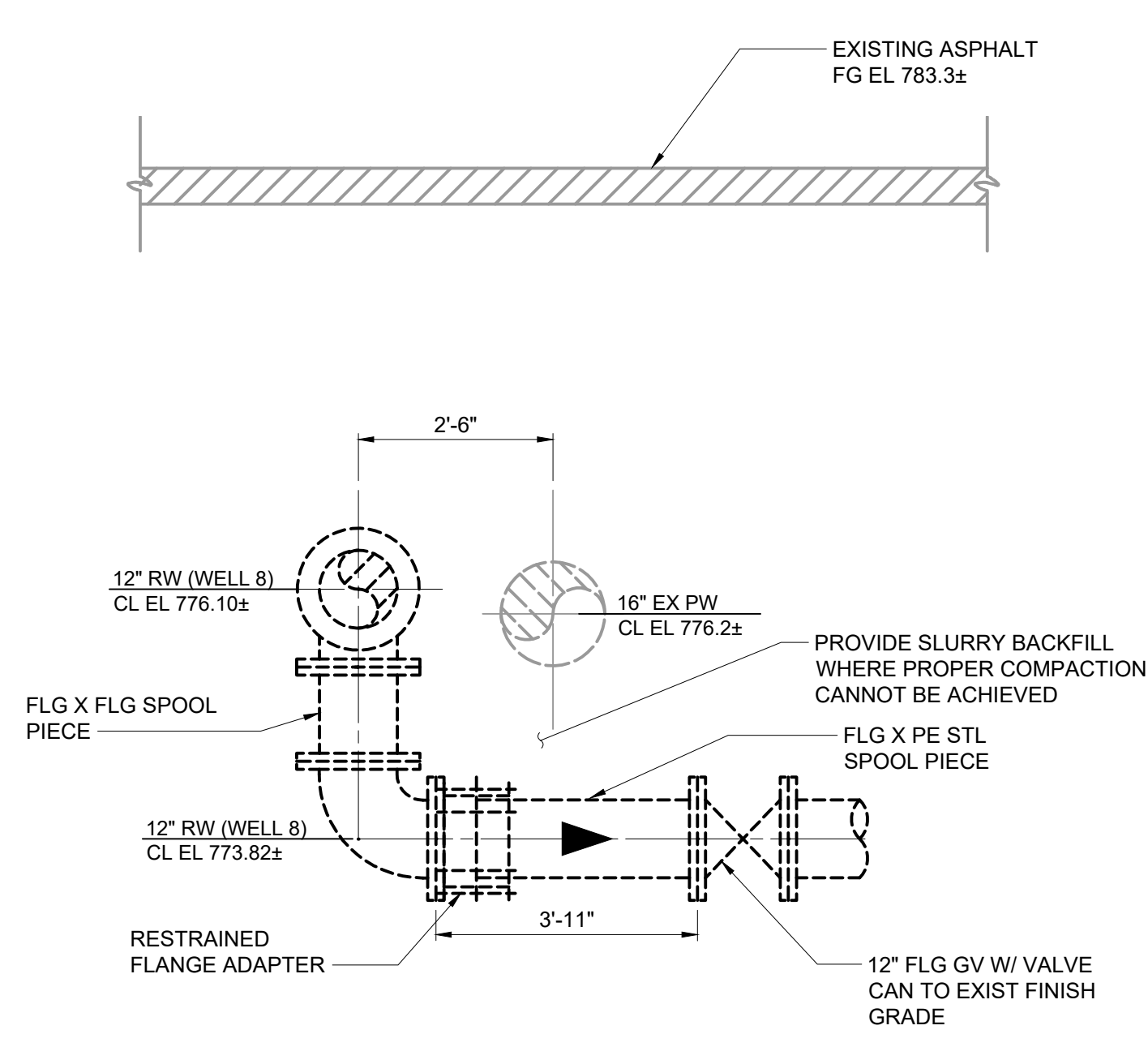
**DETAIL 3**

**DETAIL 4**

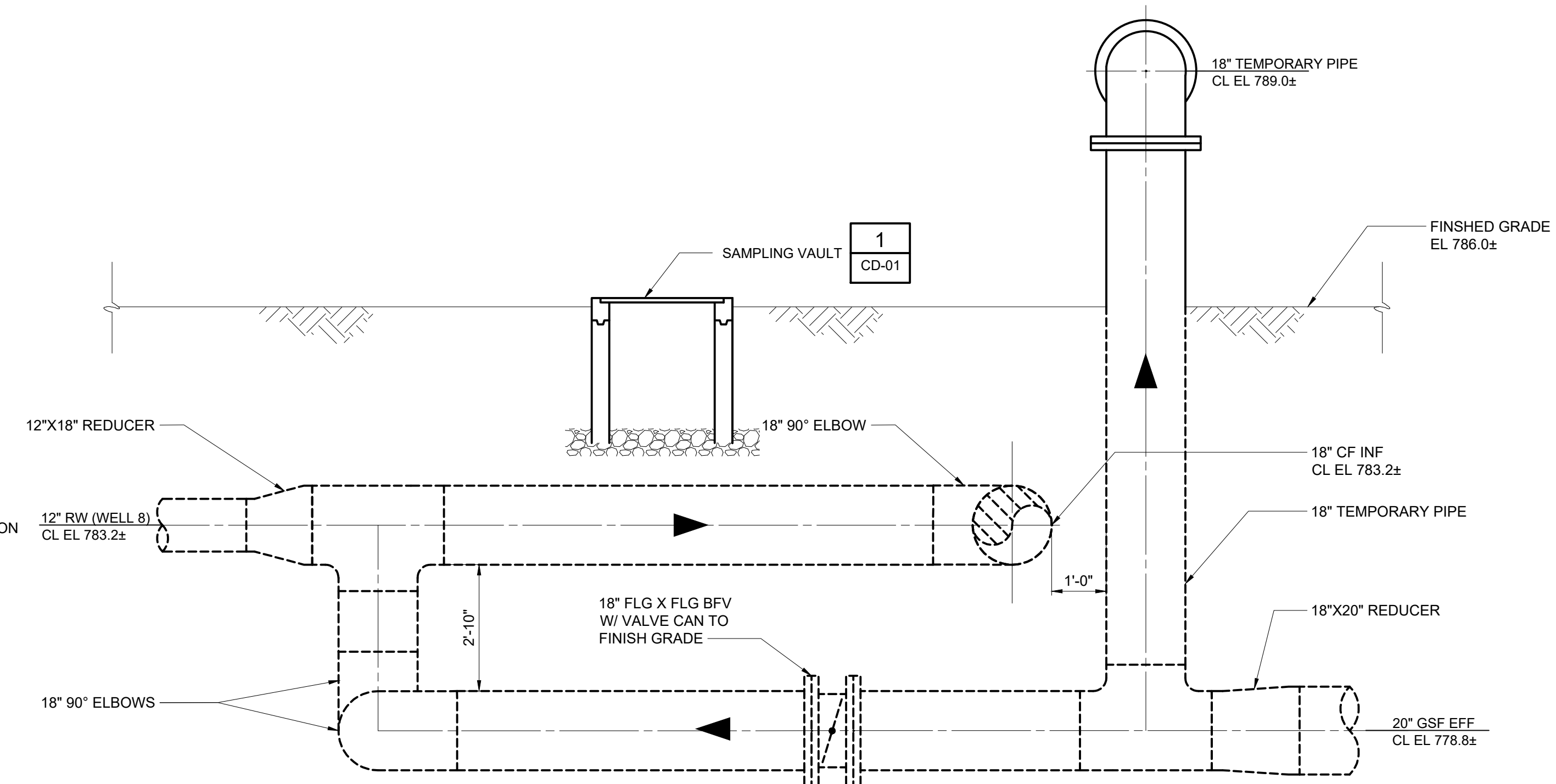


**REMOVABLE BOLLARD**

DETAIL	2
NTS	C-02



**SECTION A**



**SECTION B**

FILE: C:\Hazen\Hazen\Projects\2020\CD-01\CD-01.dwg, Saved by: AQUIROZ, Save date: 12/23/2021 5:08 PM  
 PLOT DATE: 12/23/2021 5:11 PM BY: AQUIROZ

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	T. YOKOYAMA
DRAWN BY:	A. QUIROZ
CHECKED BY:	S. CONNER
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

**RECORD DRAWING**  
 THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA  
**PFAS TREATMENT PROJECT**  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

**CIVIL DETAILS**

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 8 of 36
	CD-01

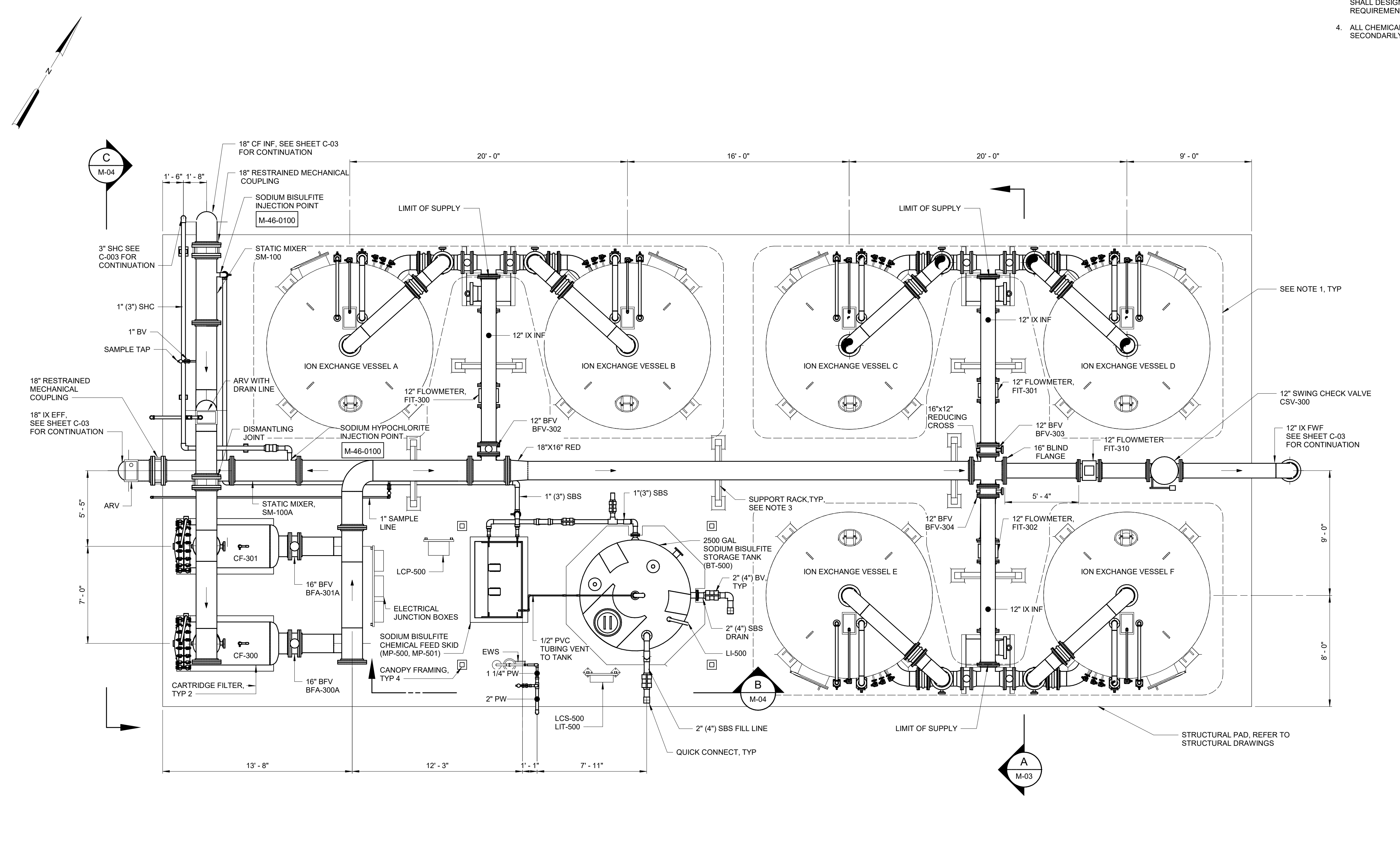






NOTES

- IX VESSELS AND ASSOCIATED VALVE MANIFOLD WITHIN THESE LIMITS HAVE BEEN PRE-PROCURED BY RCSD. REFER TO P&IDS AND SPECIFICATION 466001 FOR SCOPE OF SUPPLY AND CONTRACTOR REQUIREMENTS FOR INSTALLATION.
- SEE SPECIFICATION 466002 FOR CARTRIDGE FILTERS REQUIREMENTS.
- PIPE SUPPORTS SHOWN IN THESE DRAWINGS ARE SCHEMATIC. CONTRACTOR SHALL DESIGN AND INSTALL ADEQUATE PIPE SUPPORTS AND PIPE RACKS PER REQUIREMENTS DETAILED IN SPECIFICATION 400507 AND SHEET MD-02.
- ALL CHEMICAL PIPING OUTSIDE OF CHEMICAL SKID SYSTEM SHALL BE SECONDARILY CONTAINED PER SPECIFICATION 400537 REQUIREMENTS.



PLAN VIEW  
1/4" = 1'-0"

BM 360/20168-000\_PFA5 Treatment Evaluation and Design/20168-000-200-XX.MXD  
12/23/2021 12:06:54 PM

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	N. BOYLE
DRAWN BY:	R. SHNAYDERMAN
CHECKED BY:	I. MACKENZIE
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

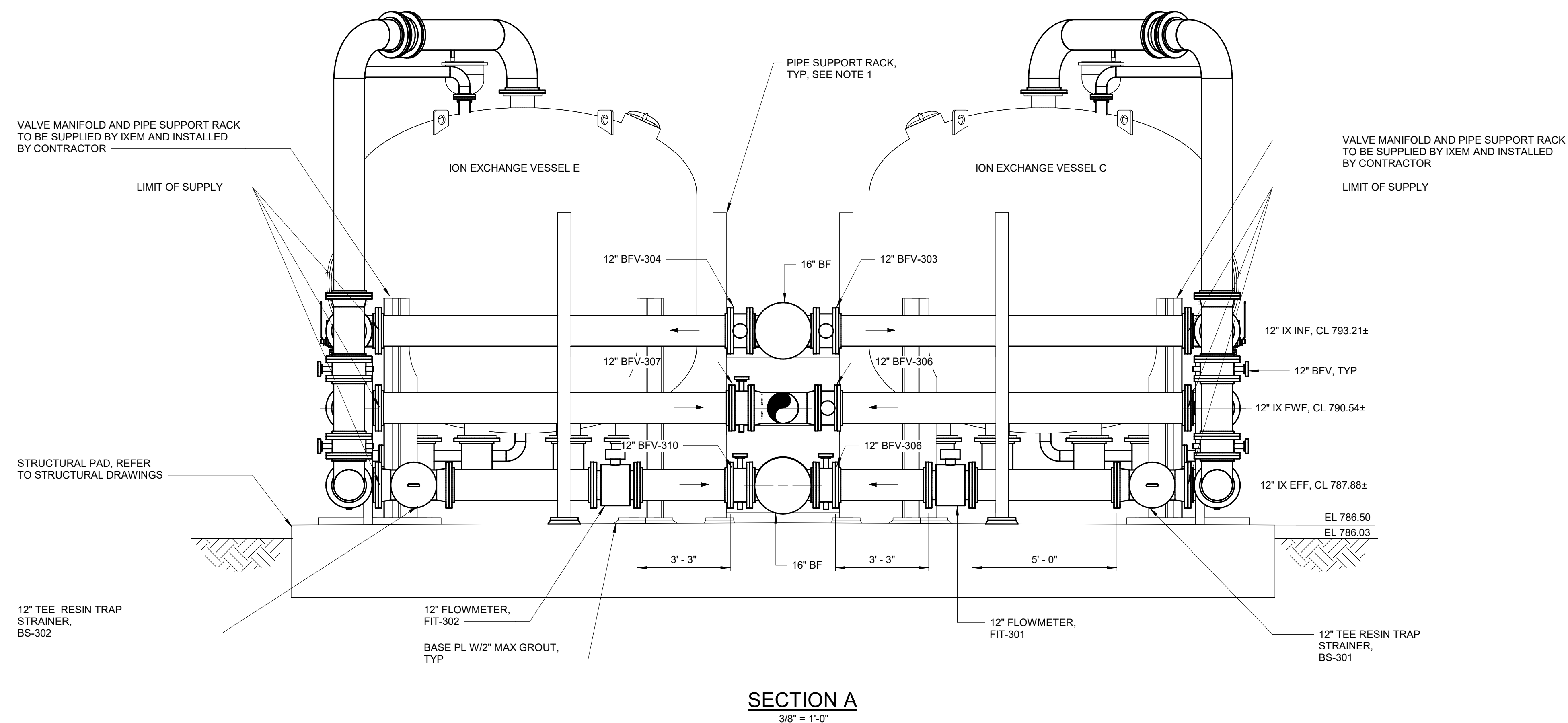
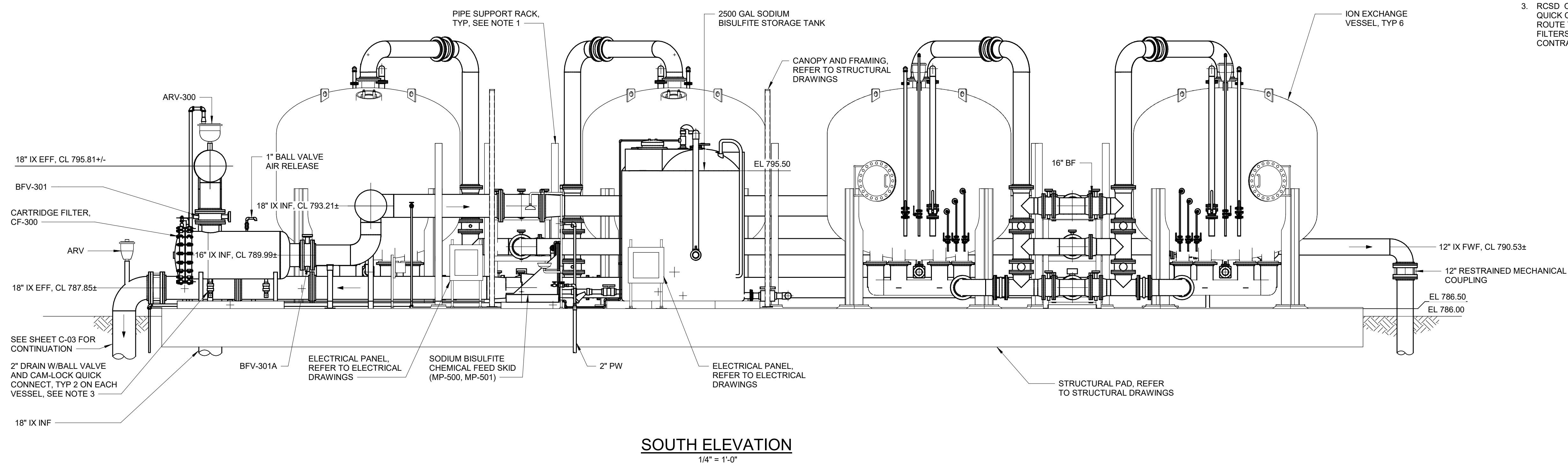
MECHANICAL  
IX TREATMENT AREA PLAN

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	1
DRAWING NUMBER:	SHEET 10 of 36
	M-02



NOTES

1. PIPE SUPPORTS SHOWN IN THESE DRAWINGS ARE SCHEMATIC. CONTRACTOR SHALL DESIGN AND INSTALL ADEQUATE PIPE SUPPORTS AND PIPE RACKS PER REQUIREMENTS DETAILED IN SPECIFICATION 400507 AND SHEET MD-02.
2. REFER TO P&IDS FOR LIMITS OF SUPPLY OF IX EQUIPMENT.
3. RCSD OPERATORS TO CONNECT TEMPORARY HOSE TO CAMLOCK QUICK CONNECTION POINTS ON CARTRIDGE FILTER DRAIN AND ROUTE TO CLEAN OUT ON ACCESS ROAD WHEN CARTRIDGE FILTERS ARE DRAINED, SEE C-03 FOR CLEAN OUT LOCATION. CONTRACTOR TO PROVIDE 15FT OF 2" FLEXIBLE HOSE.



BM 360/20168-000\_PFS Treatment Evaluation and Design/20168-000-200-IX.Mxd 12/23/2021 12:06:56 PM

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	N. BOYLE		
DRAWN BY:	R. SHNAYDERMAN		
CHECKED BY:	I. MACKENZIE		
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"		
REV	ISSUED FOR	DATE	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

MECHANICAL  
IX TREATMENT AREA ELEVATION AND SECTION

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	1
DRAWING NUMBER:	SHEET 11 of 36
	M-03

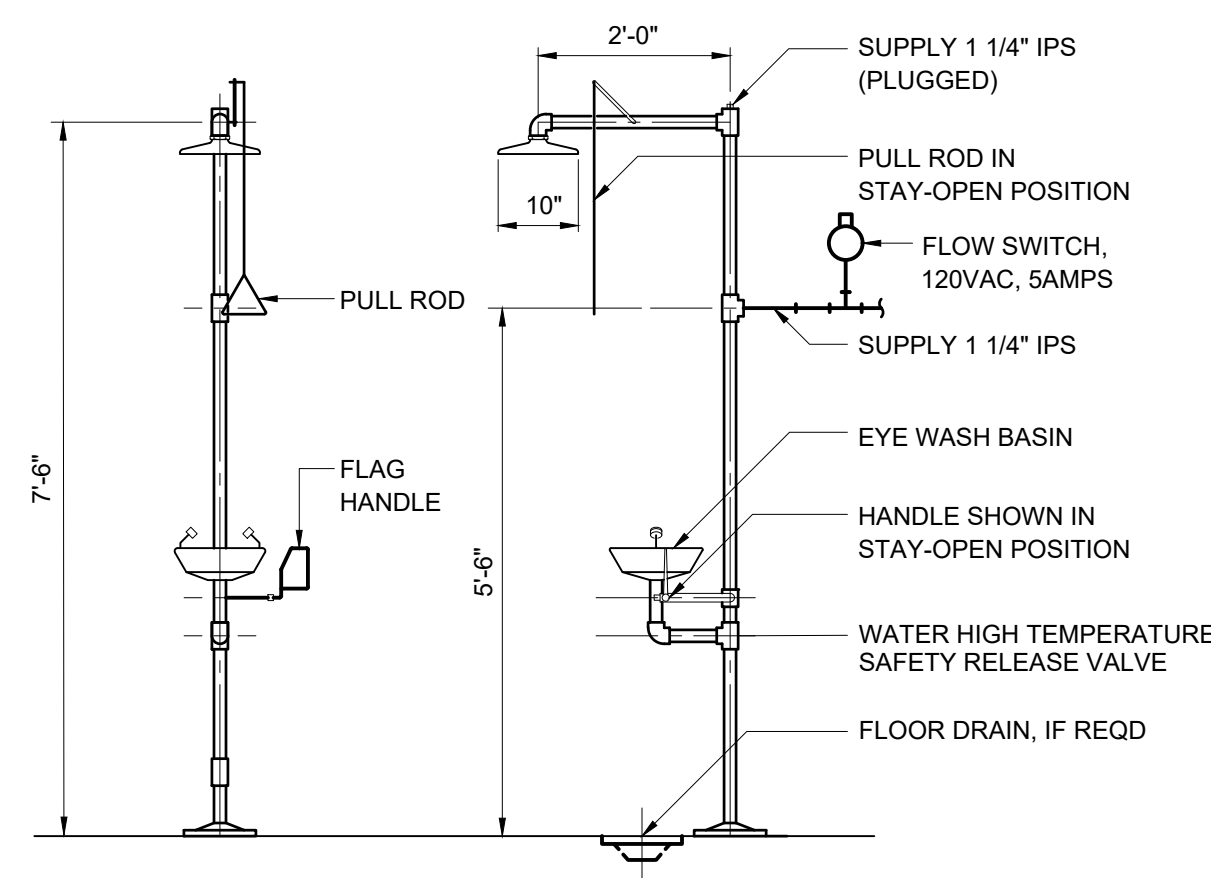




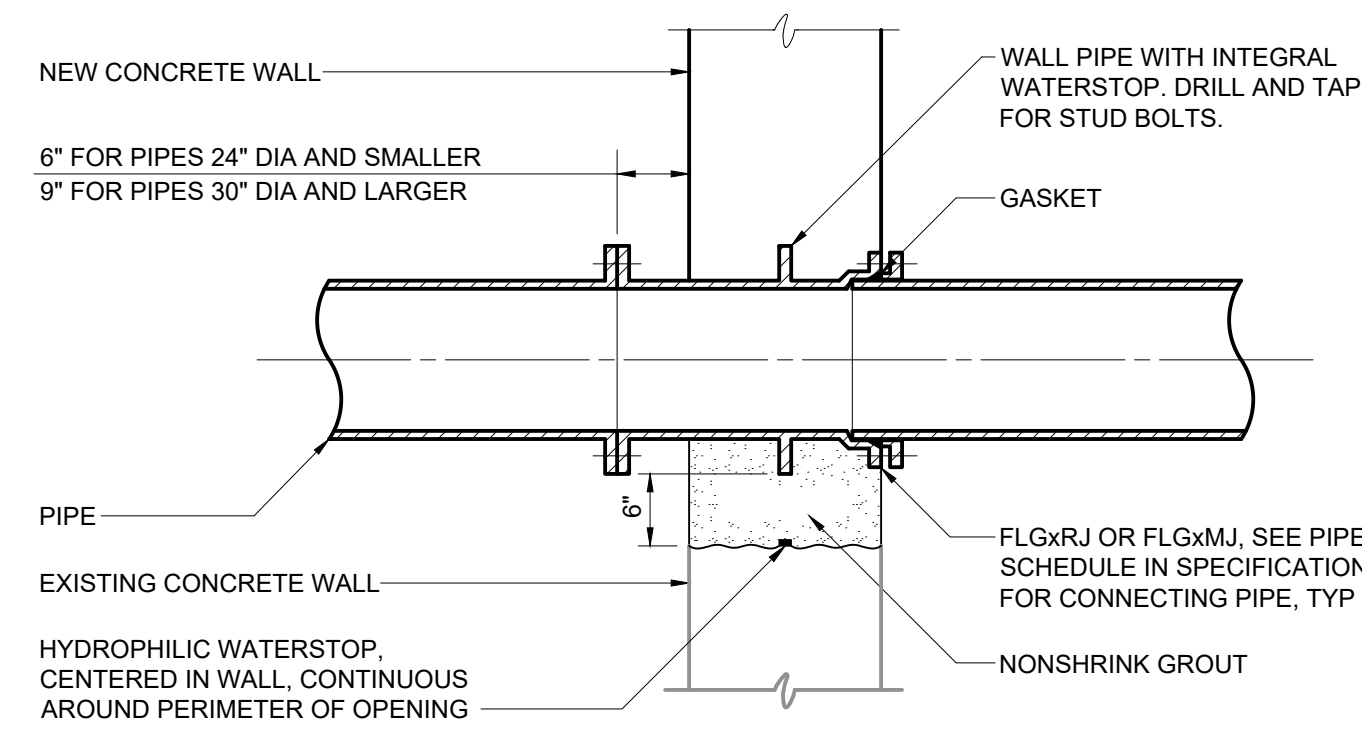


**NOTES:**

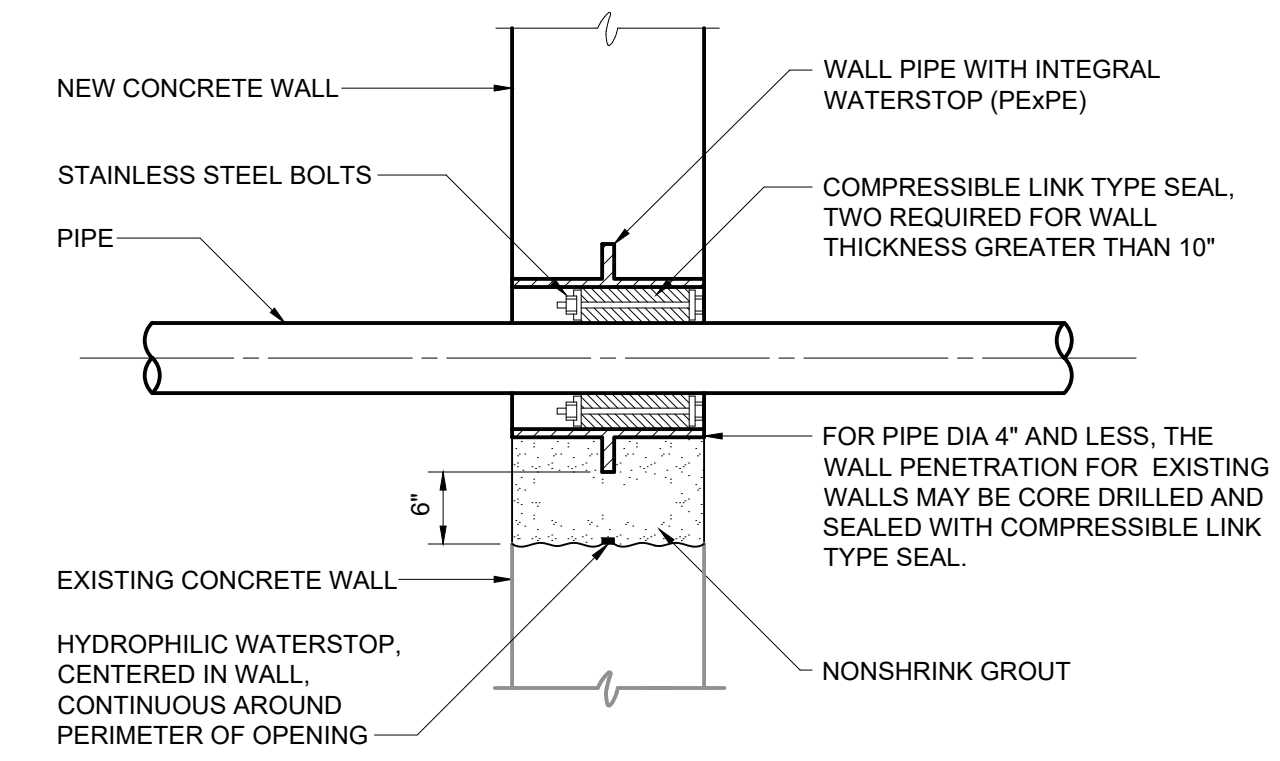
1. ALL WALL PIPES SHALL BE CAST IN PLACE UNLESS OTHERWISE NOTED.
2. PROVIDE PIPE JOINT WITHIN TWO (2) FEET OF EXTERIOR FACE OF WALL AT CONNECTION TO ALL NEW AND EXISTING STRUCTURES OR MANHOLES.
3. ALL NEW OPENINGS IN EXISTING CONCRETE WALLS AND SLABS SHALL BE SAWCUT OR CORE DRILLED. USE OF JACKHAMMERS OR STITCH DRILLING SHALL NOT BE PERMITTED. ANNULAR SURFACE SHALL BE SMOOTH. ANNULAR SURFACE SHALL BE ROUGHENED BY APPROVED METHODS WHEN INSTALLATION OF NONSHRINK GROUT IS REQUIRED AT EXISTING CONCRETE WALLS.



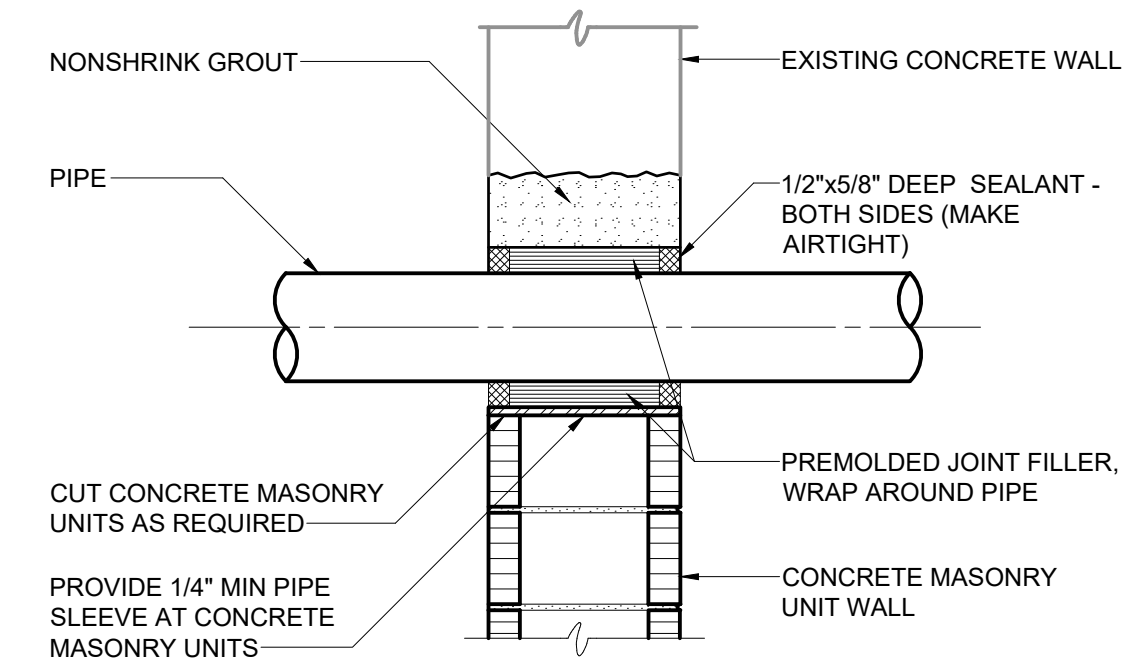
**SAFETY STATION  
INTERIOR AND EXTERIOR  
EMERGENCY SHOWER AND EYEWASH  
M-22-0100**



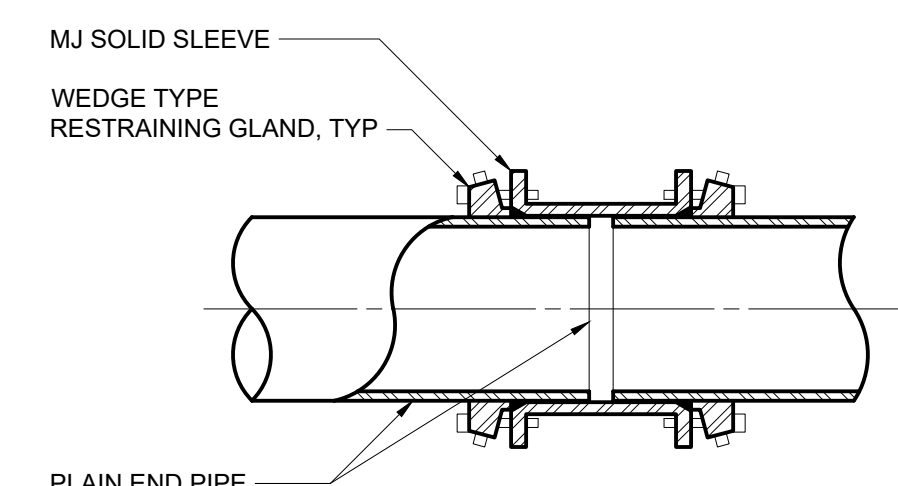
**M-40-0107**



**M-40-0111**

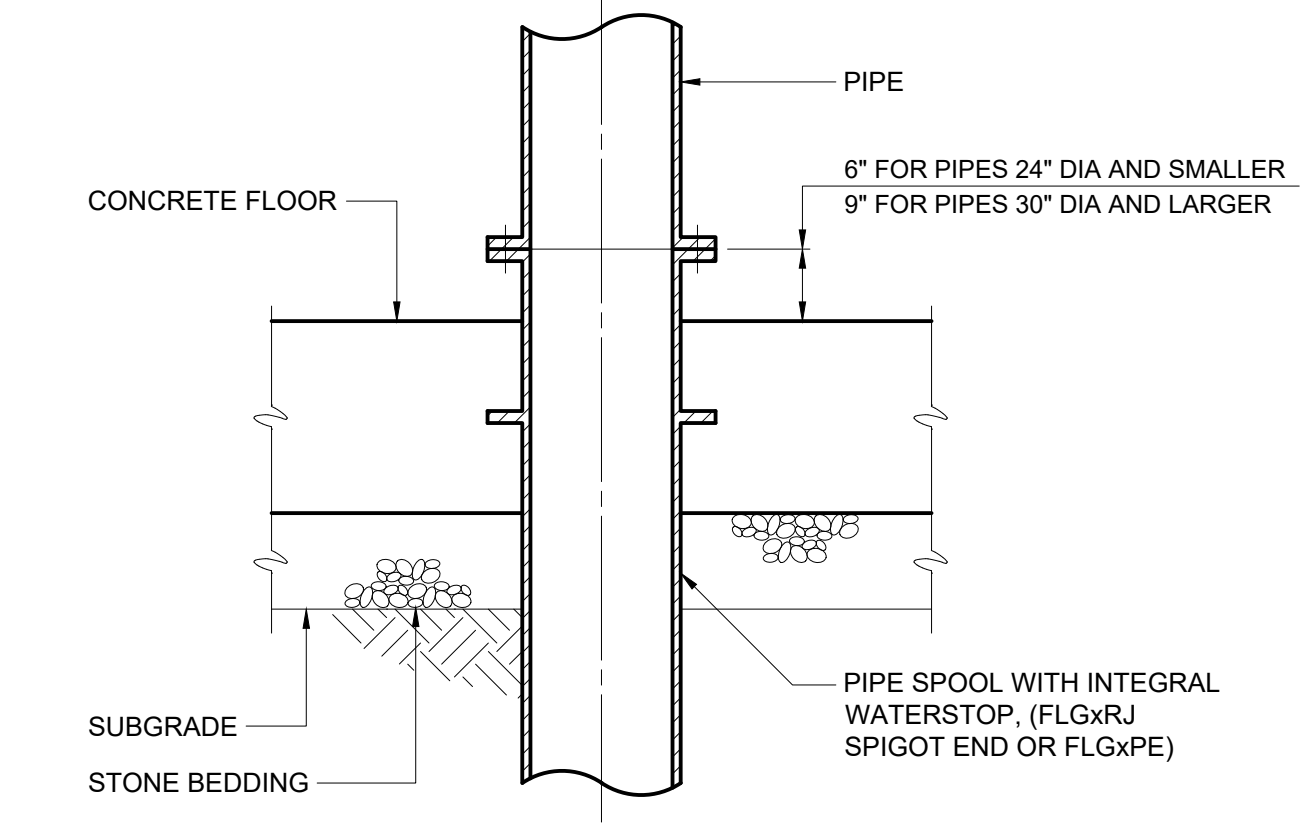


**CAULKED WALL PENETRATION  
M-40-0114**

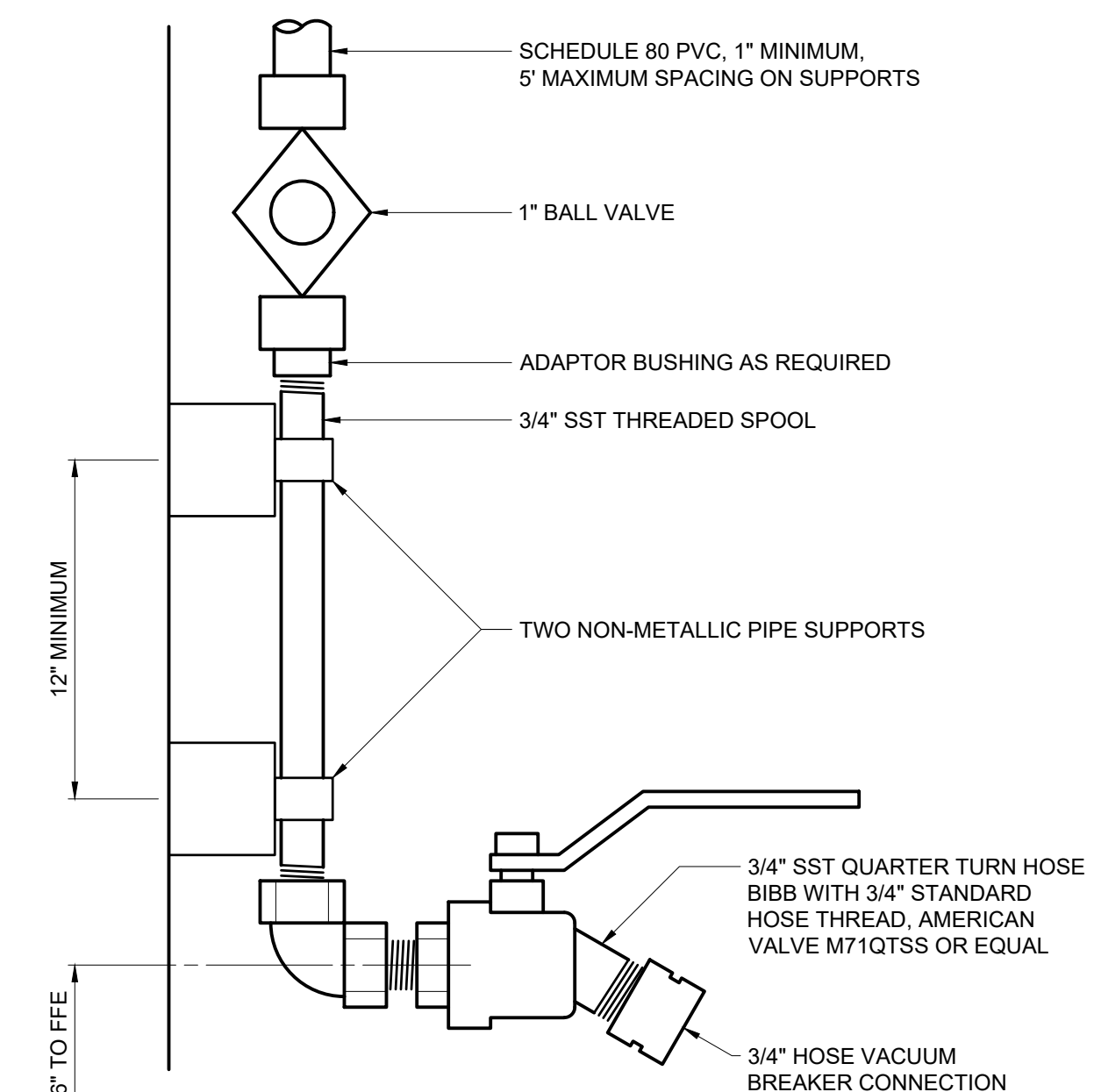


NOTE:  
CONTRACTOR MAY USE EBAA IRON 3800 MEGA-COUPLING IN LIEU OF COMPONENTS SHOWN. ALL RODS AND RESTRAINING HARDWARE SHALL BE PAINTED WITH TWO COATS COAL TAR (MIN 26 DRY MIL THICKNESS) TNEMEC 46-465 HI-BUILD OR EQUAL.

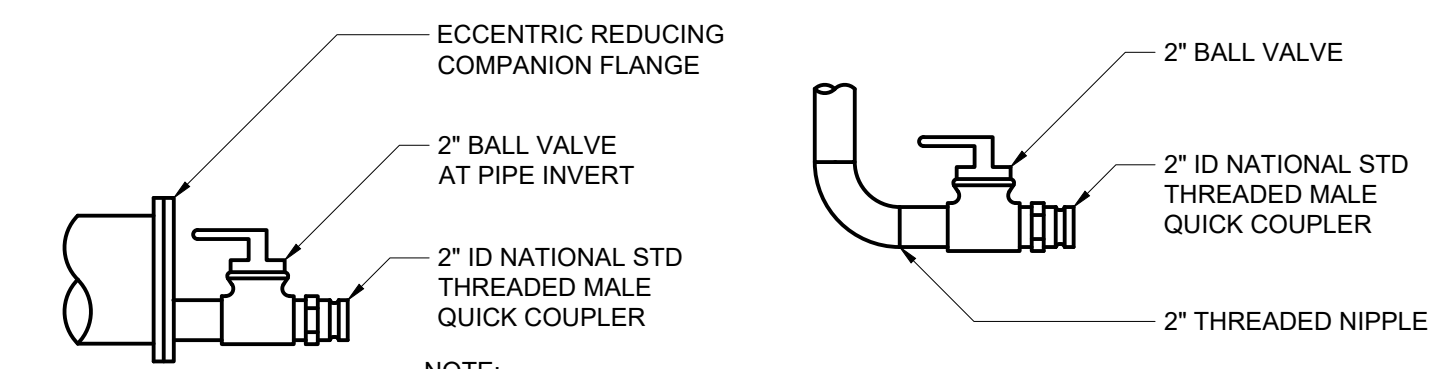
**RESTRAINED MJ SOLID SLEEVE  
M-40-0700**



**M-40-0113**



**HOSE BIBB  
M-40-0704**



NOTE:  
ALL 2\"/>

**FLUSHING CONNECTIONS  
M-40-0705**

FILE: C:\MHA\HAZEN-PW\01702201018\000-01.dwg BY: RSHNAYDERMAN Date: 08/11/2020 11:48 AM PLOT DATE: 10/27/2020 10:00 AM BY: RSHNAYDERMAN

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	N. BOYLE		
DRAWN BY:	R. SHNAYDERMAN		
CHECKED BY:	I. MACKENZIE		
IF THIS BAR DOES NOT MEASURE 1\"/>			
0	1/2"	1"	
REV	ISSUED FOR	DATE	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



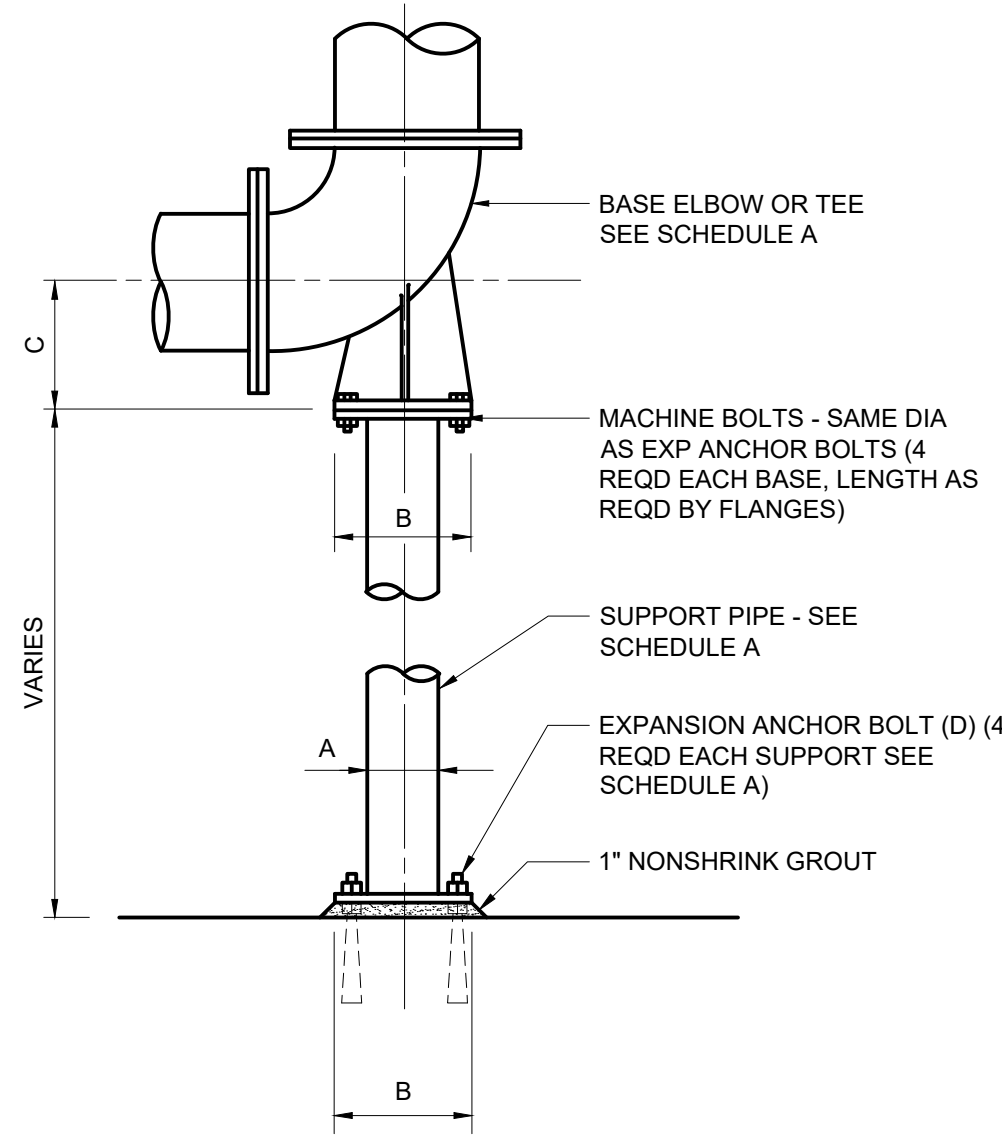
RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

MECHANICAL  
STANDARD DETAILS 1

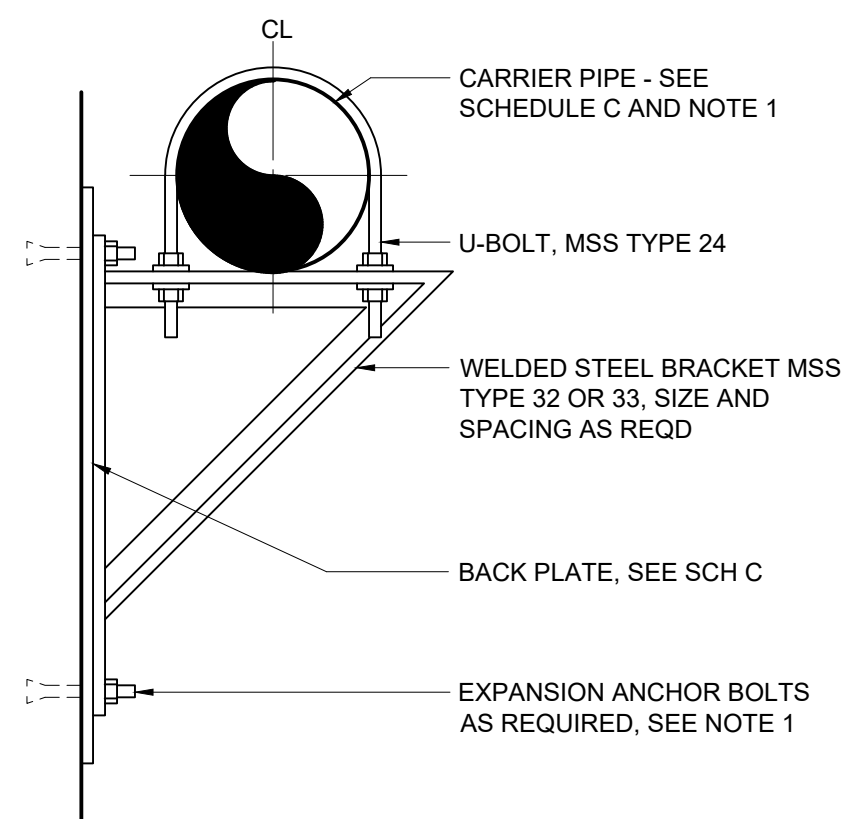
DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 14 of 36
	MD-01



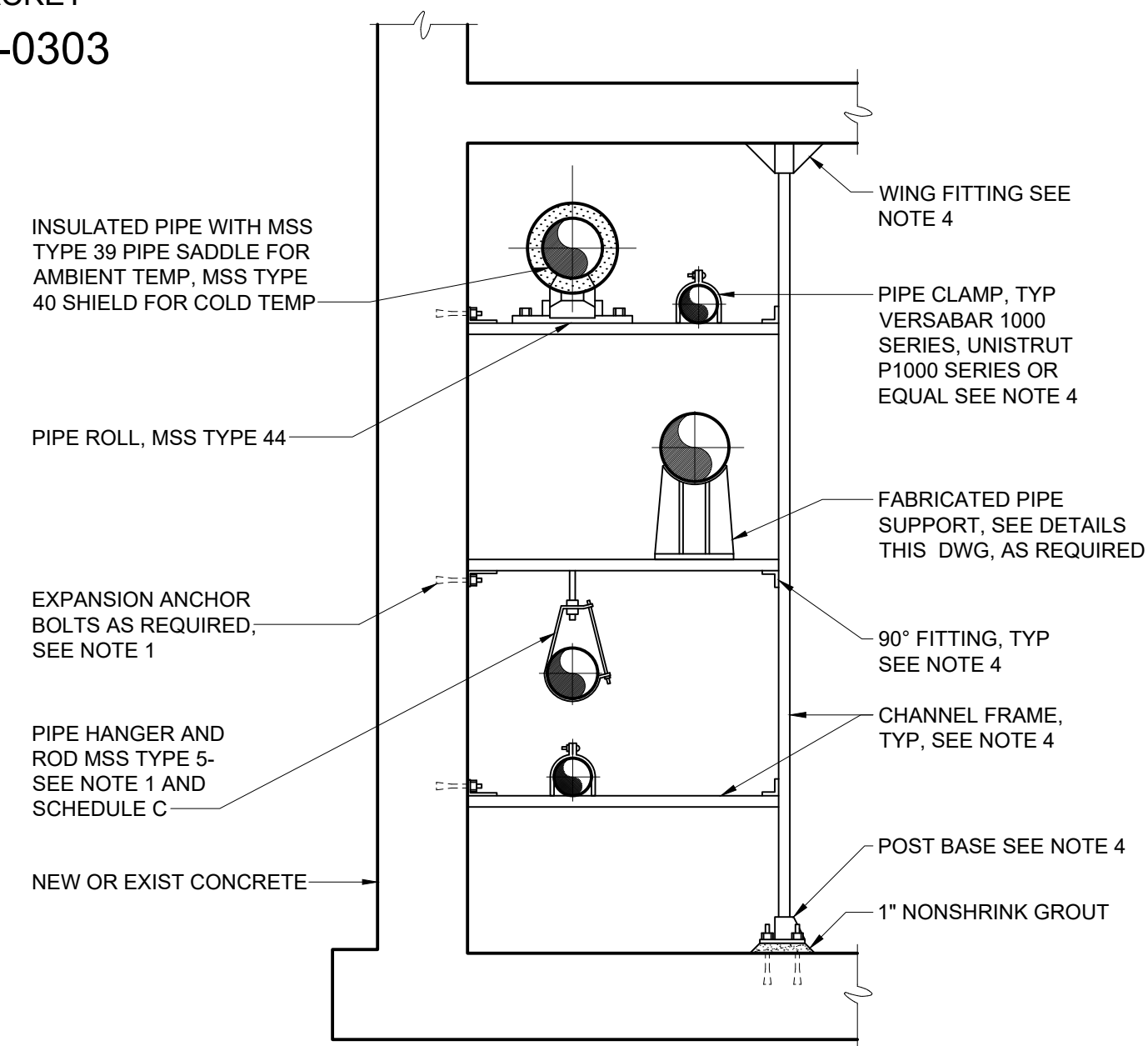


BASE ELBOW (TEE)

M-40-0300



PIPE SUPPORT BRACKET  
M-40-0303

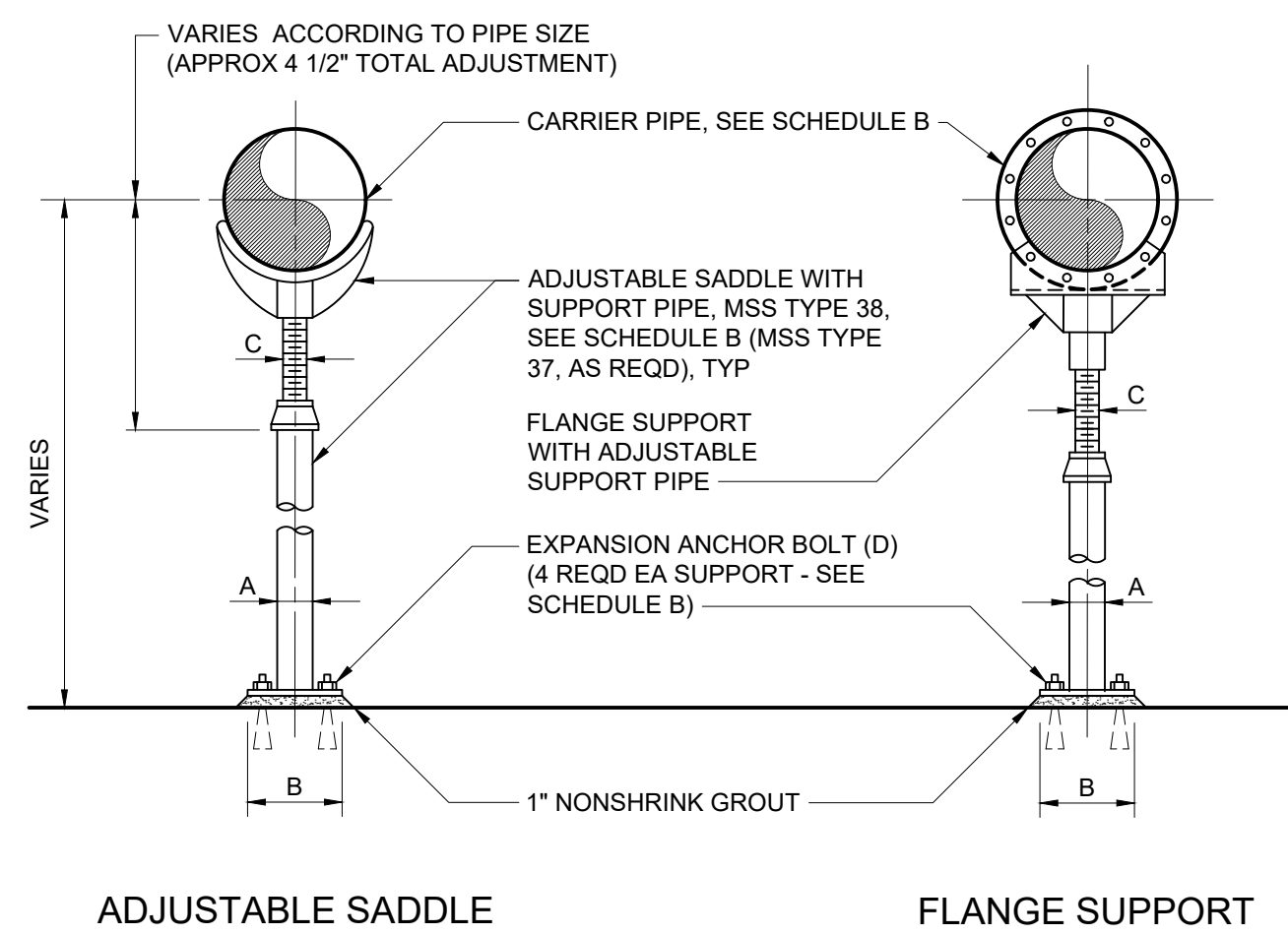


PIPE SUPPORT RACK  
M-40-0307

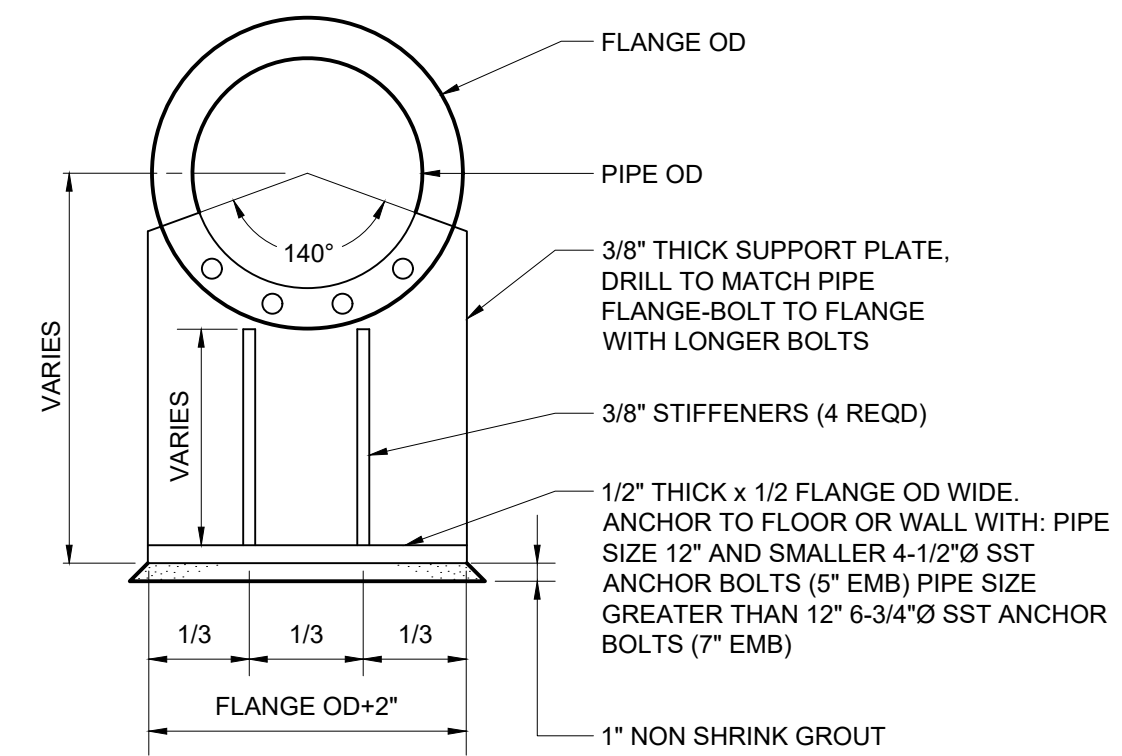
SCHEDULE A				
BASE ELBOW (TEE) (DIM IN INCHES)				
PIPE SIZE	A	B	C	D DIA x LG
3	1 1/2	5	4 7/8	1/2 x 5
4	2	6	5 1/2	5/8 x 5
5-6	2 1/2	7	VARIES	5/8 x 5
8-10	4	9	VARIES	5/8 x 5
12-16	6	11	VARIES	3/4 x 6
18-24	8	13 1/2	VARIES	3/4 x 6
30	10	16	23	7/8 x 7
36	12	19	26	7/8 x 7

SCHEDULE B				
ADJUSTABLE SADDLE (DIM IN INCHES)				
PIPE SIZE	A	B	C	D DIA x LG
3	2 1/2	7	1 1/2	5/8 x 5
4-12	3	7 1/2	2 1/2	5/8 x 5
14-16	4	9	3	5/8 x 5
18-20	6	11	3 1/2	3/4 x 6
24-48	6	11	4	3/4 x 6

SCHEDULE C								
SUPPORT RODS AND BRACKET SPACING (FOR STANDARD WEIGHT PIPE)								
PIPE SIZE (INCHES)	BACK PLATE (INCHES)	MINIMUM ROD Ø (INCHES)		MAX SPAN IN FEET (SEE NOTE 9)				
		PROCESS PIPING	STEEL AIR PIPING	COPPER	PLASTIC	STEEL	DIP (SEE NOTE 8)	
UP TO 1	SEE NOTE 6	3/8	3/8	5	5	6	-	-
1 1/4-2	"	3/8	3/8	8	5	10	-	-
2 1/2-3 1/2	"	3/8	3/8	8	5	12	6	-
4-5	"	1/2	3/8	-	5	14	8	-
6	"	5/8	3/8	-	5	15	9	-
8-12	"	3/4	1/2	-	5	15	9	-
14-16	"	7/8	1/2	-	5	15	9	-
18	"	1	1/2	-	5	18	10	-
20-24	"	1 1/4	5/8	-	5	18	10	-

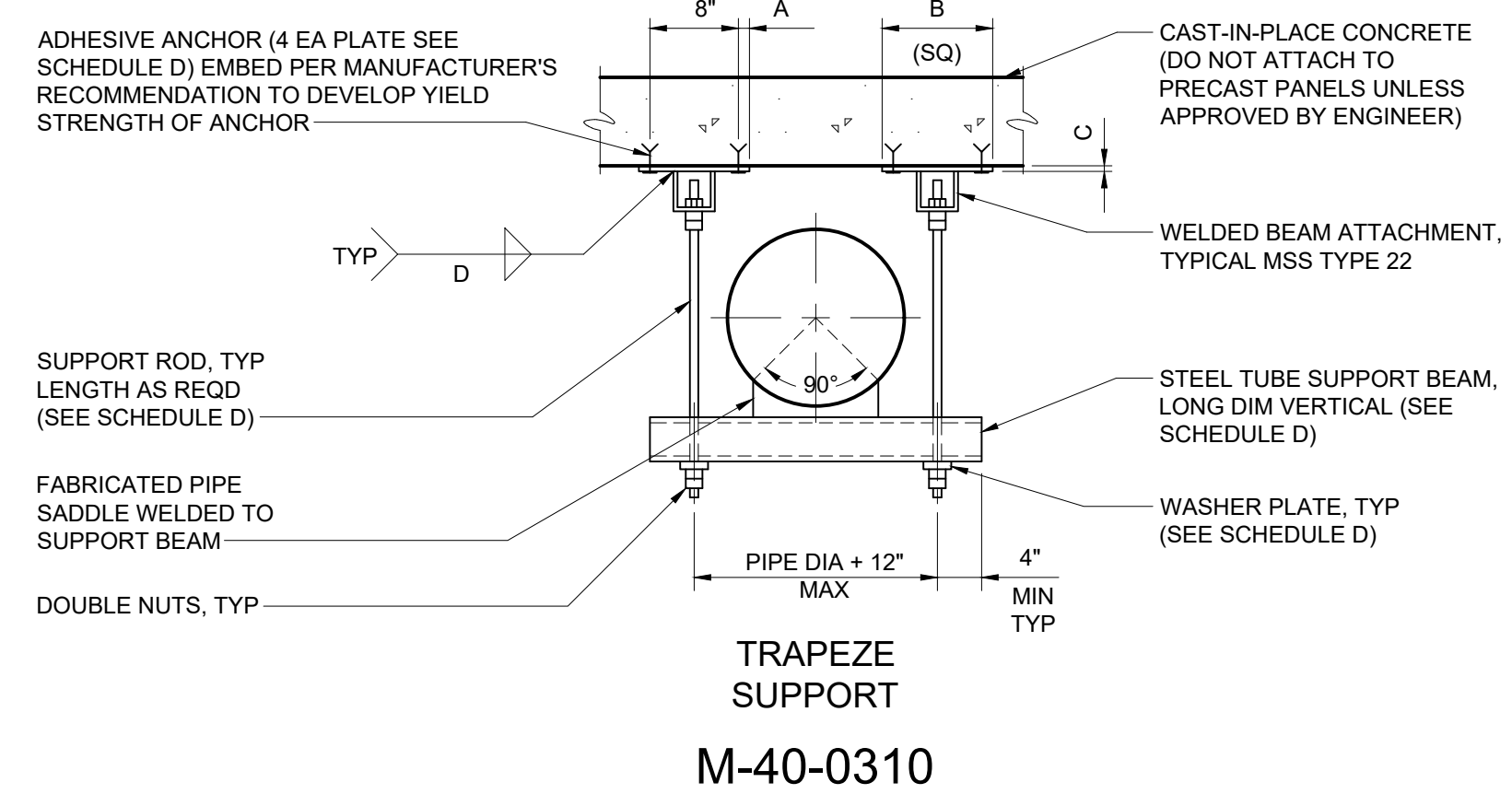


ADJUSTABLE SADDLE  
M-40-0304  
FLANGE SUPPORT

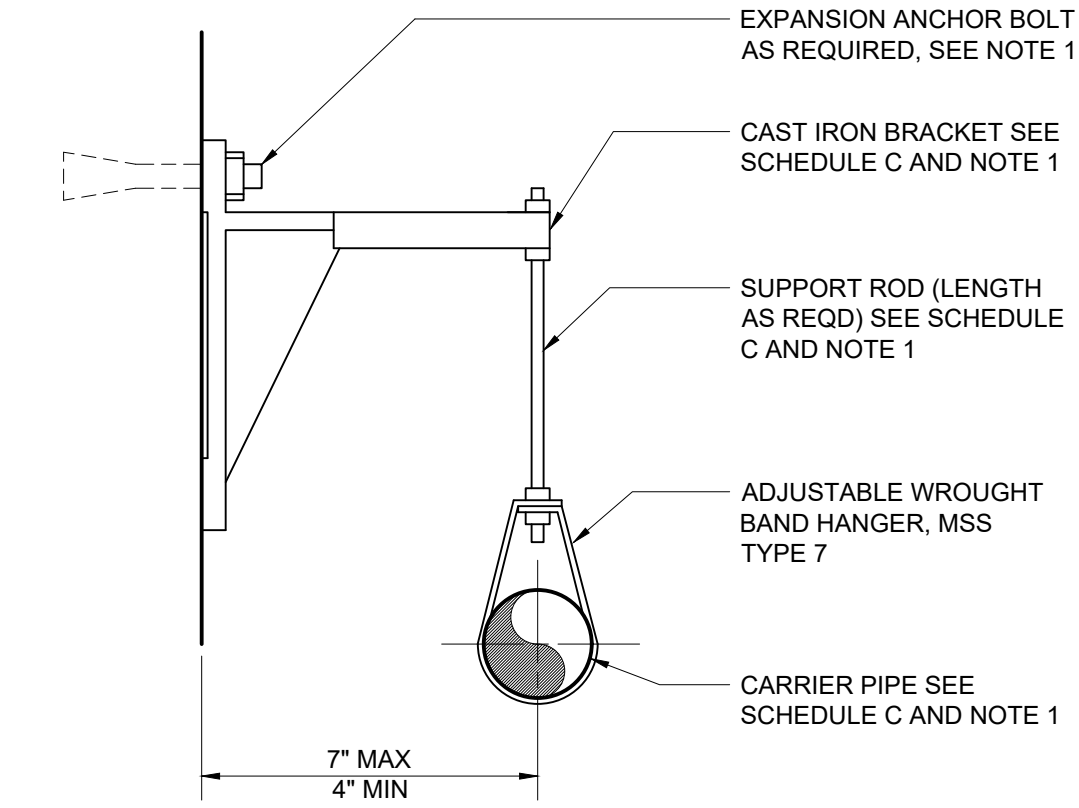


FABRICATED PIPE SUPPORT  
(AT FLANGE)  
M-40-0308

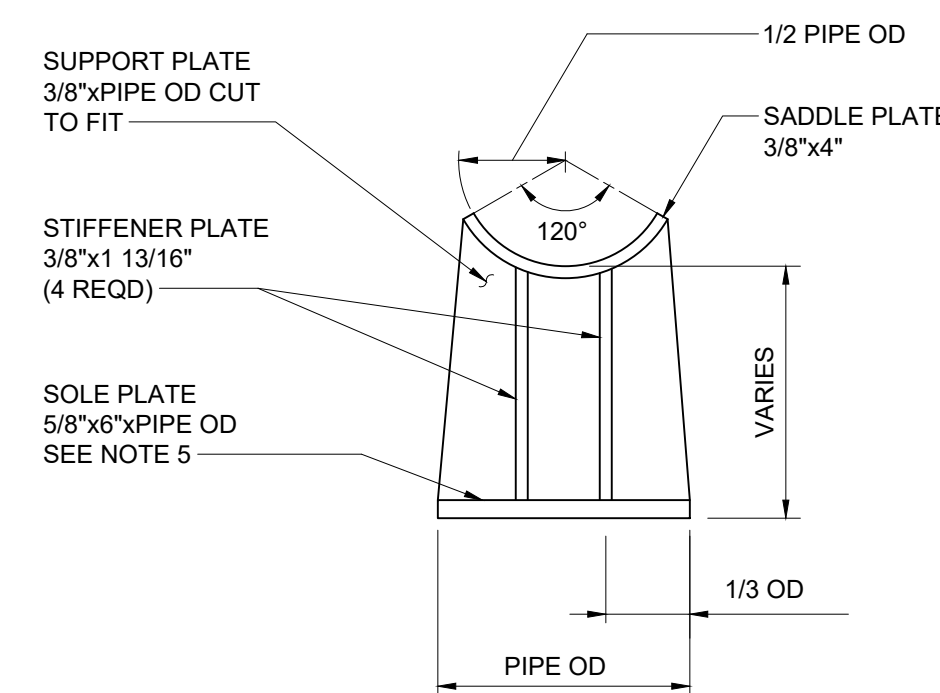
SCHEDULE D												
TRAPEZE SUPPORT (DIM IN INCHES)												
PIPE SIZE	STEEL TUBE SUPPORT BEAM VERT x HOR	MINIMUM ROD Ø (INCHES)		WASHER PLATE	BASE PLATE				WELD	ADHESIVE ANCHOR DIA	MAX SUPPORT SPACING IN FEET (SEE NOTE 9)	
		PROCESS PIPING	STEEL AIR PIPING		A	B	C	D			PROCESS PIPING	STEEL AIR PIPING
12-14	4x4x3/8	1/2	1/2	4x4x1/4	1	10	3/8	3/16	1/2	10	15	
16-24	4x4x3/8	3/4	5/8	4x4x3/8	1	10	1/2	3/16	5/8	10	15	
30-36	6x4x3/8	1	3/4	4x4x1/2	2	12	1/2	1/4	3/4	10	20	
42	6x4x3/8	1 1/4	3/4	5x5x1/2	2	12	3/4	1/4	7/8	10	25	
48	8x4x3/8	1 1/2	1	5x5x3/4	2	12	1	1/4	1	10	30	



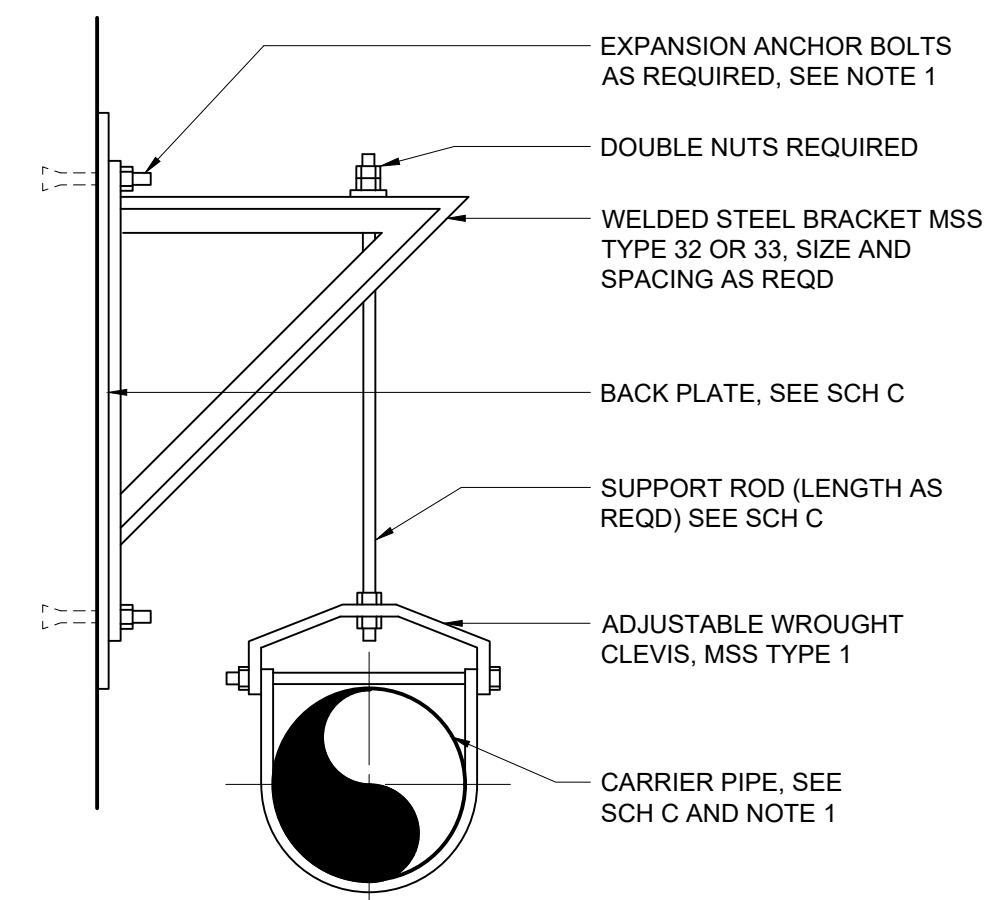
TRAPEZE SUPPORT  
M-40-0310



PIPE SUPPORT BRACKET  
M-40-0305



FABRICATED PIPE SUPPORT  
(AT PIPE)  
M-40-0309



PIPE SUPPORT BRACKET  
M-40-0306

- NOTES:**
- CONTRACTOR SHALL DESIGN THE SUPPORT SYSTEMS BASED ON ACTUAL WEIGHTS AND CONDITIONS AS SPECIFIED OR AS SHOWN ON THE CONTRACT DRAWINGS. PIPE HANGERS, SUPPORTS AND BRACKETS SHOWN HERE IN VARIOUS COMBINATIONS REPRESENT MINIMUM REQUIREMENTS FOR ACCEPTABLE SUPPORTS AS TO TYPES, MATERIALS, THICKNESSES, ORIENTATION, AND QUALITY. CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND DETAILS FOR PIPE SUPPORTS SEALED BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OR COMMONWEALTH WHERE THE PROJECT IS LOCATED WITH ALL PIPE HANGER AND SUPPORT SUBMISSIONS FOR REVIEW BY THE ENGINEER. WHEN SUBMITTING PROPOSED PIPE SUPPORTS AND SUPPORT LOCATIONS, THE CONTRACTOR SHALL USE APPROVED PIPING LAYOUT SUBMITTAL DRAWINGS TO SHOW PROPOSED PIPE SUPPORT TYPE AND LOCATION WITH ACCURATE DIMENSIONS TO DEMONSTRATE THAT SUPPORTS DO NOT EXCEED THE MAXIMUM SPACING REQUIREMENTS OF SECTION 40 05 07. THIS ENSURES THAT SUPPORTS HAVE BEEN COORDINATED WITH ACTUAL PIPE INSTALLATION DRAWINGS, AND THAT SPACING DOES NOT EXCEED MAXIMUM ALLOWABLE SPACING. THE PIPE SUPPORTS SHOWN AND REFERENCED UNDER SCHEDULES A, B & C ARE DESIGNED AND DETAILED FOR GRAVITY LOADING ONLY. RESULTING LATERAL LOADS FROM CONSTRUCTION CONDITIONS, DESIGN SEISMIC EVENT OR OTHER RELATED CONDITIONS SHALL BE APPLIED TO THE PIPE AND OTHER NON-STRUCTURAL COMPONENTS IN ACCORDANCE WITH THE GOVERNING BUILDING CODE. SUPPLEMENTAL LATERAL STIFFNESS, RESISTANCE AND MEMBERS (WHEN NECESSARY) SHALL BE PROVIDED ALONG PIPE OR AT GRAVITY SUPPORTS AND CONNECTIONS WHEN REQUIRED BY CALCULATIONS.
  - MSS REFERS TO THE MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, STANDARD PRACTICE SP-58 AND SP-69.
  - PIPE WALL SUPPORT AND PIPE SUPPORT RACK SHALL BE ASSEMBLED WITH CHANNEL FRAMES AND ACCESSORIES AS MANUFACTURED BY UNISTRUT CORP. OR VERSABAR CORP. OR EQUAL.
  - FABRICATED PIPE SUPPORT MAY BE USED AS SHOWN IN PIPE SUPPORT RACK DETAIL, OR TO SUPPORT PIPE FROM THE FLOOR.
  - BACK PLATES SHALL BE DESIGNED BY THE CONTRACTOR ACCORDING TO WALL TYPES AND THE WEIGHTS INVOLVED. BACK PLATE TO BE SUPPLIED BY BRACKET MANUFACTURER.
  - ALL INSULATED PIPES SHALL USE A SHIELD (MSS TYPE 40) WITH THE APPLICABLE PIPE SUPPORT.
  - MINIMUM OF ONE HANGER PER PIPE SECTION, CLOSE TO JOINT, ON THE BARREL. ALSO AT CHANGE IN DIRECTION AND BRANCH CONNECTIONS.
  - RODS AND SPACING ARE BASED ON STANDARD WEIGHT MATERIALS ACCORDING TO MSS SP-69. AND ARE FOR REFERENCE ONLY. THE CONTRACTOR SHALL SPACE HIS HANGERS BASED ON ACTUAL CONDITIONS.
  - REFER TO THE APPROPRIATE AND RELATED SPECIFICATION SECTIONS AND DRAWINGS OF THE CONTRACT DOCUMENTS REGARDING SUPPLEMENTAL DESIGN REQUIREMENTS RELATING TO PERFORMANCE SUBMISSIONS BY CONTRACTOR. ALL NON-STRUCTURAL COMPONENTS, INCLUDING PIPING, HVAC DUCT, PLUMBING AND ELECTRICAL CONDUIT SUPPORT SYSTEMS SHALL BE ADEQUATELY DESIGNED AND INSTALLED UTILIZING SUFFICIENT CONNECTIONS AND MEMBERS TO ACCOMMODATE AND RESIST THE DESIGN LATERAL FORCES ASSOCIATED WITH A SPECIFIC COMPONENTS DYNAMIC INERTIA DURING THE DESIGN SEISMIC EVENT. REFER TO THE CODE COMPLIANCE DRAWING FOR STRUCTURAL DESIGN INFORMATION FOR SPECIFIC SEISMIC DESIGN CRITERIA.

FILE: C:\MSHAZEN\PROJECTS\2020\10\05\MD-02\_Sheet2.dwg  
PLOT DATE: 10/20/2020 2:11 PM BY: RSHNAYDERMAN

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	N. BOYLE
DRAWN BY:	R. SHNAYDERMAN
CHECKED BY:	I. MACKENZIE
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY TORI YOKOYAMA, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C71482



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA  
  
PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

MECHANICAL  
STANDARD DETAILS 2

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 15 of 36
	MD-02





**GENERAL STRUCTURAL NOTES**

- G-1 THESE NOTES ARE GENERAL AND SUPPLEMENT THE SPECIFICATIONS. THESE NOTES APPLY TO THE ENTIRE PROJECT UNLESS MODIFIED OR NOTED OTHERWISE IN THE CONTRACT DOCUMENTS.
- G-2 STANDARD DETAILS SHALL BE USED WHEN REFERRED TO OR WHEN NO MORE RESTRICTIVE OR DIFFERENT DETAILS ARE SHOWN ON THE DRAWINGS.
- G-3 DESIGN IS IN ACCORDANCE WITH AND CONSTRUCTION SHALL COMPLY WITH THE PROVISIONS OF THE 2019 CALIFORNIA BUILDING CODE. THE DESIGN LOADS AND OTHER DESIGN VALUES GIVEN IN NOTES G-4 THROUGH G-8 WERE USED FOR DESIGN OF STRUCTURES UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- G-4 LIVE LOADS:

STRUCTURE \ LEVEL	ROOF	BOTTOM / GROUND FLOOR	EQUIPMENT
IX TREATMENT SYSTEM SLAB	N/A	150 PSF + CONCENTRATIONS	88,700 LBS PER VESSEL
CANOPY STRUCTURE	20 PSF	N/A	N/A

-ALL STAIRWAYS, LANDINGS AND PLATFORMS ARE DESIGNED FOR A LIVE LOAD = 100 PSF UNLESS NOTED OTHERWISE.

- G-5 SNOW LOAD:  
GROUND SNOW LOAD (Pg) = 0 PSF
- G-6 WIND DESIGN CRITERIA:

BASIC DESIGN WIND SPEED (V) = 102 MPH [2019 CBC FIGURE 1609.3(2)]  
ALLOWABLE STRESS DESIGN WIND SPEED (V<sub>asd</sub>) = 79 MPH  
RISK CATEGORY = III  
WIND EXPOSURE = C

STRUCTURE \ PARAMETER	PRESSURE COEFFICIENT G <sub>Cpi</sub>	PRESSURE COEFFICIENT G <sub>Cf</sub>	WIND DESIGN PRESSURE	COMPONENTS AND CLADDING	LATERAL LOAD RESISTING SYSTEM
IX TREATMENT SYSTEM	N/A	±0.18	22.71 PSF	N/A	BY MFR
CANOPY STRUCTURE	0.00	N/A	20.9 PSF/-19.2 PSF	22.8 PSF/-20.5 PSF	BY MFR

- G-7 SEISMIC LOAD:  
RISK CATEGORY = III  
SEISMIC IMPORTANCE FACTOR (I<sub>e</sub>) = 1.25  
SITE CLASS = D  
MAPPED SPECTRAL RESPONSE ACCELERATIONS (S<sub>s</sub>/S<sub>1</sub>) = 1.50/0.60  
SPECTRAL RESPONSE ACCELERATIONS (S<sub>MS</sub>/S<sub>M1</sub>) = 1.50/1.02  
SPECTRAL RESPONSE COEFFICIENTS (SDS/SD1) = 1.00/0.68  
SEISMIC DESIGN CATEGORY = D

STRUCTURE \ PARAMETER	BASIC STRUCTURAL SYSTEM	DESIGN BASE SHEAR	SEISMIC RESPONSE COEFFICIENT C <sub>s</sub>	RESPONSE MODIFICATION COEFFICIENT R	ANALYSIS PROCEDURE
IX TREATMENT SYSTEM	BY MFR	BY MFR	BY MFR	BY MFR	EQUIVALENT LATERAL FORCE
CANOPY STRUCTURE	MOMENT FRAME	BY MFR	BY MFR	BY MFR	EQUIVALENT LATERAL FORCE

- G-8 RAIN LOAD:  
RAIN INTENSITY (i) = 1.10 IN/HR
- G-9 ALL DIMENSIONS INDICATED FOR EXISTING STRUCTURES SHALL BE VERIFIED BY FIELD MEASUREMENT. ALL DIMENSIONS THAT ARE CONTROLLED BY OR RELATED TO EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR WITH THE MANUFACTURER SHOP DRAWINGS PRIOR TO CONSTRUCTION.
- G-10 THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING INFORMATION IN THE FIELD AS REQUIRED FOR NEW WORK.
- G-11 IF A CONFLICT IS FOUND BETWEEN DIFFERENT PORTIONS OF THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND OWNER IMMEDIATELY. CONTINUED CONSTRUCTION OF THE AREA IN CONFLICT SHALL BE AT THE CONTRACTOR'S OWN RISK UNTIL THE CONFLICT IS RESOLVED.
- G-12 EQUIPMENT ANCHOR SIZES, TYPES, EMBEDMENT AND PATTERNS SHALL BE VERIFIED WITH THE MANUFACTURER. ALL ANCHOR PATTERNS SHALL BE TEMPLATED TO INSURE ACCURACY OF PLACEMENT.
- G-13 STRUCTURAL DRAWINGS SHALL BE USED IN COORDINATION WITH THE DRAWINGS OF ALL OTHER DISCIPLINES AND MANUFACTURER'S SHOP DRAWINGS.
- G-14 STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON THE COMPLETED STRUCTURE. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND TEMPORARY SUPPORTS WHEREVER EXCESSIVE CONSTRUCTION LOADS MAY OCCUR. OVERSTRESSING OF ANY STRUCTURAL ELEMENT IS PROHIBITED.
- G-15 IF CONTRACTOR DESIRES TO TEMPORARILY PLACE OR MOVE LOADS ON OR ADJACENT TO EXISTING STRUCTURES OR UTILITIES DURING CONSTRUCTION PROCESS, CONTRACTOR IS EXCLUSIVELY RESPONSIBLE FOR MAINTAINING STRUCTURAL INTEGRITY AND AVOIDING OVERSTRESSING AND DAMAGING EXISTING STRUCTURES AND UTILITIES. CONTRACTOR SHALL SUBMIT STRUCTURAL CALCULATIONS AND DRAWINGS VERIFYING THAT PROPOSED CONSTRUCTION (INCLUDING APPLICATION OF TEMPORARY CONSTRUCTION LOADS) WILL NOT OVERSTRESS OR DAMAGE EXISTING STRUCTURES AND UTILITIES. DRAWINGS AND CALCULATIONS SHALL BE SEALED BY A PROFESSIONAL ENGINEER CURRENTLY REGISTERED IN THE STATE OF CALIFORNIA.

**STRUCTURAL METALS**

- M-1 DETAIL, FABRICATE, AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH ANSI/AISC 360 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, LATEST EDITION.
- M-2 STEEL MATERIAL:  
A) STRUCTURAL HSS: ASTM A500, GRADE C (48/50 KSI) OR A1085 GRADE A (50 KSI)  
B) STRUCTURAL PIPE: ASTM A53, GRADE B (35 KSI)  
C) PLATES, BARS AND ANGLES: ASTM A36 UNO (36 KSI)  
D) STRUCTURAL W, C, & MC SHAPES: ASTM A992 (50 KSI)  
E) STRUCTURAL M & S SHAPES: ASTM A36 (36 KSI)  
F) STRUCTURAL HP: ASTM A572 GRADE 50 (50 KSI)  
G) ANCHOR RODS: ASTM F1554 GRADE 55 (55 KSI)
- M-3 PROVIDE MINIMUM 3/4" DIAMETER ASTM F3125 GRADE A325 TYPE 1 OR GRADE F1852 TYPE 1 HIGH STRENGTH BOLTS WITH SNUG TIGHTENED TYPE N CONNECTIONS FOR STRUCTURAL STEEL UNLESS NOTED OTHERWISE. HOLES FOR BOLTS SHALL BE STANDARD SIZE UNLESS NOTED OTHERWISE.
- M-4 PROVIDE TYPICAL STEEL BEAM CONNECTIONS FOR A CAPACITY OF NOT LESS THAN ONE HALF OF THE TOTAL UNIFORM LOAD CAPACITY TABULATED IN THE AISC TABLES FOR ALLOWABLE LOADS OF BEAMS UNLESS NOTED OTHERWISE.
- M-5 DO NOT PAINT STEEL SURFACES WHICH ARE TO BE WELDED OR ARE TO BE ENCASED IN CONCRETE.
- M-6 ALL STAINLESS STEEL FABRICATIONS EXPOSED TO UNDERWATER SERVICE SHALL BE TYPE 316. ALL OTHER STAINLESS STEEL FABRICATIONS SHALL BE TYPE 304 UNLESS NOTED OTHERWISE.
- M-7 ALUMINUM SHALL BE ALLOY 6061-T6 UNLESS NOTED OTHERWISE.
- M-8 ALL BOLTS, ANCHORS, AND CONCRETE ANCHORS CONNECTING ALUMINUM SHALL BE STAINLESS STEEL TYPE 316 FOR UNDERWATER APPLICATIONS AND TYPE 304 FOR ALL OTHER APPLICATIONS.
- M-9 ALUMINUM SHALL BE ISOLATED FROM CONTACT WITH CONCRETE AND DISSIMILAR METALS.
- M-10 ALL GROOVE AND BUTT WELDS SHALL BE FULL PENETRATION.
- M-11 FILLET WELD SIZES SHALL NOT BE LESS THAN THE MINIMUM SIZE REQUIRED BY AISC CODE FOR PLATE SIZES TO BE CONNECTED AND SHALL BE APPLIED TO THE ENTIRE JOINT CONTACT LENGTH, AND NOT LESS THAN 3/16".
- M-12 BOTTOM SURFACES OF BASE PLATES SHALL BE GROUTED TO ENSURE FULL BEARING CONTACT WITH CONCRETE SLAB.
- M-13 WHENEVER ONE MEMBER IS FASTENED TO ANOTHER WITH FASTENINGS (BOLTS, WELDS, ETC.) SET AT A UNIFORM SPACING, A MINIMUM OF TWO FASTENINGS PER PIECE SHALL BE CONNECTED AND THE FIRST AND LAST FASTENINGS SHALL BE LOCATED NOT TO EXCEED 0.25 OF FASTENER SPACING FROM EACH END.
- M-14 GRATING PANELS SHALL BE CONFINED TO PREVENT MOVEMENT PER STANDARD DETAIL S-05-0706. USE OF GRATING CLIP ATTACHMENT IS NOT ACCEPTABLE TO PREVENT GRATING MOVEMENT.

**FOUNDATIONS**

- F-1 CONCRETE (CAST-IN-PLACE) NOTES APPLY TO FOUNDATIONS.
  - F-2 ALLOWABLE SOIL BEARING PRESSURE
- | STRUCTURE \ PARAMETER    | ALLOWABLE SOIL BEARING PRESSURE |
|--------------------------|---------------------------------|
| IX TREATMENT SYSTEM SLAB | 3,500 PSF                       |
- F-3 MINIMUM DEPTH FROM ADJACENT FINISHED GRADE TO BOTTOM OF FOUNDATION = 18 INCHES.
  - F-4 PROJECT SITE IS NOT LOCATED IN 100-YEAR FLOOD PLAIN JURUPA VALLEY GIS MAP.

**NONSTRUCTURAL COMPONENT ANCHORAGE**

- A-1 ALL ARCHITECTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS SHALL BE DESIGNED AND INSTALLED TO RESIST THE CONTROLLING CONDITION OF OPERATIONAL FORCES. WIND FORCES OR SEISMIC FORCES IN ACCORDANCE WITH THE GOVERNING BUILDING CODE. SEISMIC FORCES SHALL BE AS PER ASCE 7-16. COMPONENTS SHALL BE BOLTED, WELDED, OR OTHERWISE POSITIVELY FASTENED WITHOUT CONSIDERATION OF FRICTIONAL RESISTANCE PRODUCED BY THE EFFECTS OF GRAVITY. A CONTINUOUS LOAD PATH OF SUFFICIENT STRENGTH AND STIFFNESS BETWEEN THE COMPONENT AND THE SUPPORTING STRUCTURE SHALL BE PROVIDED. CONNECTIONS FOR BOTH ORTHOGONAL DIRECTIONS (TRANSVERSE AND LONGITUDINAL) SHALL BE DESIGNED BY THE CONTRACTOR'S ENGINEER CURRENTLY REGISTERED IN THE STATE OF CALIFORNIA.
- A-2 COMPONENT REACTION FORCES AT THE POINT OF ATTACHMENT TO THE STRUCTURE SHALL BE SUBMITTED TO AND COORDINATED WITH THE ENGINEER FOR CONFIRMATION THAT SUPPORTING STRUCTURE IS ADEQUATE TO RESIST REQUIRED REACTION FORCES.
- A-3 CONTRACTOR SHALL PROVIDE SPECIAL SEISMIC CERTIFICATION (SSC) FROM MANUFACTURER OF EQUIPMENT FOR ALL SYSTEMS DEEMED NECESSARY BY SPECIFICATIONS. SPECIAL SEISMIC CERTIFICATION SHALL BE IN COMPLIANCE WITH ASCE 7-16.

**EXISTING INFORMATION**

- X-1 ALL EXISTING INFORMATION SHOWN ON THESE DRAWINGS INCLUDING LOCATION, DIMENSIONS, ELEVATIONS, AND CONFIGURATIONS IS DERIVED FROM THE 2011 WELL 18 AS-BUILTS CONTRACT DRAWINGS AND IS NOT GUARANTEED TO BE COMPLETE OR CORRECT.
- X-2 THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING INFORMATION IN THE FIELD AS REQUIRED FOR DEMOLITION AND MODIFICATIONS.

**SPECIAL INSPECTIONS**

- SI-1 SPECIAL PERIODIC AND CONTINUOUS INSPECTIONS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS AND THE CALIFORNIA BUILDING CODE, CHAPTER 17. SEE SCHEDULE OF SPECIAL INSPECTIONS ON SHEET S-02.

**CONCRETE (CAST-IN-PLACE)**

- C-1 DESIGN OF CONCRETE ELEMENTS INCLUDING WALLS, FORMED SLABS, BEAMS, AND COLUMNS IS IN ACCORDANCE WITH ACI 318 (CODE REQUIREMENTS FOR STRUCTURAL CONCRETE)
- C-2 FOR CONCRETE MIX DESIGN SEE SPECIFICATION SECTION 03 30 00.
- C-3 CONCRETE STRENGTH CLASSES (28-DAY COMPRESSIVE STRENGTH):  
A) CLASS A2 CONCRETE (4,000 PSI); NORMAL WEIGHT STRUCTURAL CONCRETE IN ALL STRUCTURES UNLESS OTHERWISE NOTED ON DRAWINGS, AND FOR ALL SIDEWALKS, CURB AND GUTTERS, AND PAVEMENT.  
B) CLASS B CONCRETE (3,000 PSI); NORMAL WEIGHT STRUCTURAL CONCRETE USED FOR DUCT BANK ENCASUREMENTS, CATCH BASINS, FENCE AND GUARD POST EMBEDMENT, CONCRETE FILL, AND OTHER AREAS WHERE SPECIFICALLY NOTED ON CONTRACT DRAWINGS.
- C-4 ALL BAR REINFORCING SHALL CONFORM TO ASTM A615, GRADE 60. WHERE REINFORCEMENT IS TO BE WELDED IN ACCORDANCE WITH AWS D1.4, ASTM A706 GRADE 60 SHALL BE USED. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
- C-5 CONCRETE COVER FOR REINFORCING (UNLESS NOTED OTHERWISE ON THE DRAWINGS):  
A) CONCRETE DEPOSITED DIRECTLY AGAINST SOIL: 3"  
B) CONCRETE EXPOSED TO WEATHER (#5 OR SMALLER): 1 1/2"  
CONCRETE EXPOSED TO WEATHER (#6 OR LARGER): 2"  
C) SLABS: 1 1/2"  
AT SURFACES CONTACTING FLUID: 2"  
D) BEAMS AND COLUMNS (TO MAIN REINFORCEMENT): 2"  
BEAMS AND COLUMNS (TO COLUMN TIES OR STIRRUPS): 1 1/2"  
E) WALLS 12" OR MORE: 2"  
WALLS LESS THAN 12" (#5 OR SMALLER): 1 1/2"  
WALLS LESS THAN 12" (#6 OR LARGER): 2"  
F) FOR SURFACES EXPOSED TO FLUID IN BEAMS, COLUMNS AND WALLS: ADD 1/2" TO ABOVE VALUES
- C-6 SPLICES SHALL BE CLASS "B" CONFORMING TO THE PROVISIONS OF ACI 318 UNLESS NOTED OTHERWISE. SPLICE LENGTH FOR TWO DIFFERENT SIZED BARS TO BE LAP SPLICED TOGETHER SHALL BE THE LENGTH OF THE LARGER BAR UNLESS NOTED OTHERWISE.
- C-7 CONSTRUCTION JOINTS SHALL BE LOCATED AS SHOWN ON THE DRAWINGS. CONSTRUCTION JOINTS NOT SHOWN SHALL BE SUBMITTED BY THE CONTRACTOR FOR THE APPROVAL OF THE ENGINEER PRIOR TO SUBMITTING REBAR SHOP DRAWINGS.
- C-8 ALL JOINTS WHICH ARE IN MEMBERS IN CONTACT WITH LIQUID OR BELOW GRADE SHALL HAVE A WATERSTOP. CONSTRUCTION JOINTS SHALL HAVE A 6" PVC RIBBED WATERSTOP. EXPANSION JOINTS SHALL HAVE A 9" PVC CENTER BULB RIBBED WATERSTOP. IN VERTICAL JOINTS, WATERSTOPS SHALL TERMINATE NO LESS THAN 18" ABOVE THE MAXIMUM WATER SURFACE OR 18" ABOVE GRADE, WHICHEVER IS HIGHER.
- C-9 ALL EXPOSED CORNERS SHALL HAVE A 3/4" CHAMFER.
- C-10 EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DOCUMENTS, SHALL BE INSTALLED PRIOR TO PLACING CONCRETE.
- C-11 REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH ANY METAL PIPE, PIPE FLANGE, METAL CONDUIT, OR OTHER METAL PARTS EMBEDDED IN CONCRETE. A MINIMUM CLEARANCE OF 2" SHALL BE PROVIDED.
- C-12 CONDUITS AND OTHER SIMILAR ITEMS EMBEDDED IN OR PENETRATING THROUGH CONCRETE SHALL BE SPACED ON CENTER NOT LESS THAN 3 TIMES THEIR OUTSIDE DIMENSION, BUT NOT LESS THAN 2 1/2" CLEAR. WHEN SUCH ITEMS ARE EMBEDDED IN WALLS OR SLABS, THEY SHALL NOT OCCUPY MORE THAN 1/3 OF THE MEMBER THICKNESS.
- C-13 AT ALL TYPICAL CURBS, EQUIPMENT PADS, AND PIPE SUPPORT PIERS, REINFORCING DOWELS SHOWN MAY BE REPLACED WITH MATCHING DOWELS SET IN EPOXY IN DRILLED HOLES AS SPECIFIED. DOWELS LOCATED CLOSER THAN 3" FROM ANY EDGE OF CONCRETE SHALL NOT BE REPLACED WITH DRILLED DOWELS.
- C-14 DRILLED ADHESIVE DOWELS AND CONCRETE ANCHORS (WHERE DOWELS OR ANCHORS ARE SHOWN TO BE PLACED INTO HARDENED CONCRETE, SEE SPECIFICATION SECTION 03 21 00):  
A) ADJUST THE DOWEL OR ANCHOR LOCATIONS AS NEEDED TO AVOID DRILLING THROUGH ANY REINFORCING BARS. IF THE LOCATION NEEDS TO BE MODIFIED, CONTACT THE ENGINEER. CONTRACTOR SHALL USE NON-DESTRUCTIVE MEANS TO FIELD LOCATE REINFORCEMENT PRIOR TO DRILLING HOLES FOR DOWELS OR ANCHORS.
- C-15 CLEAR DISTANCE FROM ANCHOR RODS TO ANY CONCRETE EDGE SHALL BE 4" MINIMUM UNLESS NOTED OTHERWISE.

**DEMOLITION**

- D-1 FOR DEMOLITION REQUIREMENTS, REFER TO SPECIFICATION 02 41 00 - DEMOLITION.
- D-2 CONCRETE DEMOLITION WITHIN STRUCTURES BEING MODIFIED SHALL BE SELECTIVE DEMOLITION BY CORE DRILLING OR SAWCUTTING AND CAREFUL REMOVAL OF CONCRETE SHOWN TO BE REMOVED. NO OVER CUTTING OF AREAS TO BE DEMOLISHED SHALL BE PERMITTED. CONTRACTOR SHALL CORE DRILL CORNERS OF OPENING PRIOR TO SAWCUTTING. EXPLOSIVES AND VIBRATORY HAMMERS SHALL NOT BE USED FOR DEMOLITION WORK.
- D-3 UNLESS ANCHORING DEVICES AND/OR REINFORCEMENT IS NOTED TO REMAIN FOLLOWING DEMOLITION, REMOVE AND/OR BURN BACK ANCHORS AND REINFORCEMENT STEEL 1/2" MIN BELOW SURFACE AND VOIDS CREATED SHALL BE FILLED WITH EPOXY RESIN BINDER.
- D-4 EMBEDDED CONDUIT ENCOUNTERED DURING DEMOLITION WORK LIMITS SHALL BE PERMANENTLY REROUTED AS NECESSARY. CONTRACTOR SHALL SUBMIT PROPOSED MEANS OF REROUTING ANY INTERFERING CONDUIT.
- D-5 WHERE DRAWINGS INDICATE A CONCRETE EQUIPMENT PAD TO BE DEMOLISHED, THE FLOOR SLAB SURFACE SHALL BE REPAIRED AS APPROVED BY ENGINEER. FOLLOWING SELECT DEMOLITION AND REMOVAL OF THE EQUIPMENT PAD REMOVAL THE REPAIR SHALL BE:  
A. SAWCUT THE FLOOR AROUND THE EQUIPMENT PAD PERIMETER TO A DEPTH OF 1/4".  
B. SCARIFY AND REMOVE SLAB CONCRETE WITHIN THE PERIMETER TO A NOMINAL 1/4" DEPTH CLEAN AND REMOVE ALL CONCRETE LAITANCE.  
C. RESURFACE THE AREA BY APPLYING A POLYMER MODIFIED OR SILICA FUME ENHANCED CEMENTITIOUS REPAIR MORTAR, APPROVED BY THE ENGINEER, FOLLOWING THE MANUFACTURER'S SURFACE PREPARATION AND APPLICATION RECOMMENDATIONS. LEVEL AND FINISH THE SURFACE TO MATCH THE FLOOR SLAB SURROUNDING AREA.
- D-6 PRIOR TO DEMOLITION OF SMALL OPENINGS (LESS THAN 6 INCHES IN SIZE) FOR PENETRATIONS, ETC., CONTRACTOR SHALL USE NON-DESTRUCTIVE MEANS TO FIELD LOCATE REINFORCEMENT. OPENINGS SHALL BE LOCATED TO AVOID CUTTING THROUGH EXISTING REINFORCEMENT, IF POSSIBLE. EXISTING REINFORCEMENT SHALL NOT BE CUT WITHOUT APPROVAL OF ENGINEER.
- D-7 CONCRETE SURFACES LEFT EXPOSED FOLLOWING DEMOLITION SHALL BE SEALED WITH EPOXY RESIN COATING SUCH AS DURALKOTE 240 BY EUCLID CHEMICAL, OR APPROVED EQUAL.
- D-8 DETAILED CONSTRUCTION AND DEMOLITION PLAN SHALL BE SUBMITTED TO THE ENGINEER AND APPROVED BY THE ENGINEER AND OWNER PRIOR TO BEGINNING CONSTRUCTION. ANY SHUTDOWNS SHALL BE SUBMITTED TO, COORDINATED WITH, AND APPROVED BY THE OWNER. ONCE APPROVED, CONTRACTOR SHALL PROVIDE A MINIMUM OF THREE (3) WEEKS NOTICE TO OWNER PRIOR TO SHUTDOWN.

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	J. BERGER
DRAWN BY:	A. GARCIA
CHECKED BY:	W. DRESSLER
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"
REV	ISSUED FOR DATE BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY SEAN DUPUIS, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C85064



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

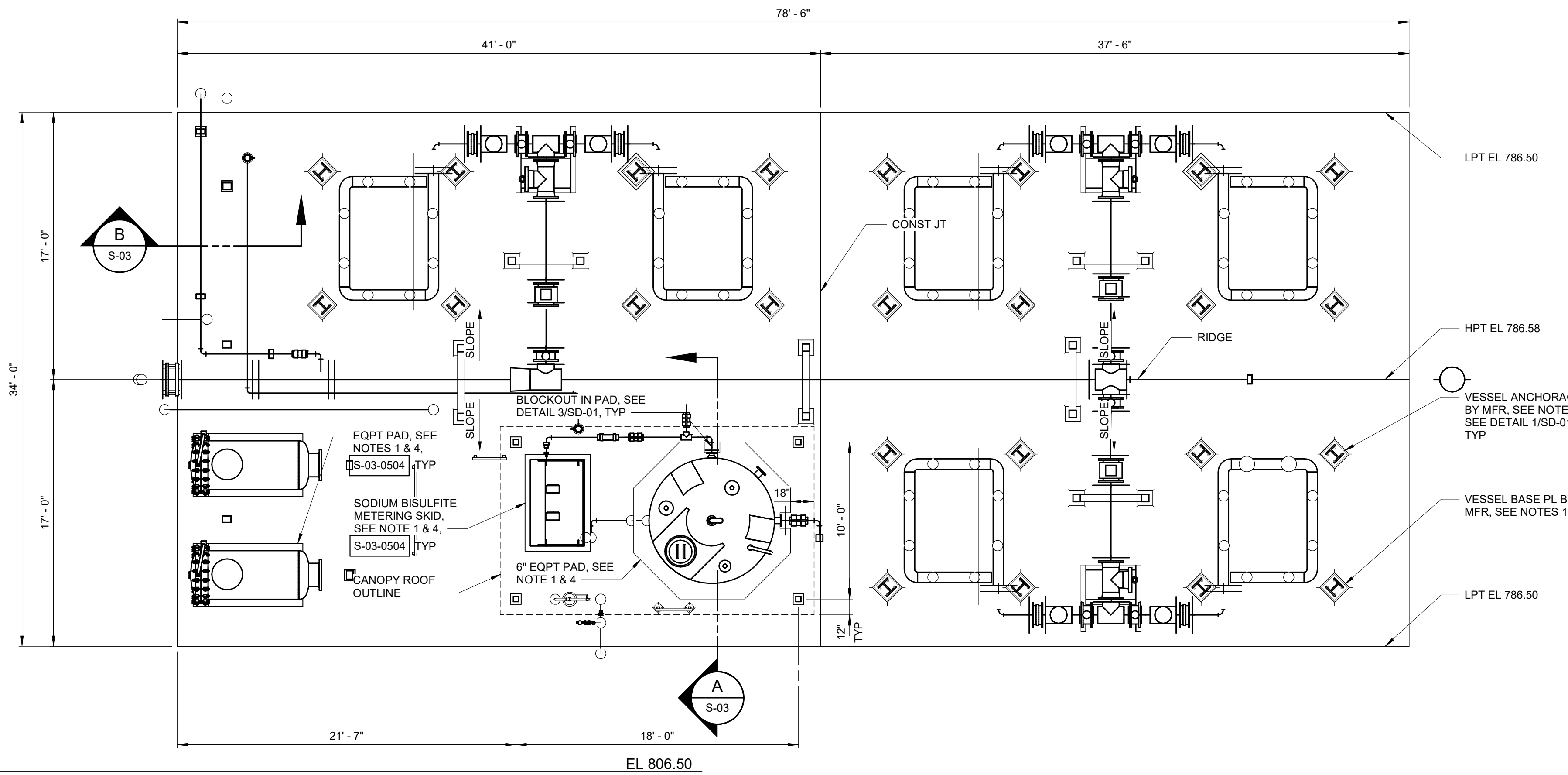
STRUCTURAL  
GENERAL NOTES

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	1
DRAWING NUMBER:	SHEET 17 of 36
	S-01

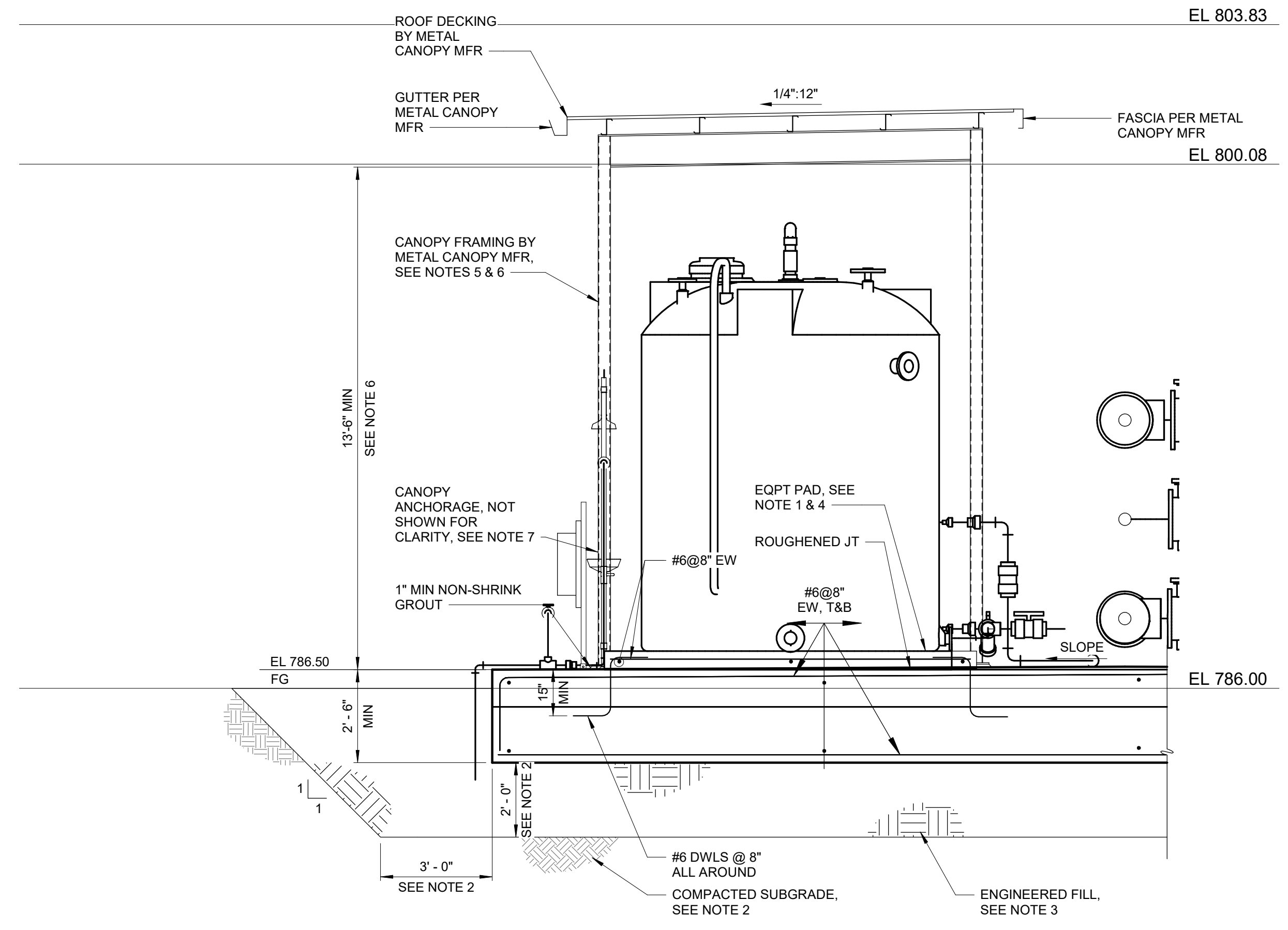




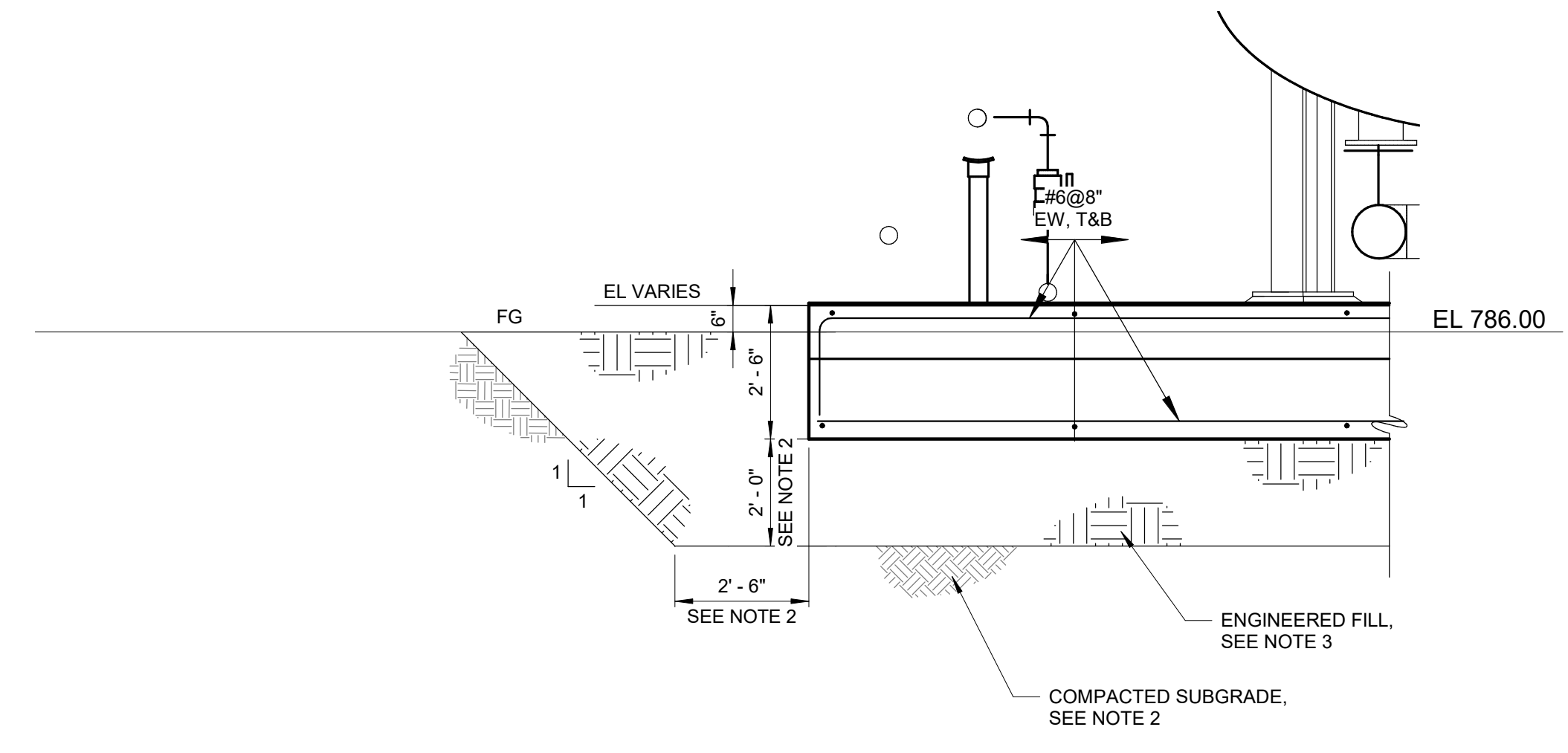
- NOTES:**
- GENERAL CONTRACTOR SHALL REFER TO THE MECHANICAL DRAWINGS FOR LOCATION OF IX VESSELS AND THE CONCRETE EQUIPMENT PADS SUPPORTING THE CARTRIDGE FILTERS AND SODIUM BISULFITE STORAGE TANK. GENERAL CONTRACTOR SHALL COORDINATE WITH EQUIPMENT MANUFACTURER TO VERIFY PLAN DIMENSION AND THICKNESS OF EQUIPMENT PADS. GENERAL CONTRACTOR IS RESPONSIBLE FOR DESIGN OF PIPE SUPPORTS AND THEIR ANCHORAGE IN CONFORMANCE WITH SPECIFICATION 40 05 07. REFER TO THE MECHANICAL DRAWINGS FOR PIPE SUPPORT LOCATIONS.
  - OVER-EXCAVATION AS SHOWN ON THE DRAWINGS SHALL EXTEND VERTICALLY TO A MINIMUM DEPTH OF 2 FEET BELOW LOWEST BOTTOM OF FOUNDATION ELEVATION OR 3 FEET BELOW EXISTING GROUND SURFACE, WHICHEVER IS DEEPER. EXCAVATION SHALL EXTEND LATERALLY A MINIMUM OF 3 FEET BEYOND THE SLAB EDGE ALONG EACH SIDE. EXPOSED BOTTOM OF EXCAVATIONS SHALL BE SCARIFIED A MINIMUM DEPTH OF 6 INCHES. MOISTURE CONDITIONED TO WITHIN 3 PERCENT OF OPTIMUM FOR COARSE SOILS AND 0 TO 2 PERCENT ABOVE OPTIMUM FOR FINE SOILS, AND RECOMPACTED TO AT LEAST 90 PERCENT RELATIVE COMPACTION.
  - IN CONFORMANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL INVESTIGATION, ENGINEERED FILL MATERIAL SHALL BE PLACED IN UNIFORM LIFTS NO GREATER THAN 6 INCHES IN UNCOMPACTED THICKNESS MOISTURE CONDITIONED TO WITHIN 3 PERCENT OF OPTIMUM FOR COARSE SOILS AND 0 TO 2 PERCENT ABOVE OPTIMUM FOR FINE SOILS, AND COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DRY DENSITY PER ASTM D1557.
  - GENERAL CONTRACTOR SHALL SUBMIT PROPOSED ANCHORAGE PLAN WITH STRUCTURAL CALCULATIONS AND DRAWINGS, SIGNED AND SEALED BY A CIVIL ENGINEER CURRENTLY REGISTERED IN THE STATE OF CALIFORNIA. MINIMUM EMBEDMENT OF ANCHOR SHALL BE INTO THE SLAB AND NOT THE EQUIPMENT PAD. GENERAL CONTRACTOR SHALL COORDINATE ANCHORAGE DESIGN WITH THE ENGINEER PRIOR TO THE CONCRETE POUR. ANCHORS SHALL BE DESIGNED IN ACCORDANCE WITH ASCE 7-16, SECTION 15.7.5 AND ACI 318-14 SECTIONS 17.2.3.4.3 AND 17.2.3.5.3.
  - PRE-FABRICATED METAL CANOPY SHALL BE DESIGNED BY A METAL BUILDING MANUFACTURER IN ACCORDANCE WITH THE 2019 CALIFORNIA BUILDING CODE AND THE WIND AND SEISMIC DESIGN CRITERIA LISTED IN NOTES G-6 AND G-7 ON DRAWING S-01. METAL CANOPY DESIGN CALCULATIONS AND DETAILED DRAWINGS SHALL BE SIGNED AND SEALED BY A CIVIL ENGINEER CURRENTLY REGISTERED IN THE STATE OF CALIFORNIA. SEE SPECIFICATION TO 13 34 19.
  - METAL CANOPY IS SHOWN SCHEMATICALLY. METAL CANOPY SHALL HAVE A 2'-6" MINIMUM VERTICAL CLEARANCE FROM THE TOP OF THE CHEMICAL STORAGE TANK. CANOPY MANUFACTURER SHALL COORDINATE WITH THE GENERAL CONTRACTOR FOR EQUIPMENT HEIGHT.
  - GENERAL CONTRACTOR SHALL COORDINATE ANCHOR ROD REQUIREMENTS WITH THE CANOPY MANUFACTURER. CANOPY ANCHORAGE TO THE FOUNDATION SHALL BE DESIGNED AND DETAILED BY THE GENERAL CONTRACTOR, IN ACCORDANCE WITH SPECIFICATION 13 34 19.
  - GENERAL CONTRACTOR SHALL COORDINATE WITH IX VESSEL MANUFACTURER TO CREATE ANCHOR ROD TEMPLATE USED TO LOCATE ANCHOR RODS AND ANCHOR REINFORCING. GENERAL CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSITION OF ANCHOR REINFORCING DURING CONCRETE PLACEMENT.



**PLAN**  
3/16" = 1'-0"



**SECTION A**  
3/8" = 1'-0"



**SECTION B**  
3/8" = 1'-0"

BM 360/20168-000\_PFA5 Treatment Evaluation and Design/20168-000-200-1A-S.rvt  
 10/23/2021 12:19:43 PM

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	J. BERGER		
DRAWN BY:	A. GARCIA		
CHECKED BY:	W. DRESSLER		
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"		
REV	ISSUED FOR	DATE	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY SEAN DUPUIS, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C85064

**Hazen**

HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

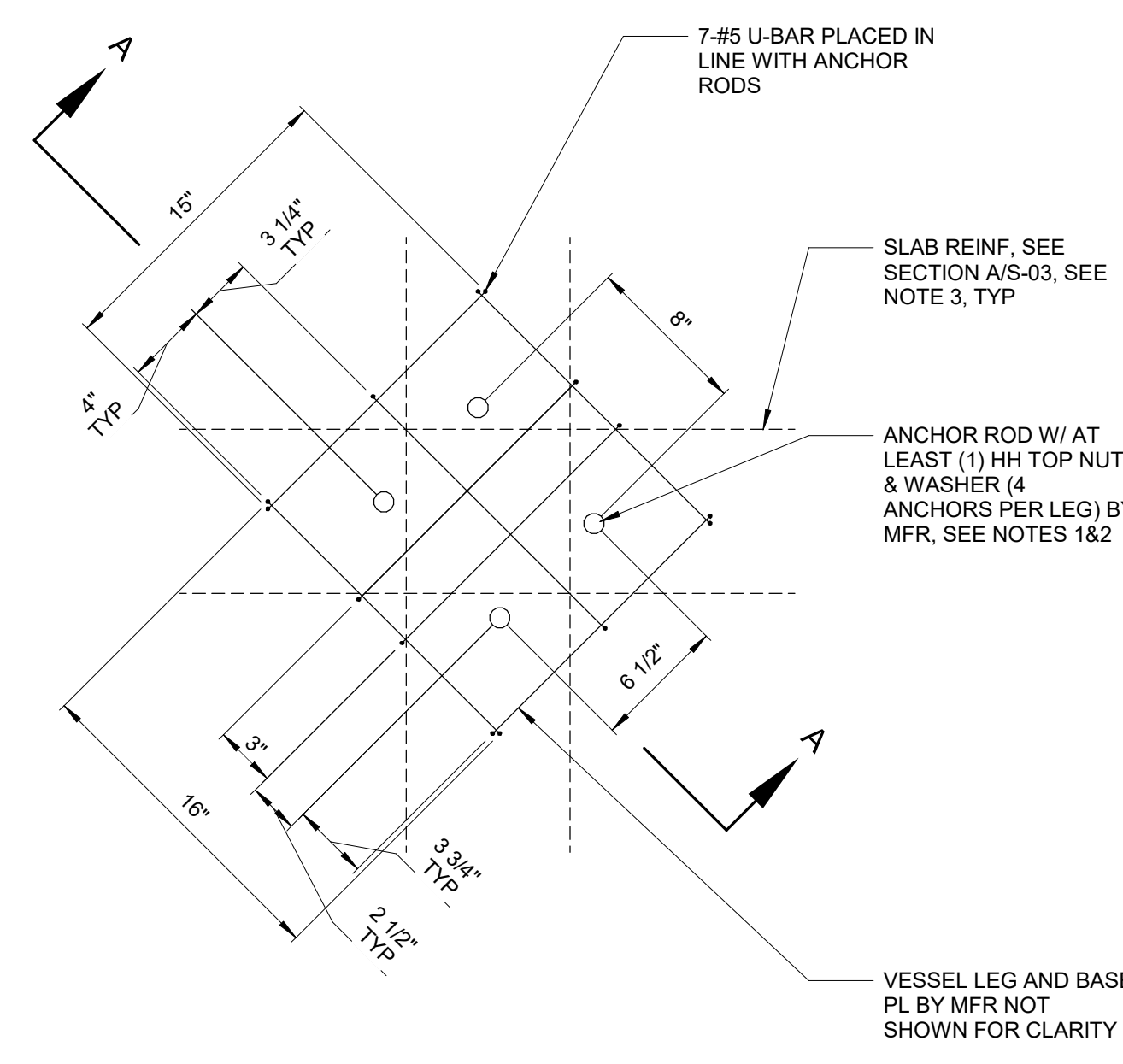
RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

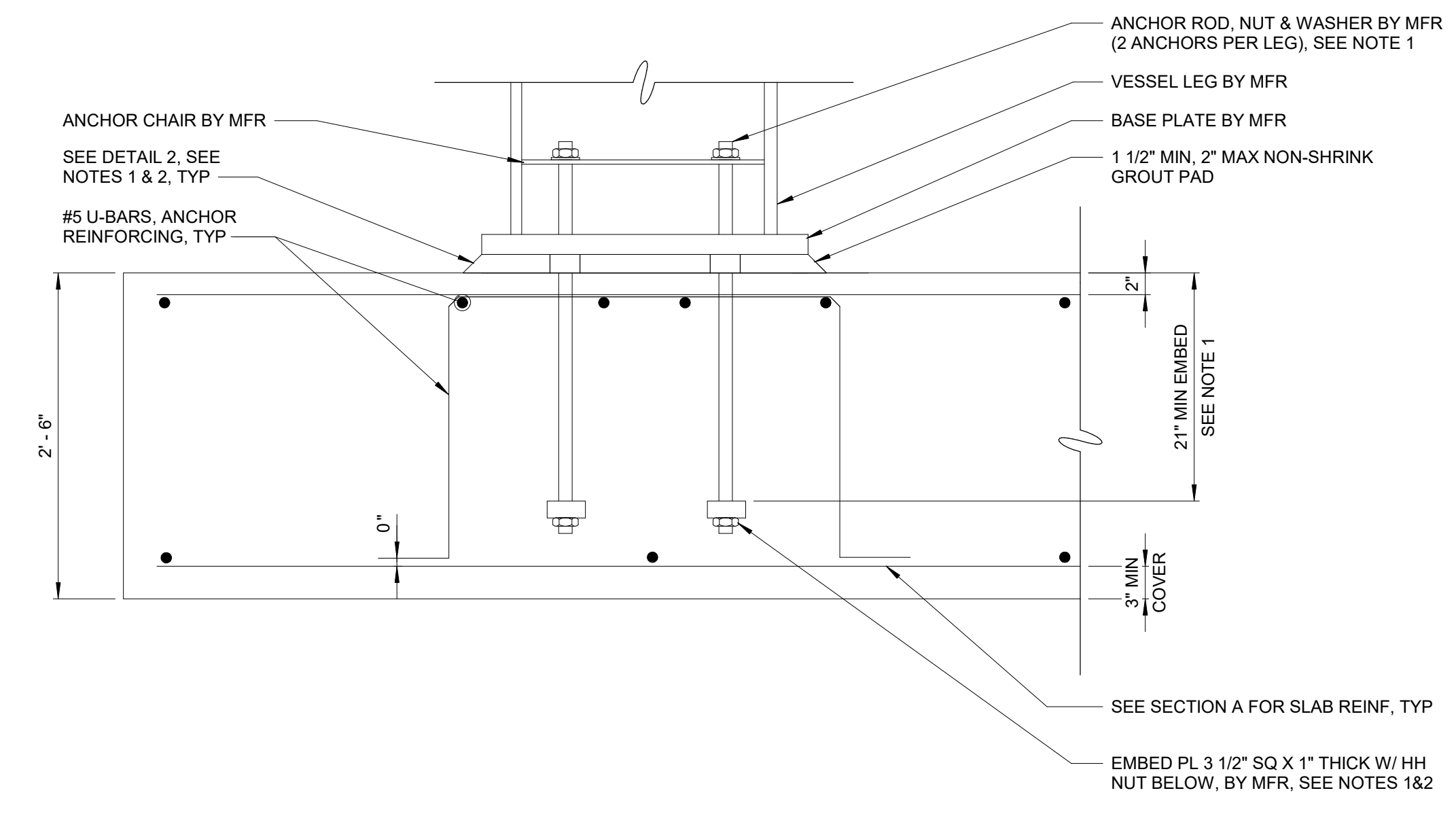
STRUCTURAL  
PLAN AND SECTIONS

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	1
DRAWING NUMBER:	SHEET 19 of 36
	S-03

- NOTES:**
1. VESSEL ANCHORAGE AND SUPPLEMENTAL REINFORCING ARE IN ACCORDANCE WITH THE MANUFACTURER'S ANCHORAGE DESIGN AND DETAIL SHOP DRAWINGS.
  2. GENERAL CONTRACTOR SHALL COORDINATE VESSEL LEG AND ANCHOR ROD LOCATIONS WITH EQUIPMENT MANUFACTURER'S ANCHOR ROD TEMPLATE. PRIOR TO INSTALLATION CONTRACTOR SHALL SUBMIT FOR ENGINEER'S REVIEW, THE ANCHOR ROD INSTALLATION, INCLUDING MATERIAL, ANCHOR GEOMETRY, AND LAYOUT.
  3. SLAB REINFORCING BARS IN CONFLICT WITH EQUIPMENT ANCHORS OR ANCHOR REINFORCING SHALL BE PLACED IN ACCORDANCE WITH THE TOLERANCES SPECIFIED IN SPECIFICATION 03 21 00.

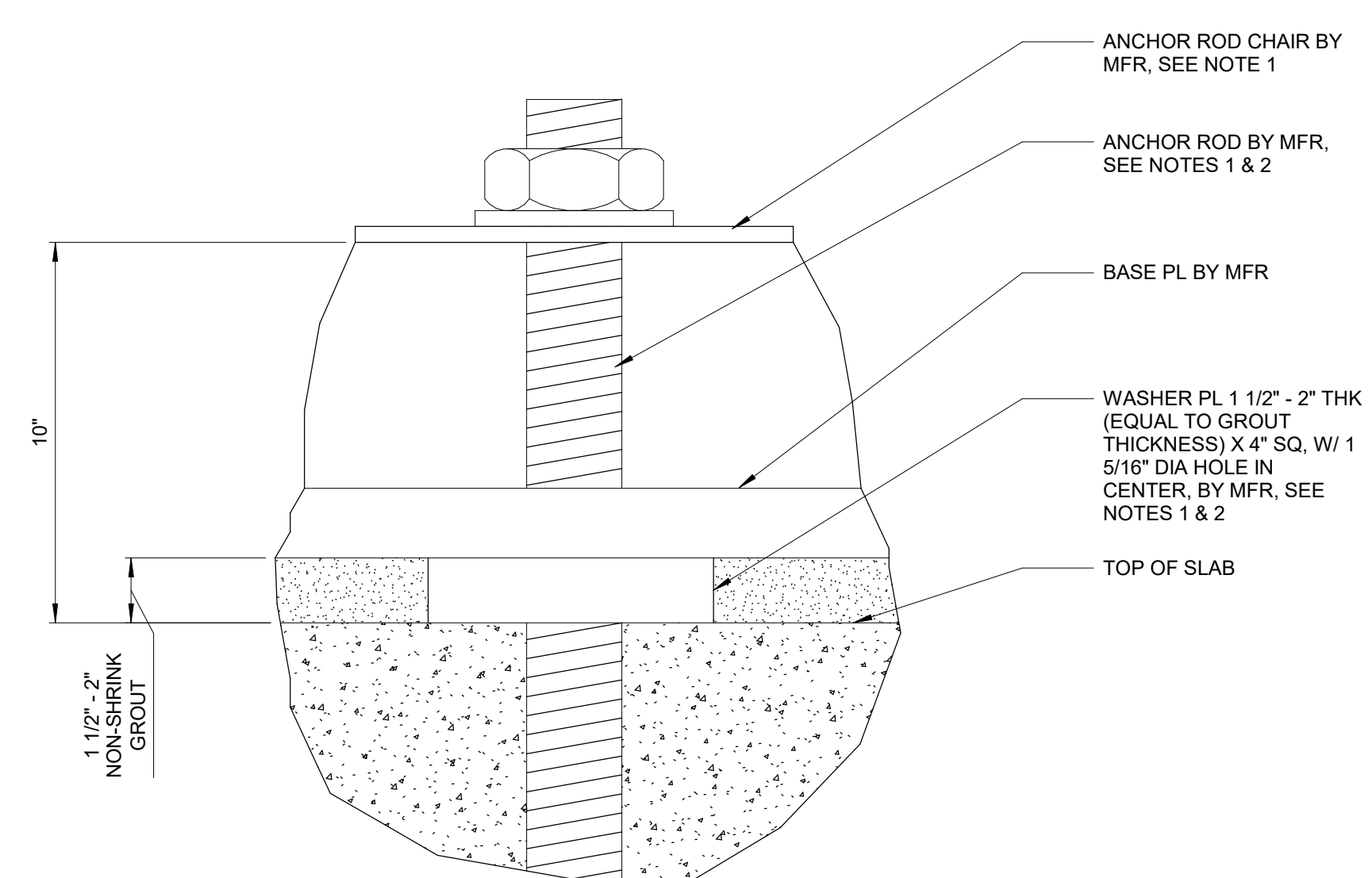


**PLAN**  
1 1/2" = 1'-0"

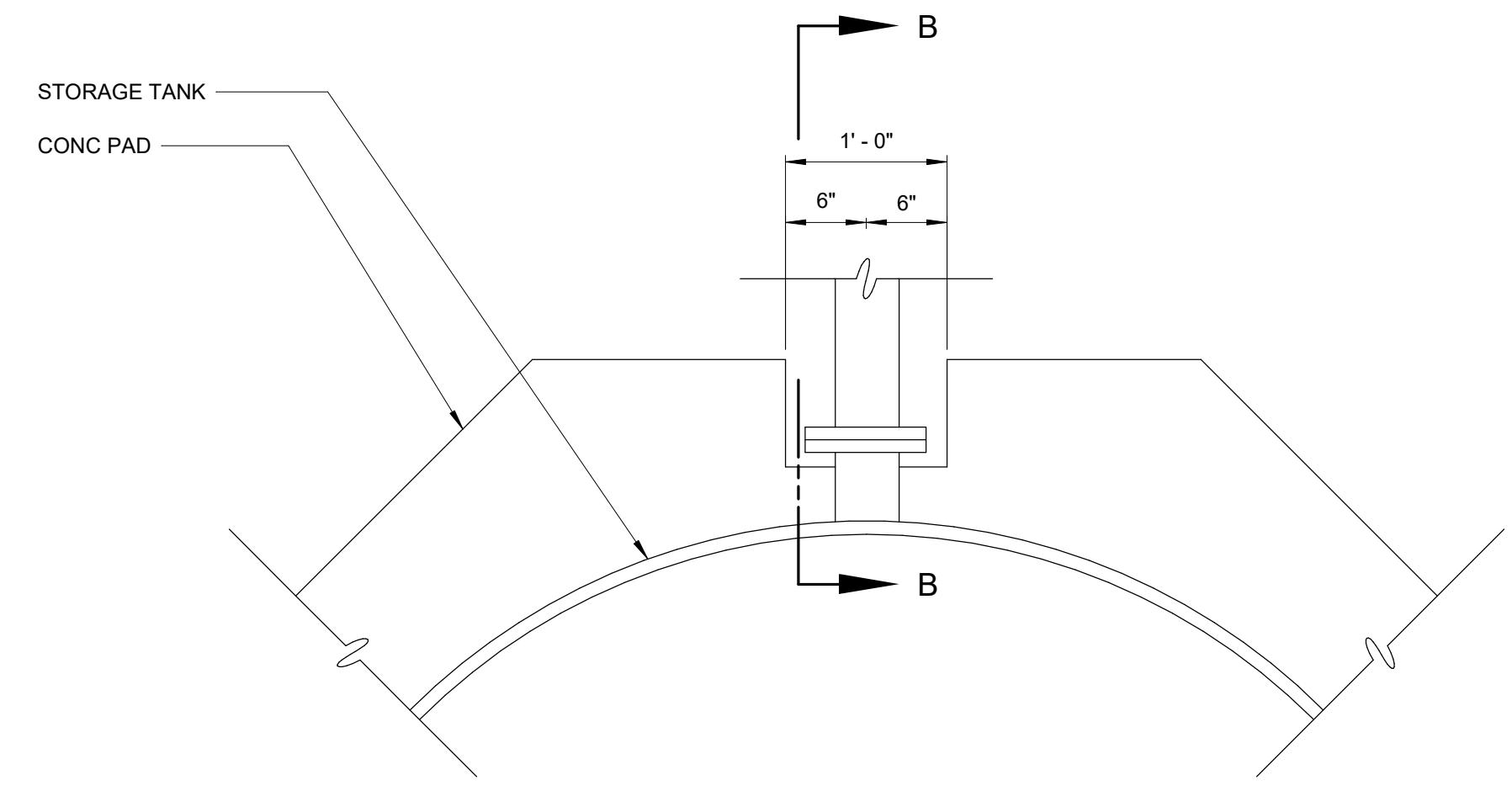


**SECTION A-A**  
1" = 1'-0"

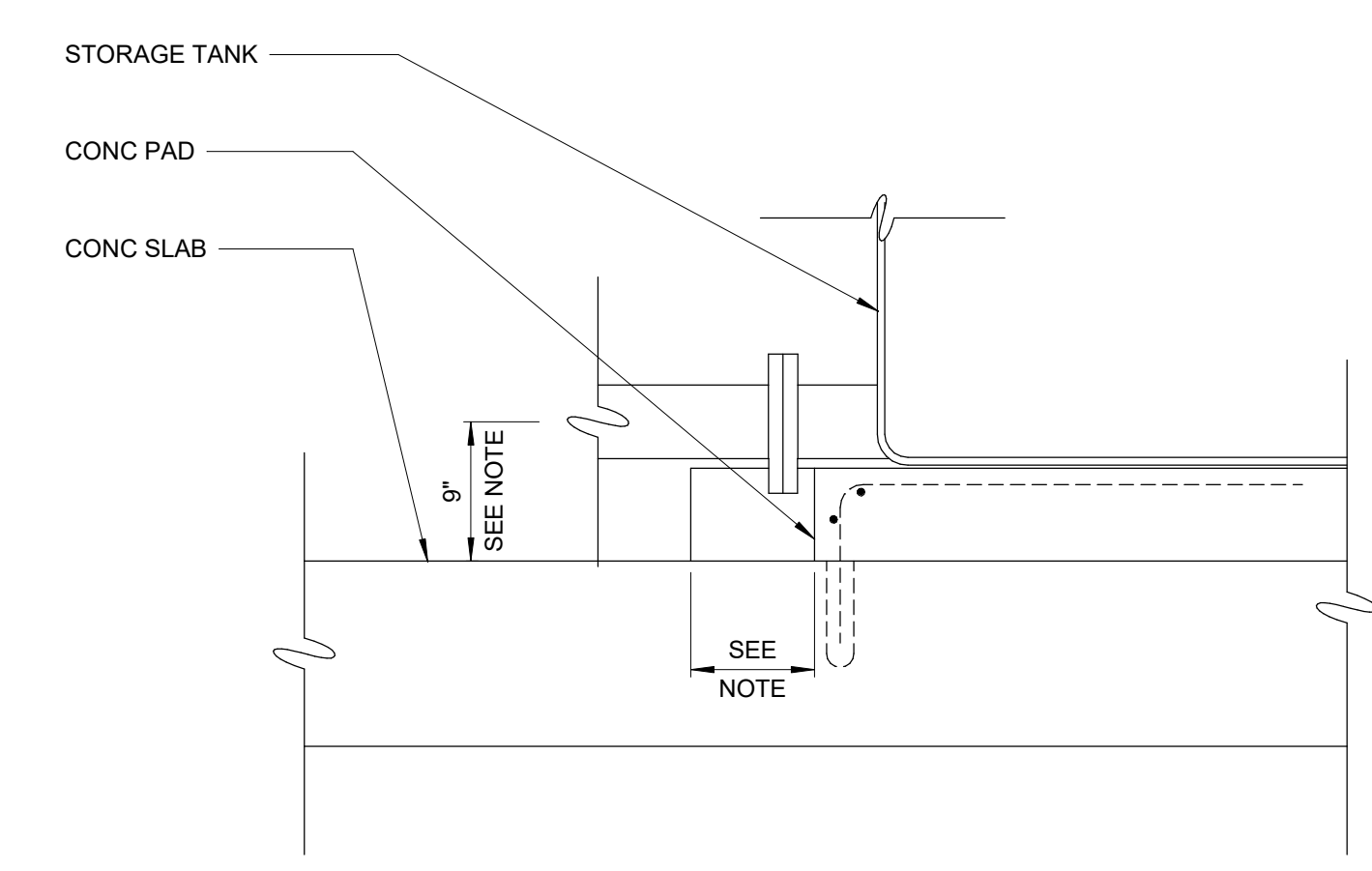
**DETAIL 1**  
1 1/2" = 1'-0" S-03



**DETAIL 2**  
3" = 1'-0" SD-01



**PLAN**  
1" = 1'-0"



**SECTION B-B**  
1" = 1'-0"

NOTE: EDGE OF BLOCKOUT IN CONCRETE PAD SHALL HAVE A 2" MINIMUM CLEARANCE TO MECHANICAL COMPONENTS. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS AND COORDINATE WITH MECHANICAL DRAWINGS.

**DETAIL 3**  
1" = 1'-0" S-03

BM 360/20168-000\_PFA5 Treatment Evaluation and Design/20168-000-200-1K-S.rvt 10/23/2021 12:16:43 PM

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	J. BERGER		
DRAWN BY:	A. GARCIA		
CHECKED BY:	W. DRESSLER		
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"		
REV	ISSUED FOR	DATE	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY SEAN DUPUIS, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C85064

**Hazen**

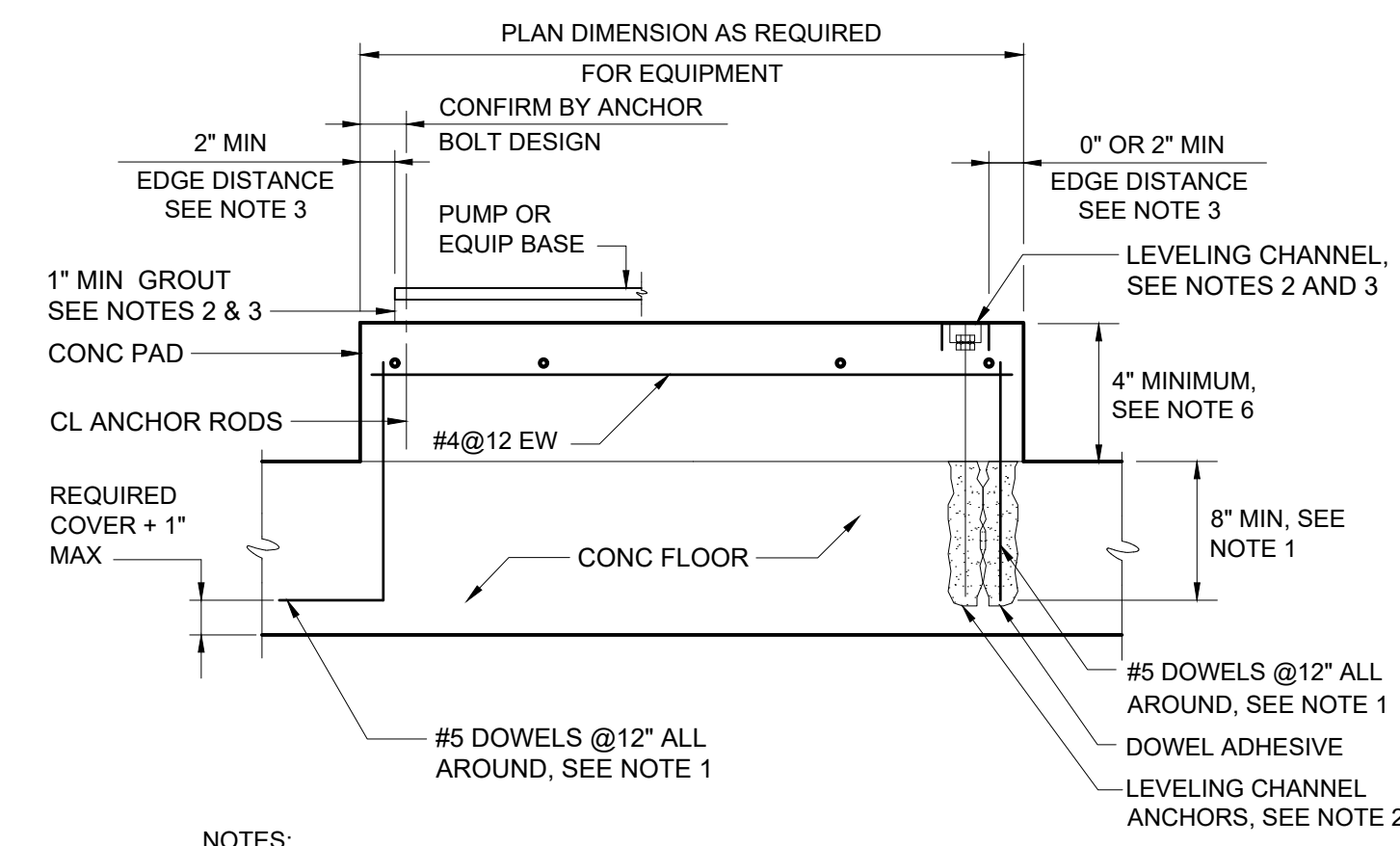
HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

STRUCTURAL DETAILS

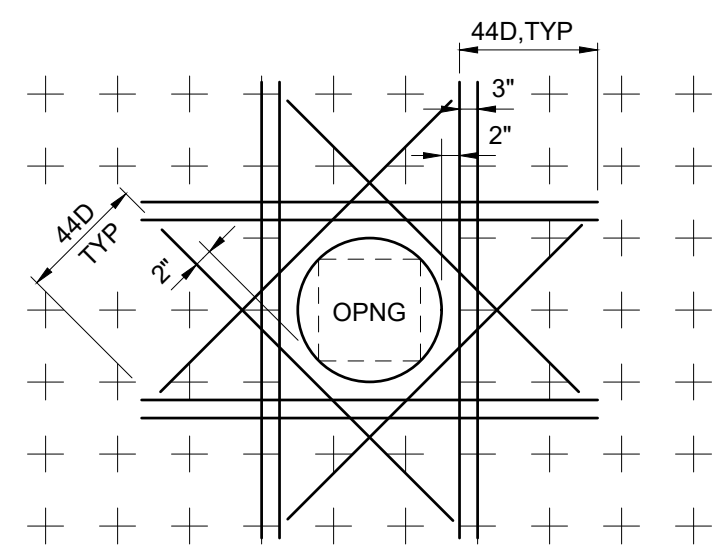
DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	1
DRAWING NUMBER:	SHEET 20 of 36
	SD-01



NOTES:

- DOWELS MAY BE CAST IN WITH 90° HOOK OR ANCHORED WITH DOWEL ADHESIVE AT CONTRACTOR'S OPTION. WHERE FLOOR IS 8" THICK OR LESS, USE #4 DOWELS EMBEDDED TO WITHIN 2" OF BOTTOM OF FLOOR SLAB.
- THE CONTRACTOR SHALL PROVIDE LEVELING CHANNELS AND LEVELING CHANNEL ANCHORS FOR SWITCHGEAR, SWITCHBOARDS, MOTOR CONTROL CENTERS, AND SIMILAR EQUIPMENT WHEN REQUIRED TO MEET EQUIPMENT MANUFACTURER'S LEVELING TOLERANCES. THE CONTRACTOR SHALL PROVIDE 1" MINIMUM GROUT FOR PUMPS AND SIMILAR EQUIPMENT WHEN REQUIRED TO MEET EQUIPMENT MANUFACTURER'S UNIFORM BEARING AND LEVELING REQUIREMENTS.
- PRIOR TO PLACING CONCRETE PAD, LEVELING CHANNEL SIZE AND MEANS OF INSTALLATION, ANCHORAGE, GROUT, CONCRETE EDGE DISTANCE, AND CONCRETE BLOCKOUTS REQUIREMENTS SHALL BE COORDINATED WITH EQUIPMENT MANUFACTURER.
- COAT DISSIMILAR MATERIALS PER THE CONTRACT DOCUMENTS.
- STAGGER CHANNEL ANCHORS AND PAD DOWELS.
- FOR PADS 24" OR GREATER IN DEPTH, PROVIDE #4@8" HORIZONTAL SKIN REINFORCING AROUND PERIMETER OF PAD.

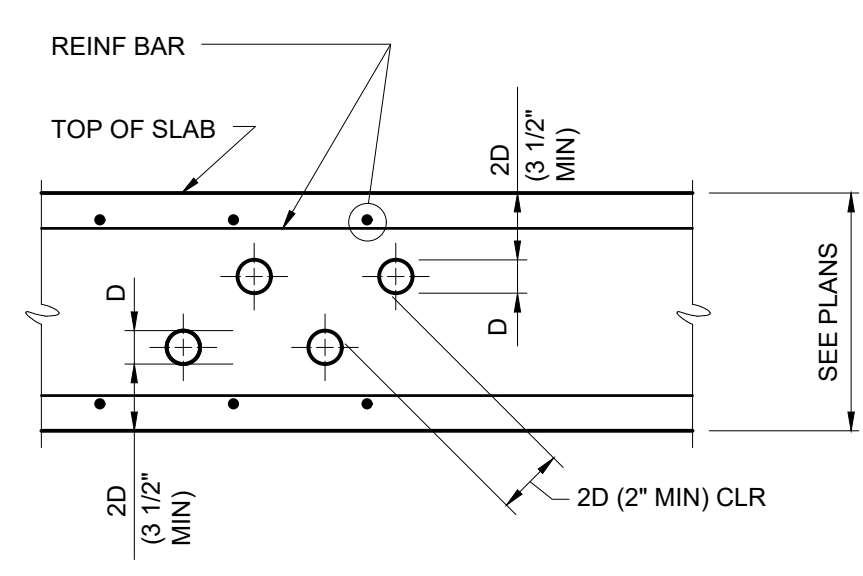
EQUIPMENT PAD  
S-03-0504



NOTES:

- THIS DETAIL APPLIES FOR OPENINGS 8"Ø AND LARGER. FOR SMALLER OPENINGS, BEND BARS OR ADJUST SPACING OF REINFORCEMENT TO AVOID OPENING.
- PLACE EXTRA BARS OF THE SAME SIZE AS THE INTERRUPTED BARS AT EACH SIDE OF OPENING. QUANTITY OF EXTRA BARS AT EACH SIDE SHALL EQUAL HALF THE QUANTITY OF INTERRUPTED BARS EXCEPT WHERE NOTED OTHERWISE.
- PROVIDE ONE DIAGONAL BAR EACH SIDE OF OPENING WITH SIZE EQUAL TO MAIN REINFORCEMENT, TYPICAL EACH FACE.
- WHERE INVERT OF OPENING IN WALL IS LESS THAN 44 BAR DIAMETERS FROM TOP OF SLAB, EXTRA REINFORCEMENT ON EACH SIDE SHALL INCLUDE DOWELS EMBEDDED INTO SLAB WITH STANDARD 90 DEGREE HOOKS TO SPLICE WITH EXTRA VERTICAL REINFORCEMENT. DOWELS SHALL ALSO STILL BE PROVIDED BELOW OPENING.
- WHERE INVERT OF OPENING IN WALL OR SLAB IS CLOSER THAN 44 BAR DIAMETERS TO EDGE OF SLAB OR BOTTOM OF WALL, EXTRA DIAGONAL BARS MAY BE TERMINATED TWO INCHES FROM EDGE OF SLAB OR BOTTOM OF WALL. DOWELS DO NOT HAVE TO BE PROVIDED TO SPLICE WITH DIAGONAL BARS.

REINFORCING AT OPENINGS  
S-03-0109

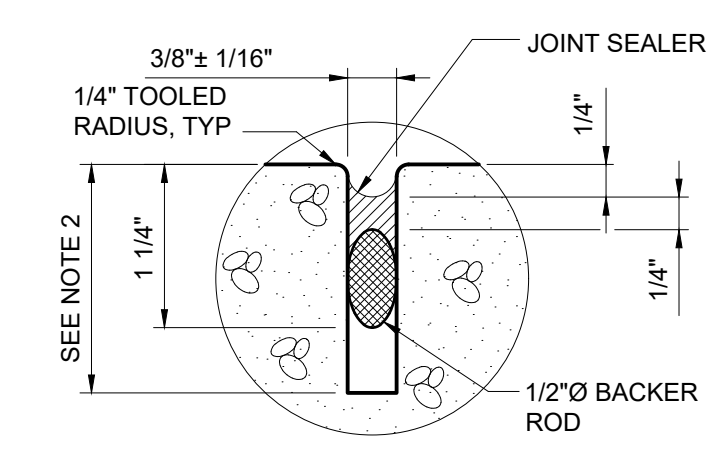


NOTE:  
D DENOTES PIPE OR CONDUIT ØD

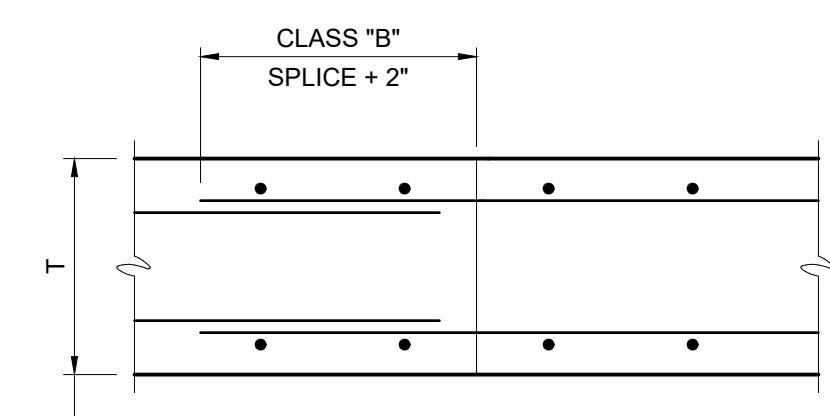
PIPE OR CONDUIT EMBEDDED IN SLAB  
S-03-0403

NOTES:

- VERTICAL JOINTS SHALL BE FORMED BY AN APPROVED JOINT INSERT. HORIZONTAL JOINTS SHALL BE FORMED BY AN APPROVED JOINT INSERT OR SAWCUTTING PERFORMED PER SPECIFICATION.
- DEPTH SHALL BE 1 1/2" IN REINF CONC DEPTH SHALL BE 1/3 OF CONCRETE THICKNESS IN UNREINFORCED CONCRETE PAVEMENT.



SEALED JOINT  
S-03-0202



FOR SLAB OR WALL THICKNESS AND REINFORCING, SEE DESIGN DRAWINGS.

CONSTRUCTION JOINT  
S-03-0203R

DEVELOPMENT LENGTH OF STANDARD HOOKS FOR UNCOATED BARS IN TENSION		
	$f_y = 60,000 \text{ psi}$	$f_c' = 4000 \text{ psi OR GREATER}$
BAR SIZE	DEVELOPMENT LENGTH, $l_{dh}$	
	BASIC	W/ CONC COVER *
#3	8"	6"
#4	10"	7"
#5	1'-0"	9"
#6	1'-3"	11"
#7	1'-5"	1'-0"
#8	1'-7"	1'-2"
#9	1'-10"	1'-4"
#10	2'-1"	1'-6"
#11	2'-3"	1'-7"

\* SIDE COVER NORMAL TO PLANE OF HOOK AT LEAST 2 1/2", AND FOR 90° HOOK, END COVER BEYOND OUTSIDE END OF HOOK AT LEAST 2".

BASIC DEVELOPMENT LENGTH AND SPLICE LENGTH FOR UNCOATED BARS IN TENSION								
		** BASED ON MATERIALS AND CONDITIONS AS FOLLOWS: $f_y = 60,000 \text{ psi}$ CLEAR COVER ≥ 1.5 INCHES $f_c' = 4000 \text{ psi OR GREATER}$ NORMAL WEIGHT CONCRETE						
BASIC DEVELOPMENT LENGTH $l_d$				CLASS B SPLICE LENGTH $1.3 \times l_d$				
CLEAR SPACING ≥ 3"		CLEAR SPACING < 3"		BAR SIZE	CLEAR SPACING ≥ 3"		CLEAR SPACING < 3"	
BASIC	TOP *	BASIC	TOP *		BASIC	TOP *	BASIC	TOP *
1'-0"	1'-0"	1'-0"	1'-4"	# 3	1'-0"	1'-3"	1'-4"	1'-8"
1'-0"	1'-3"	1'-7"	2'-1"	# 4	1'-3"	1'-8"	2'-1"	2'-9"
1'-3"	1'-7"	2'-4"	3'-0"	# 5	1'-7"	2'-0"	3'-0"	3'-11"
1'-6"	1'-11"	3'-1"	4'-0"	# 6	1'-11"	2'-5"	4'-0"	5'-2"
2'-5"	3'-1"	4'-11"	6'-4"	# 7	3'-1"	4'-0"	6'-4"	8'-3"
3'-0"	3'-11"	6'-0"	7'-9"	# 8	3'-11"	5'-1"	7'-9"	10'-1"
3'-8"	4'-9"	6'-9"	8'-9"	# 9	4'-9"	6'-3"	8'-9"	11'-4"
4'-6"	5'-10"	7'-7"	9'-10"	# 10	5'-10"	7'-7"	9'-10"	12'-9"
5'-5"	7'-0"	8'-5"	10'-11"	# 11	7'-0"	9'-1"	10'-11"	14'-2"

\* TOP REINFORCEMENT IS ANY HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE REINFORCEMENT.

\*\* FOR MATERIALS OR CONDITIONS DIFFERENT FROM THOSE STATED, LENGTHS SHOWN IN CHART SHALL BE MODIFIED TO CONFORM TO THE PROVISIONS OF ACI 318-14, SECTION 25.3.

FILE: C:\Hazen\Hazen\PROJECTS\2016\2016-01-15\2016-01-15.dwg; PLOT DATE: 10/26/2020 4:20 PM; PLOT DATE: 10/26/2020 4:20 PM; BY: GARCIA

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	J. BERGER
DRAWN BY:	A. GARCIA
CHECKED BY:	W. DRESSLER
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"
REV	ISSUED FOR
	DATE
	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY SEAN DUPUIS, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO C85064

HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

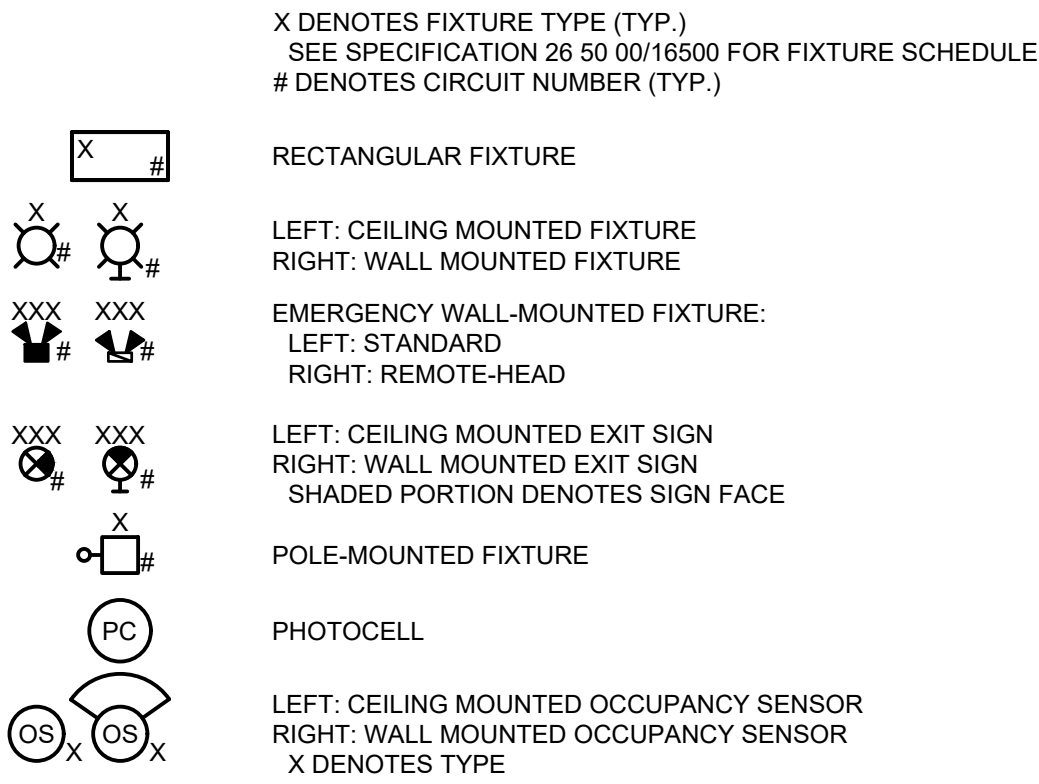
RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

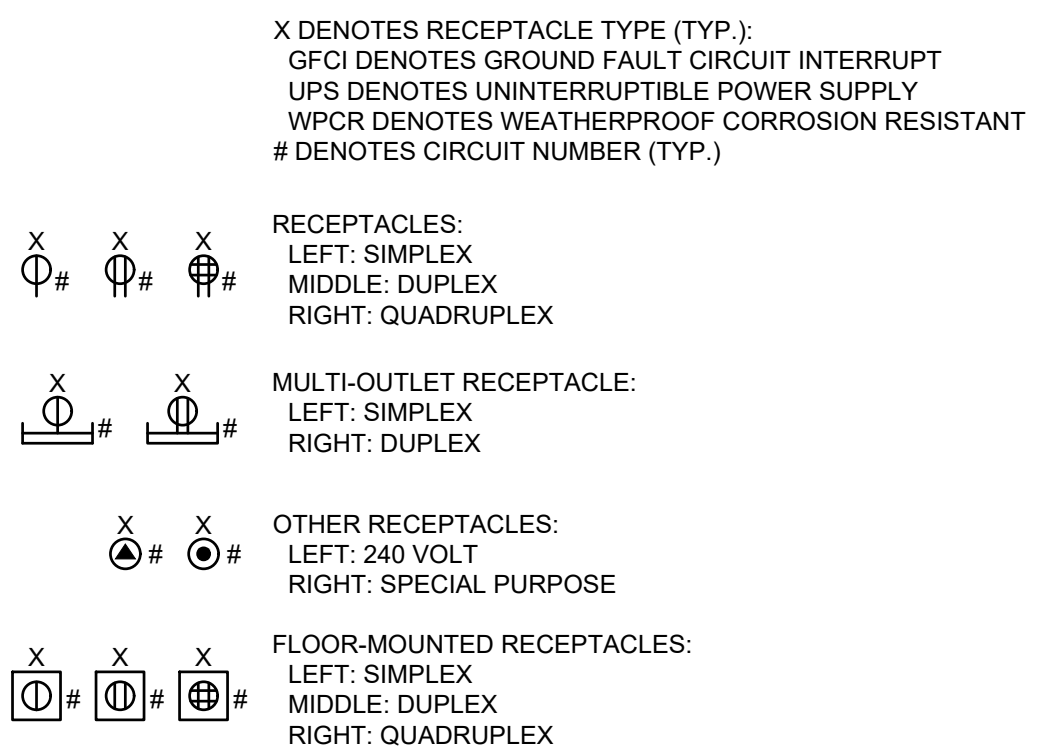
STRUCTURAL  
STANDARD DETAILS

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 21 of 36
	SD-02

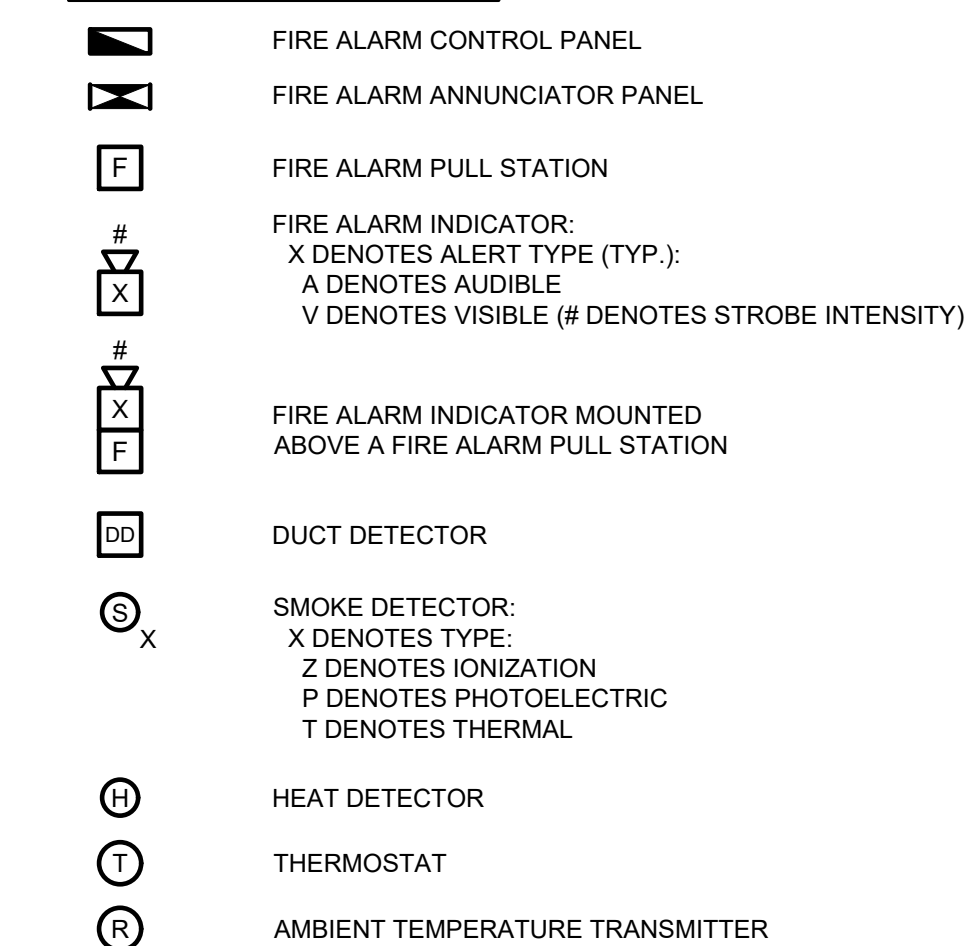
**LIGHTING:**



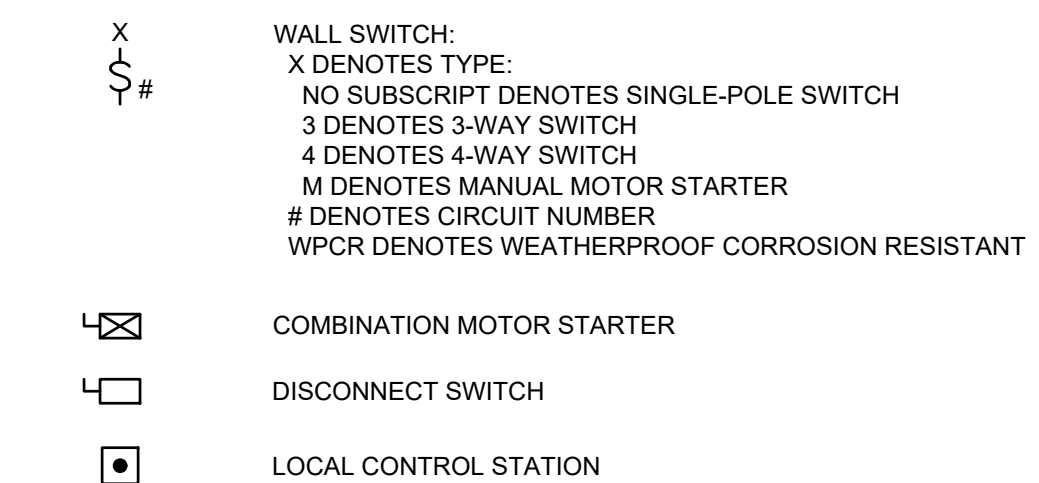
**RECEPTACLES:**



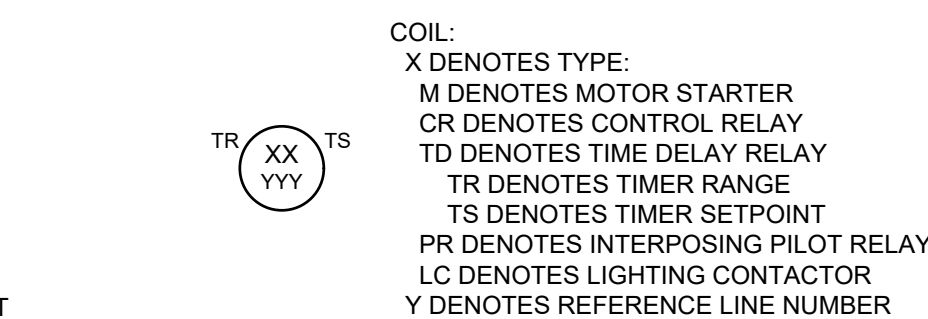
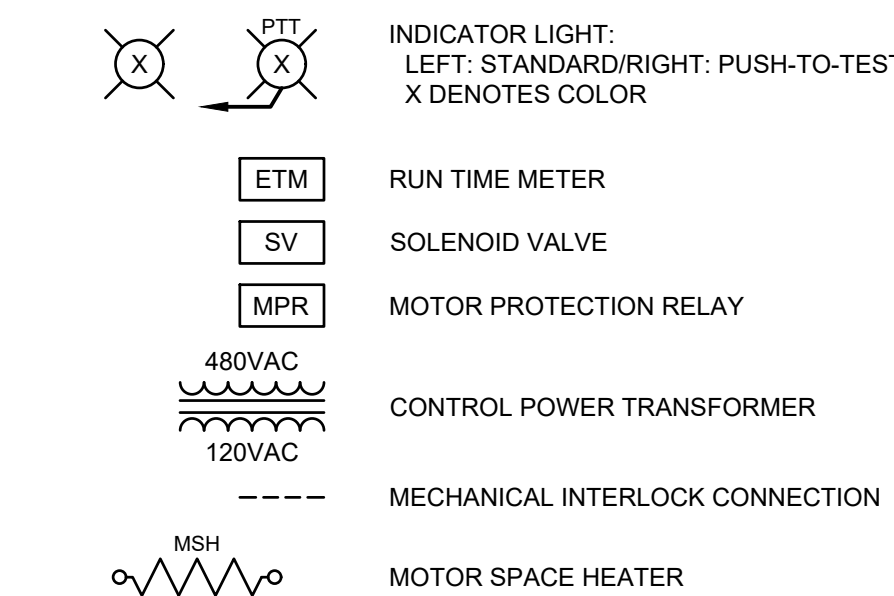
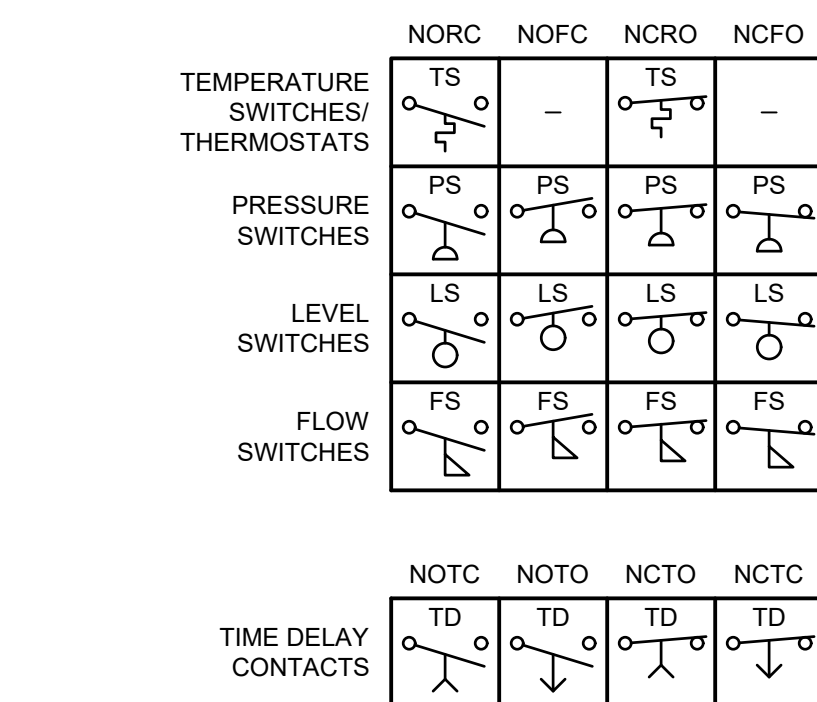
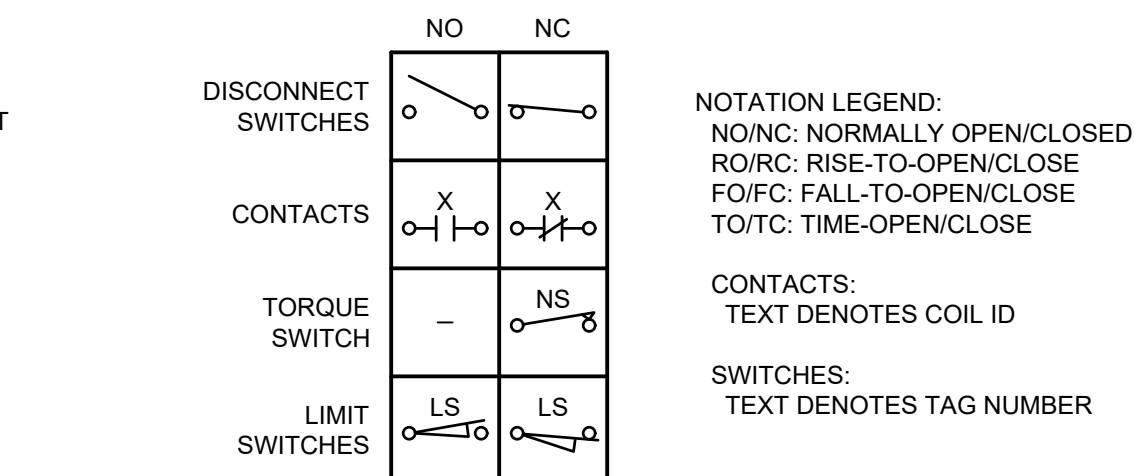
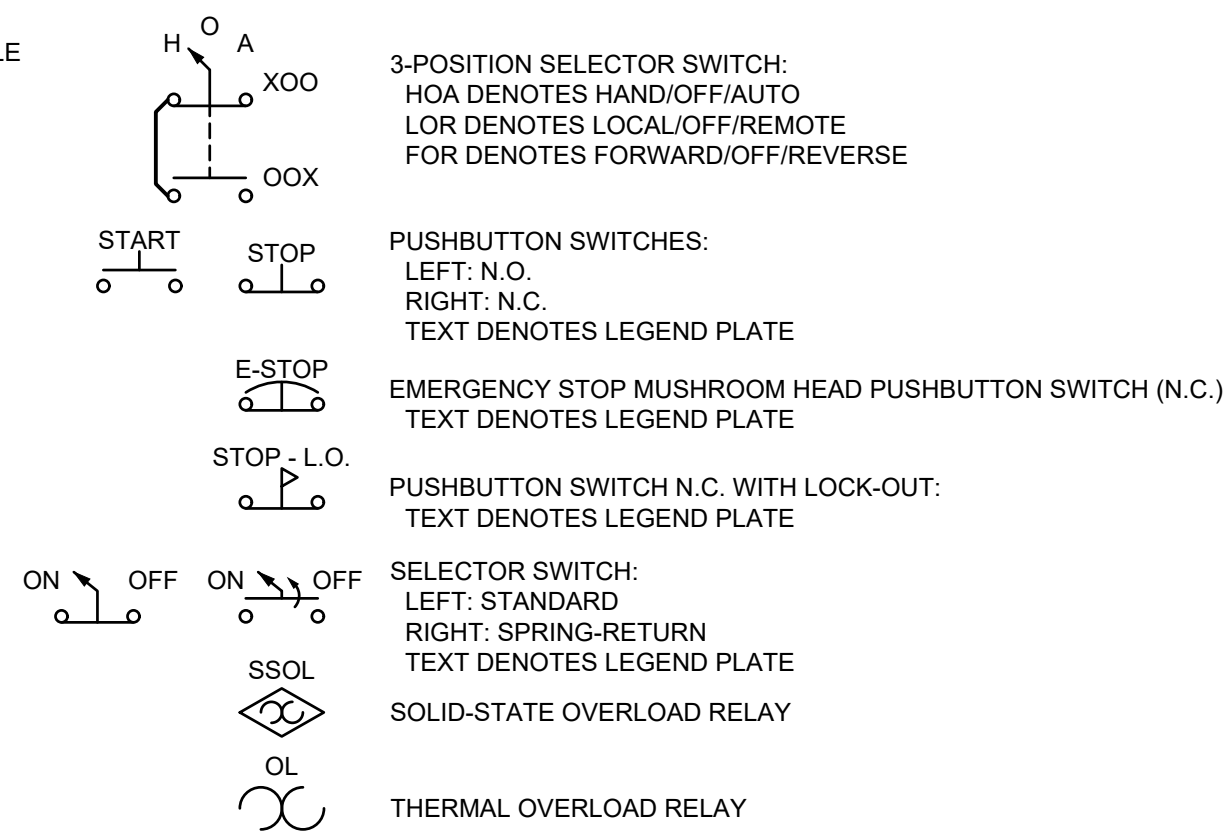
**HVAC AND FIRE ALARM**



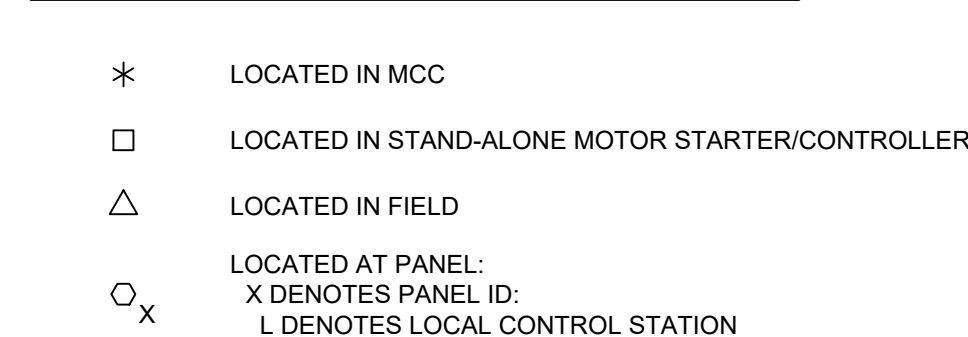
**SWITCHES**



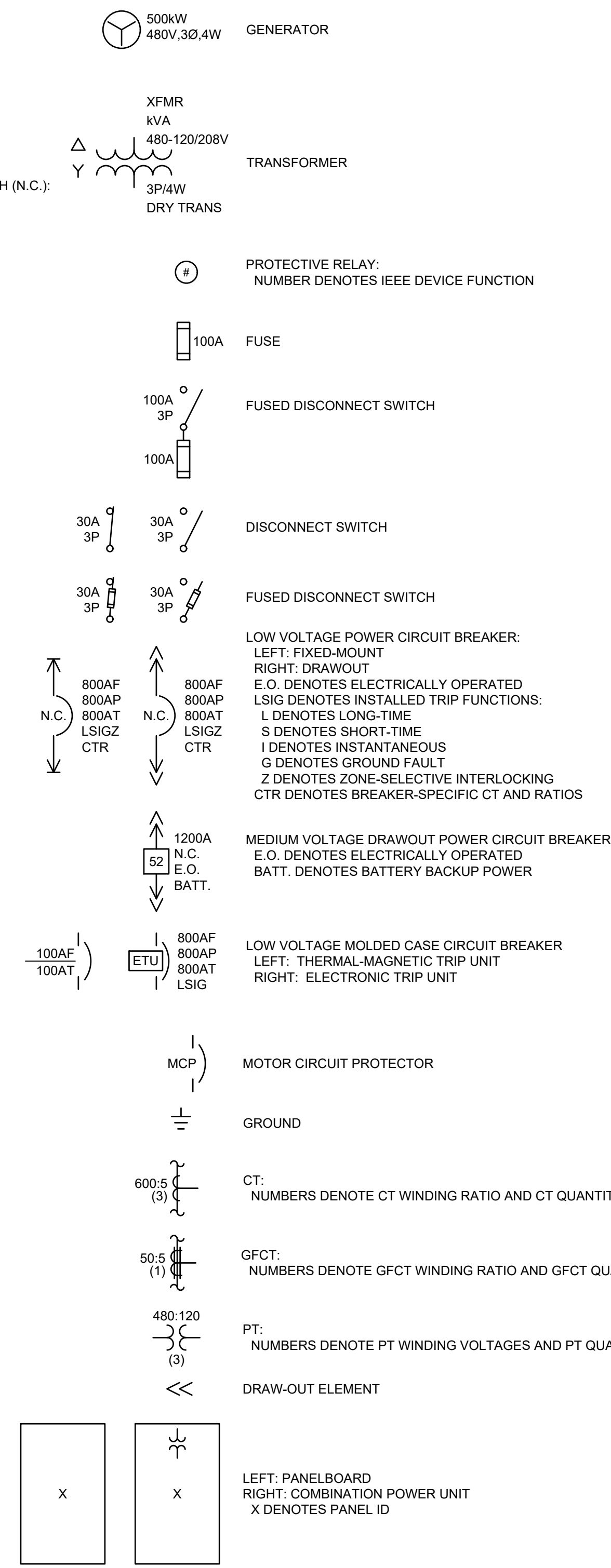
**ELEMENTARY CONTROL SCHEMATICS**



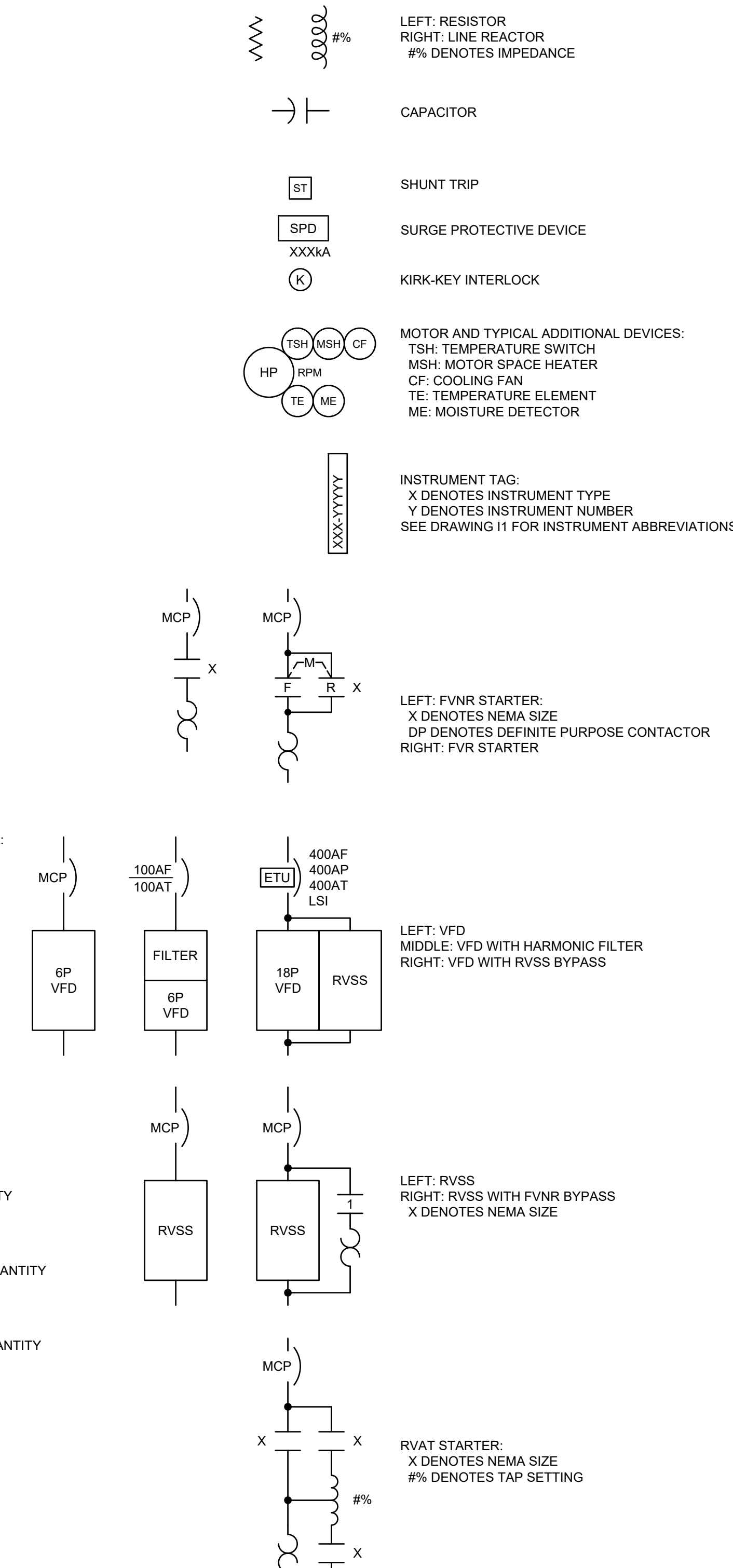
**EQUIPMENT/DEVICE LOCATION SYMBOLS**



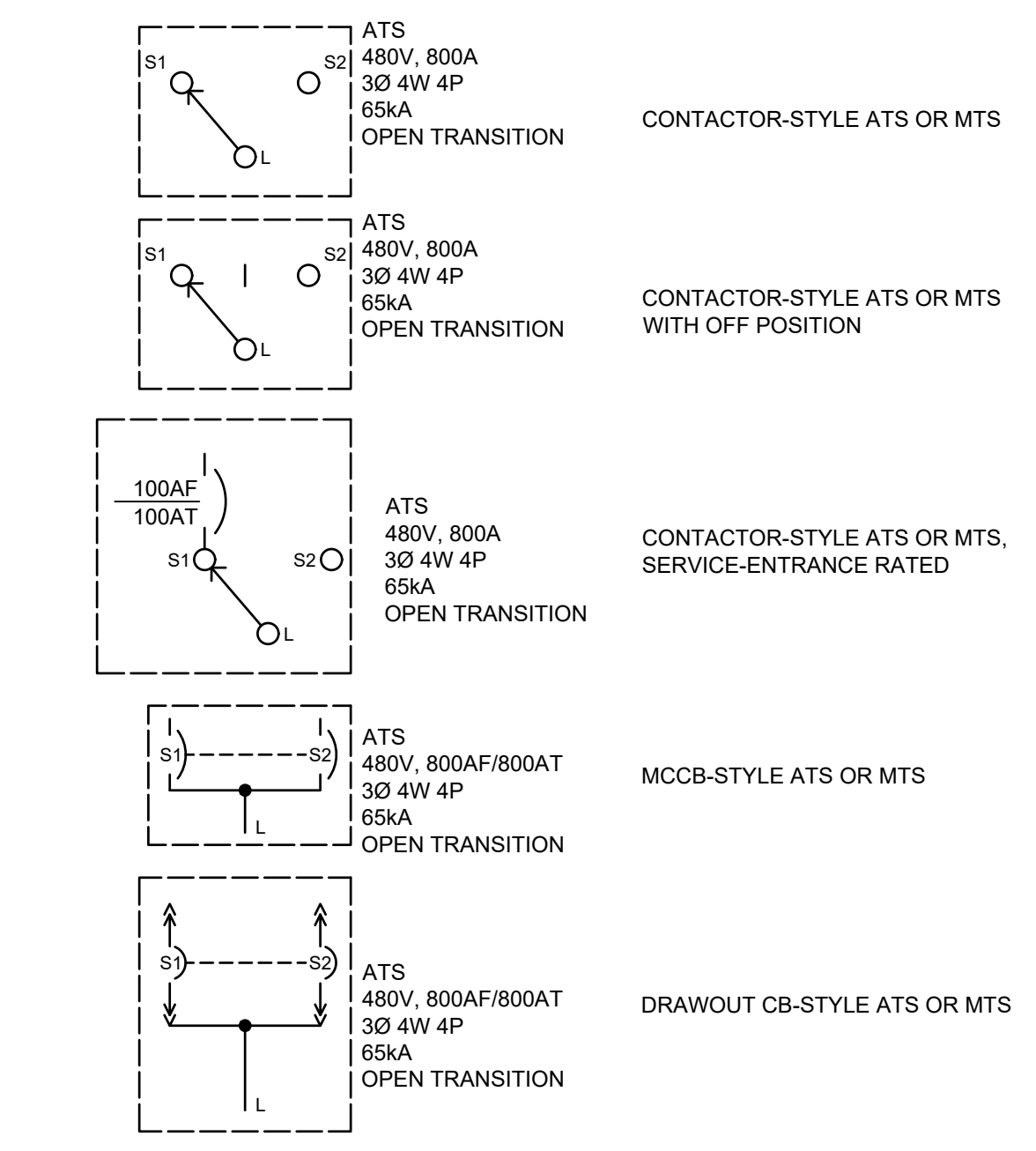
**SINGLE-LINE DIAGRAMS**



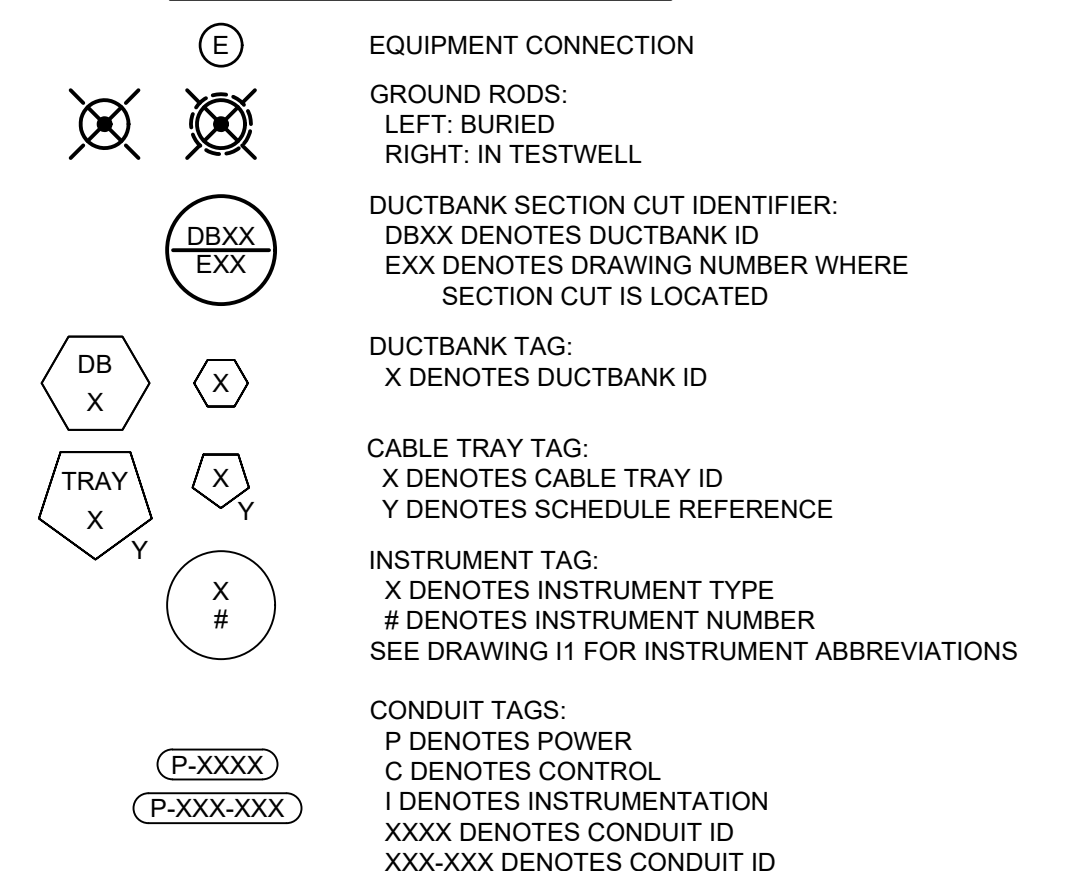
**SINGLE-LINE DIAGRAMS, CONT'D.**



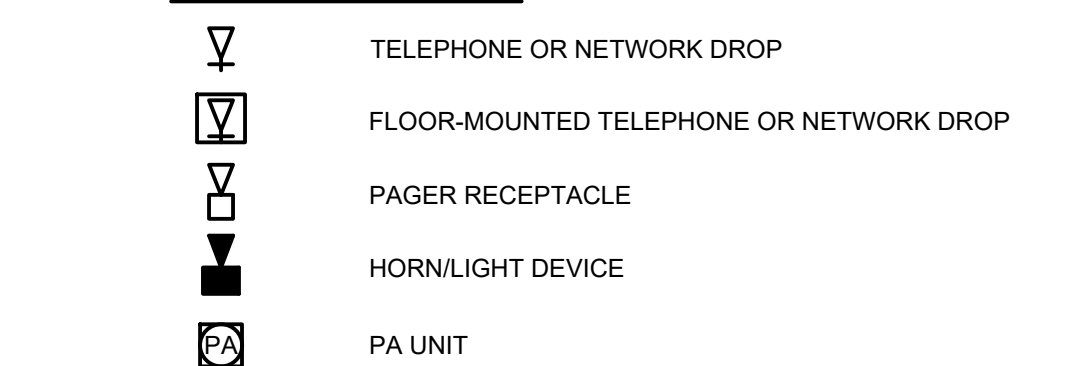
**SINGLE-LINE DIAGRAMS, CONT'D.**



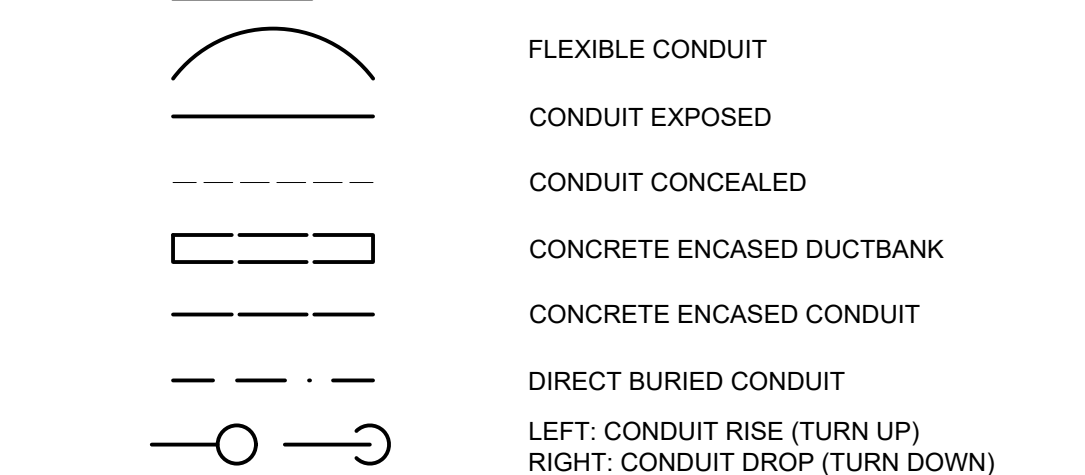
**MISC PLAN VIEW SYMBOLS**



**COMMUNICATIONS**



**WIRING**



PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. BUTTS
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381

**Hazen**  
HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

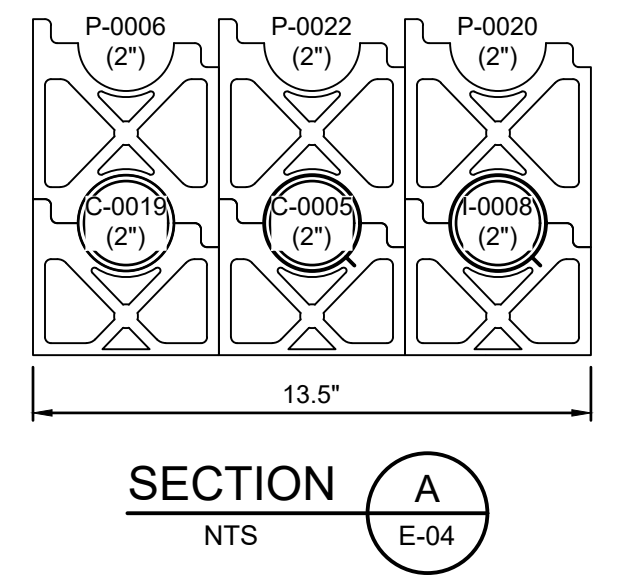
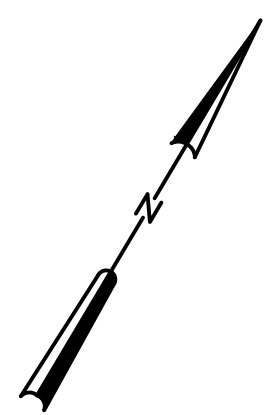
ELECTRICAL  
LEGEND AND SYMBOLS

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 22 of 36



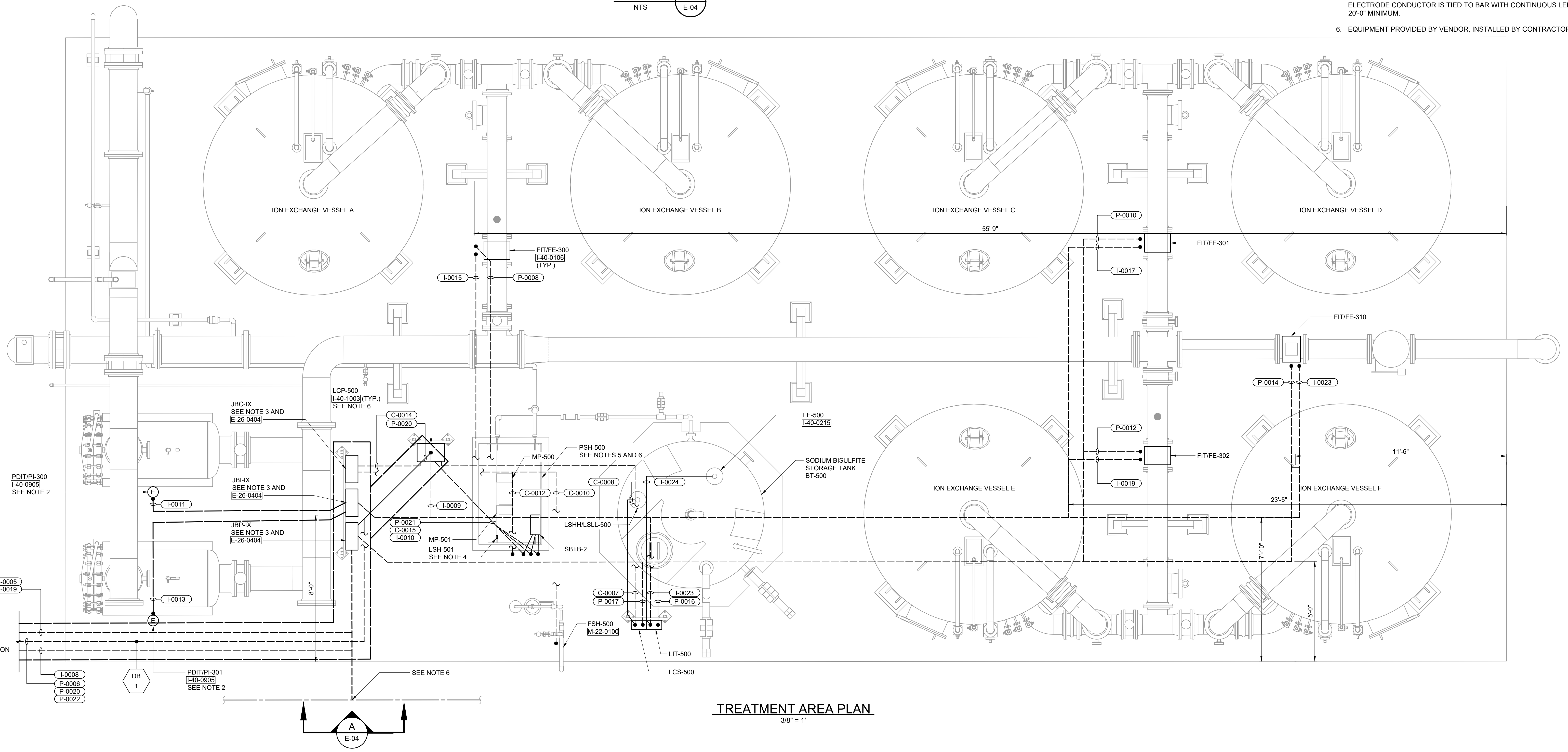






**NOTES:**

1. ROUTE CONDUIT BETWEEN JUNCTION BOXES AND BUILDING IN DUCTBANK. REFER TO DRAWING E-03 FOR DUCTBANK ROUTING AND DUCTBANK SCHEDULE. ROUTE ALL HORIZONTAL CONDUITS INCLUDING CONDUIT BETWEEN JUNCTION BOXES AND FINAL DEVICES IN SLAB OF TREATMENT AREA. REFER TO DETAIL S-03-0403 FOR CONDUIT ROUTING IN SLAB.
2. INSTALL INSTRUMENTS AND MANIFOLDS WITH OVERALL INSTRUMENT ENCLOSURES. TESCOM ANDERSON GREENWOOD OR EQUAL. DO NOT SUPPORT INSTRUMENTS OR ENCLOSURES FROM FILTER HOUSING.
3. COIL 20'-0" SPARE CABLE IN JUNCTION BOX.
4. LEVEL SWITCH SHALL BE PROVIDED BY CHEMICAL SKID VENDOR AND INSTALLED IN CONTAINMENT SUMP. COORDINATE FINAL LOCATION OF SWITCH IN CONTAINMENT SUMP PER FINAL SUBMITTED EQUIPMENT.
5. PROVIDE #2/0 MINIMUM GROUNDING ELECTRODE CONDUCTOR FROM EQUIPMENT, ENCLOSURE, OR LOCATION (AS APPLICABLE) TO SLAB REINFORCEMENT BAR. UTILIZE IRREVERSIBLE COMPRESSION-STYLE GROUNDING CONNECTION TO TIE EXISTING #3/0 BARE COPPER GEC TO REBAR. COORDINATE WITH REBAR PLACEMENT TO ENSURE GROUNDING ELECTRODE CONDUCTOR IS TIED TO BAR WITH CONTINUOUS LENGTH OF 20'-0" MINIMUM.
6. EQUIPMENT PROVIDED BY VENDOR, INSTALLED BY CONTRACTOR.



**TREATMENT AREA PLAN**  
3/8" = 1'



FILE: C:\MSH\HAZEN\PROJECTS\2016\2016-010\2016-010-001\2016-010-001-001.dwg  
 PLOT DATE: 10/15/2020 10:30 AM BY: ALAU

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. BUTTS
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381



RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

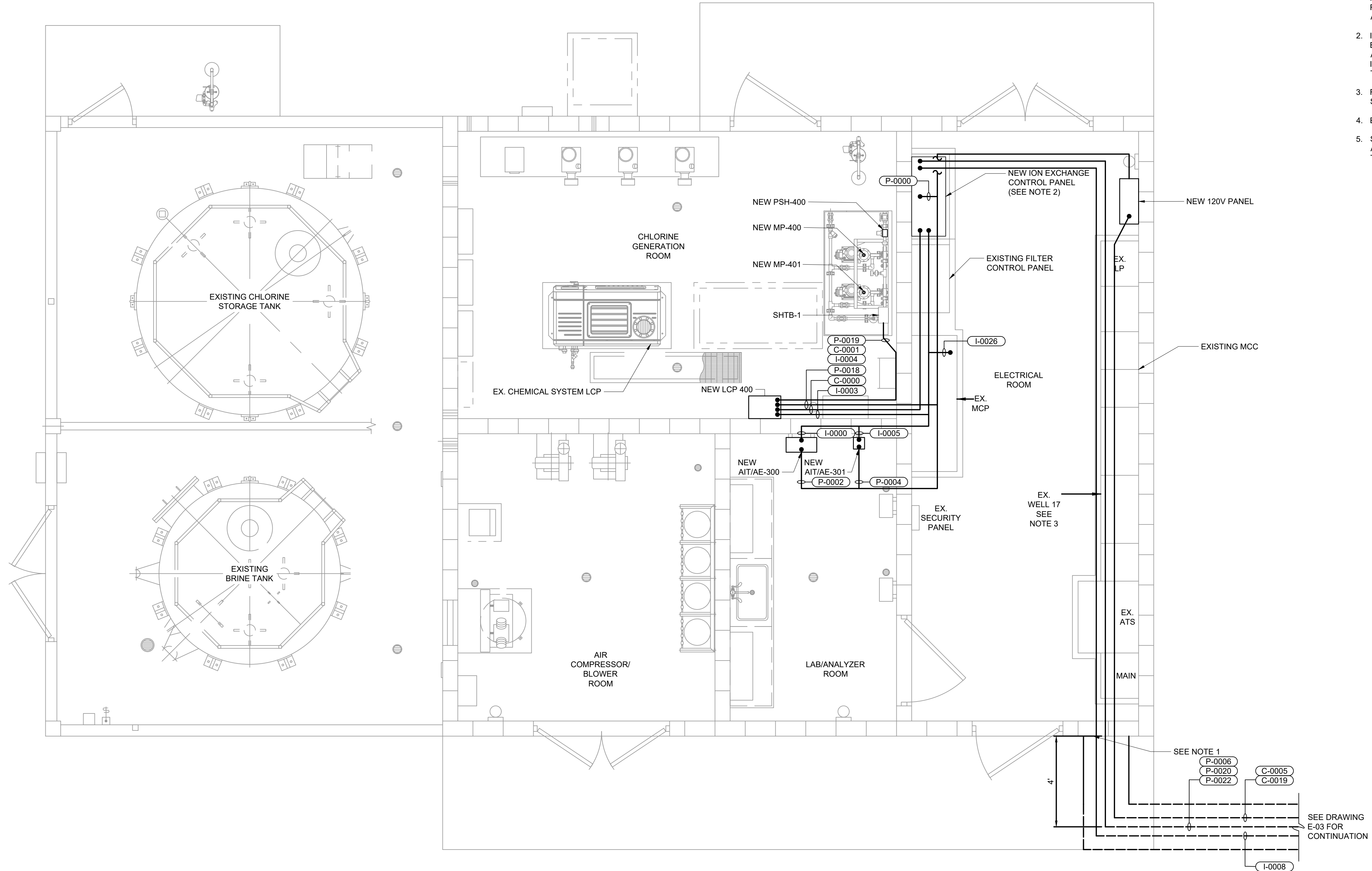
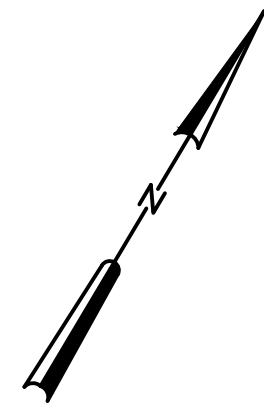
PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

ELECTRICAL  
TREATMENT AREA PLAN

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 25 of 36

E-04





- NOTES:
1. CORE DRILL EXISTING WALL AT THE CEILING. INSTALL CONDUITS THROUGH BLOCK WALL, AND INSTALL LB CONDUIT BODIES ON THE EXTERIOR OF THE WALL. ROUTE CONDUIT FOR DUCTBANK PER DETAIL E-33-0107. PRIOR TO DEMOLITION OF SMALL OPENINGS (LESS THAN 6 INCHES IN SIZE) FOR PENETRATIONS, CONTRACTOR SHALL USE NON-DESTRUCTIVE MEANS TO FIELD LOCATE REINFORCEMENT. OPENINGS SHALL BE LOCATED TO AVOID CUTTING THROUGH EXISTING REINFORCEMENT, IF POSSIBLE. EXISTING REINFORCEMENT SHALL NOT BE CUT WITHOUT APPROVAL OF ENGINEER.
  2. ION EXCHANGE CONTROL PANEL WILL BE PROCURED, BUILT, AND INSTALLED OUTSIDE OF THIS CONTRACT AND IS SHOWN FOR REFERENCE. REFER TO DRAWING I-02 NOTES 2 AND 3 FOR DELINEATION OF WORK FOR THE ION EXCHANGE CONTROL PANEL.
  3. RELABEL EXISTING WELL 17 MCC SECTION AS "SPARE SOFT STARTER".
  4. EXISTING LP IS LOCATED IN MCC.
  5. SURFACE MOUNT CONDUIT INSIDE OF CHEMICAL AND ANALYZER BUILDING EXCEPT FOR CORE DRILLS THROUGH WALLS AS REQUIRED.

**CHEMICAL AND ANALYZER BUILDING PLAN**  
3/8" = 1'-0"



FILE: C:\MSH\HAZEN\PROJECTS\2016\2016-03\2016-03-15\2016-03-15.dwg  
 PLOT DATE: 10/15/2020 1:03:00 PM BY: JALU

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	A. BUTTS		
DRAWN BY:	A. LAU		
CHECKED BY:	C. THUNHORST		
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE			
REV	ISSUED FOR	DATE	BY

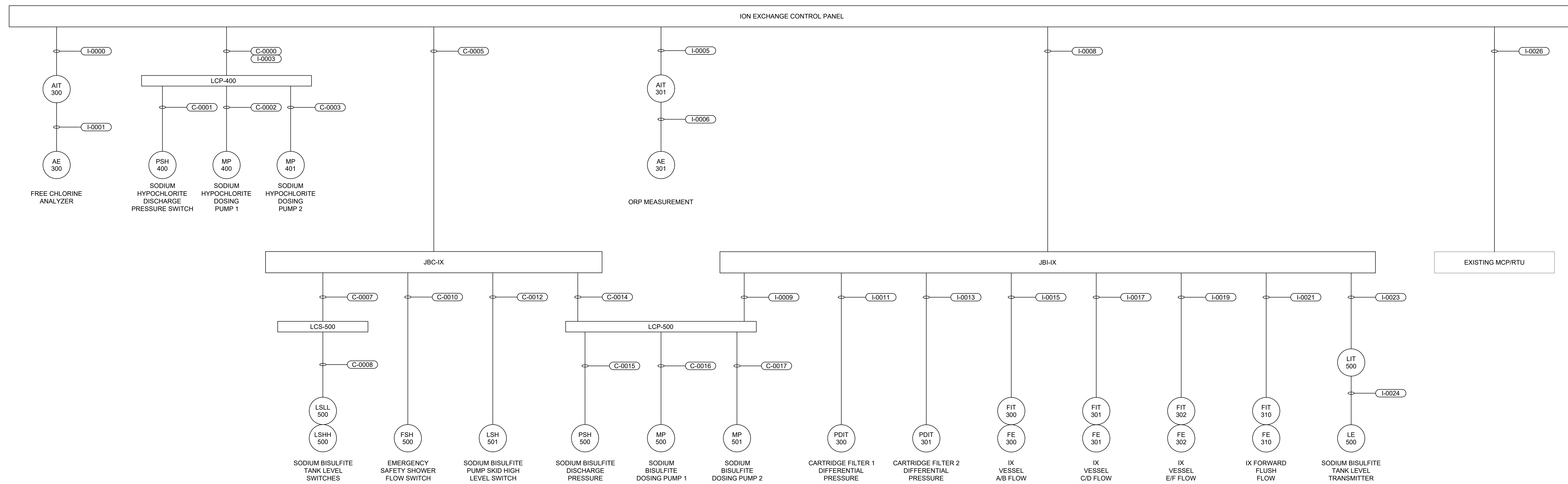
RECORD DRAWING  
 THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381

**Hazen**  
 HAZEN AND SAWYER  
 7700 IRVINE CENTER DRIVE, SUITE 200  
 IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA  
 PFAS TREATMENT PROJECT  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

**ELECTRICAL**  
**CHEMICAL AND ANALYZER BUILDING PLAN**

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 26 of 36
	<b>E-05</b>



FILE: C:\MSHAZEN\PROJECTS\2020\2020-001\2020-001-001.dwg  
 PLOT DATE: 10/15/2020 1:03:01 PM BY: ALAU

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. BUTTS
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	
REV	ISSUED FOR
	DATE
	BY

RECORD DRAWING  
 THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381



RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA  
 PFAS TREATMENT PROJECT  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

ELECTRICAL  
 CONTROL ONE-LINE DIAGRAMS

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 27 of 36
	E-06

NOTES:

1. LIGHTING PANEL SCHEDULE IS BASED ON SITE INVESTIGATION AND FIELD DATA. NOT ALL PERTINENT INFORMATION FOR THE EXISTING LP IS SHOWN IN THE SCHEDULE.

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
P-0000	1"	(N) 120V PANEL	ION EXCHANGE CONTROL PANEL	2 #12, #12GND	CKT #2
P-0001				NOT USED	
P-0002	1"	(N) 120V PANEL	AIT-300	2 #12, #12GND	CKT #4
P-0003				NOT USED	
P-0004	1"	(N) 120V PANEL	AIT-301	2 #12, #12GND	CKT #6
P-0005				NOT USED	
P-0006	2"	(N) 120V PANEL	JBP-IX	20 #12, #12GND	SPARES #ED 45, 47, 48, 49
P-0007				NOT USED	
P-0008	1"	(N) 120V PANEL (VIA JPB-IX)	FIT-300	2 #12, #12GND	CKT #1
P-0009				NOT USED	
P-0010	1"	(N) 120V PANEL (VIA JPB-IX)	FIT-301	2 #12, #12GND	CKT #3
P-0011				NOT USED	
P-0012	1"	(N) 120V PANEL (VIA JPB-IX)	FIT-302	2 #12, #12GND	CKT #5
P-0013				NOT USED	
P-0014	1"	(N) 120V PANEL (VIA JPB-IX)	FIT-310	2 #12, #12GND	CKT #7
P-0015				NOT USED	
P-0016	1"	(N) 120V PANEL (VIA JPB-IX)	LIT-500	2 #12, #12GND	CKT #9
P-0017	1"	(N) 120V PANEL (VIA JPB-IX)	LCS-500	2 #12, #12GND	CKT #11
P-0018	1"	(N) 120V PANEL	LCP-400	2 #12, #12GND	CKT #8
P-0019	1"	LCP-400	SHTB-1	2 #12, #12GND	POWER TO PMP RECEP'TS
P-0020	2"	(N) 120V PANEL	LCP-500	2 #12, #12GND	CKT #13
P-0021	1"	LCP-500	SBTB-2	2 #12, #12GND	POWER TO PMP RECEP'TS
P-0022	2"	ION EXCHANGE CONTROL PANEL	JBP-IX	EMPTY W/ PULLSTRING	SPARE CONDUIT
P-0023				NOT USED	
P-0024				NOT USED	

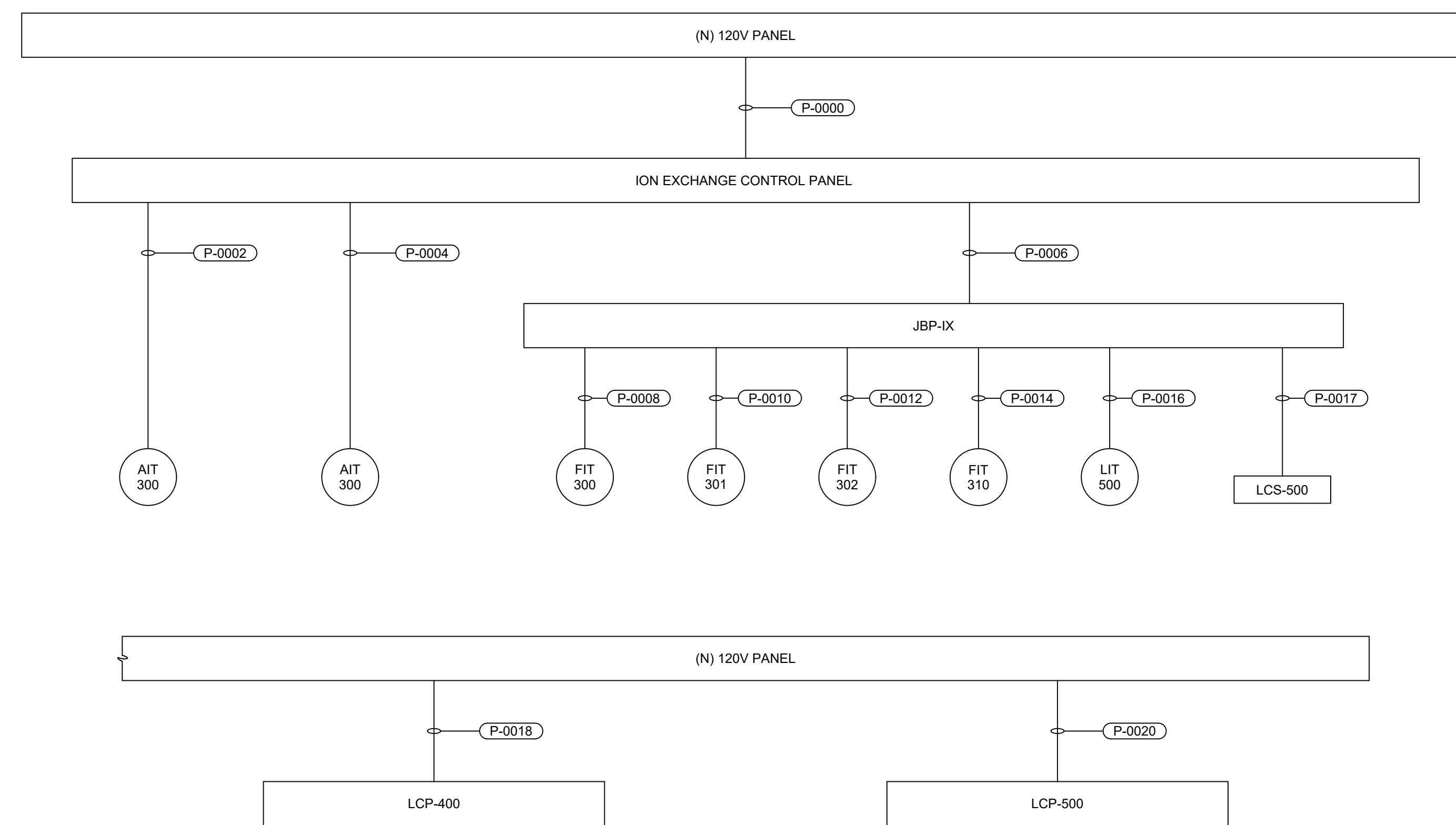
CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
C-0000	1"	ION EXCHANGE CONTROL PANEL	LCP-400	20 #14, #14GND	
C-0001	3/4"	LCP-400	PSH-400	2 #14, #14GND	
C-0002	3/4"	LCP-400	MP-400	VENDOR SUPPLIED CABLE	
C-0003	3/4"	LCP-400	MP-401	VENDOR SUPPLIED CABLE	
C-0004				NOT USED	
C-0005	2"	ION EXCHANGE CONTROL PANEL	JBC-IX	40 #14, #14GND	SPARES #ED 17-31 ODD
C-0006				NOT USED	
C-0007	3/4"	JBC-IX	LCS-500	4 #14, #14GND	WIRES #1, 3, 5, 7, 9, 11
C-0008	1"	LCS-500	LSLL-500/LSHH-500	4 #14, #14GND	
C-0009				NOT USED	
C-0010	3/4"	JBC-IX	FSH-500	2 #14, #14GND	WIRES #9, 11
C-0011				NOT USED	
C-0012	3/4"	JBC-IX	LSH-501	2 #14, #14GND	WIRES #13, 15
C-0013				NOT USED	
C-0014	3/4"	JBC-IX	LCP-500	20 #14, #14GND	WIRES #2- 40 EVEN, SPARES 30-40
C-0015	3/4"	LCP-500	PSH-500	2 #14, #14GND	
C-0016	3/4"	LCP-500	MP-500	VENDOR SUPPLIED CABLE	
C-0017	3/4"	LCP-500	MP-501	VENDOR SUPPLIED CABLE	
C-0018				NOT USED	
C-0019	2"	ION EXCHANGE CONTROL PANEL	JBC-IX	EMPTY W/ PULLSTRING	SPARE CONDUIT
C-0020				NOT USED	
C-0021				NOT USED	

CONDUIT NO.	SIZE	FROM	TO	CONDUCTORS	REMARKS
I-0000	3/4"	ION EXCHANGE CONTROL PANEL	AIT-300	2/C#16TSH, #14GND	
I-0001	3/4"	AIT-300	AE-300	MANUFACTURER SUPPLIED CABLE	
I-0002				NOT USED	
I-0003	1"	ION EXCHANGE CONTROL PANEL	LCP-400	4 (2/C#16TSH), #14GND	LABELED A, B, C, D
I-0004	1"	LCP-400	SHTB-1	4 (2/C#16TSH), #14GND	
I-0005	3/4"	ION EXCHANGE CONTROL PANEL	AIT-301	2/C#16TSH, #14GND	
I-0006	3/4"	AIT-301	AE-301	MANUFACTURER SUPPLIED CABLE	
I-0007				NOT USED	
I-0008	2"	ION EXCHANGE CONTROL PANEL	JBI-IX	14 (2/C#16TSH), #14GND	INCLUDES 3 (2/C#16TSH) SPARES
I-0009	1"	JBI-IX	LCP-500	4 (2/C#16TSH), #14GND	LABELED A, B, C, D
I-0010	1"	LCP-500	SBTB-2	4 (2/C#16TSH), #14GND	
I-0011	3/4"	JBI-IX	PDIT-300	2/C#16TSH, #14GND	
I-0012				NOT USED	
I-0013	3/4"	JBI-IX	PDIT-301	2/C#16TSH, #14GND	
I-0014				NOT USED	
I-0015	3/4"	JBI-IX	FIT/FE-300	2/C#16TSH, #14GND	
I-0016				NOT USED	
I-0017	3/4"	JBI-IX	FIT/FE-301	2/C#16TSH, #14GND	
I-0018				NOT USED	
I-0019	3/4"	JBI-IX	FIT/FE-302	2/C#16TSH, #14GND	
I-0020				NOT USED	
I-0021	3/4"	JBI-IX	FIT/FE-310	2/C#16TSH, #14GND	
I-0022				NOT USED	
I-0023	3/4"	JBI-IX	LIT-500	2/C#16TSH, #14GND	
I-0024	3/4"	LIT-500	LE-500	MANUFACTURER SUPPLIED CABLE	
I-0025				NOT USED	
I-0026	3/4"	ION EXCHANGE CONTROL PANEL	EXISTING MCP/RTU	1 CAT-6A	
I-0027				NOT USED	
I-0028				NOT USED	

240/120 VOLTS 1 PHASE, 3 WIRE		120V PANEL MAIN BREAKER 100A 2P										TYPE: NEMA 1 MOUNT: WALL			
MODS	DESCRIPTION	WIRE	TRIP	POLE	CKT No.	VOLT-AMPERES		VOLT-AMPERES	CKT No.	POLE	TRIP	WIRE	DESCRIPTION	MODS	
						A	B								A
-	FIT-300				1	-	-	-	2	1	20		ION EXCH CTRL PANEL	-	
-	FIT-301		20	1	3	-	-	-	4	1	20		AIT-301	-	
-	FIT-302		20	1	5	-	-	-	6	1	20		AIT-300	-	
-	FIT-310		20	1	7	-	-	-	8	1	20		LCP-400	-	
-	LIT-500		20	1	9	-	-	-	10	1	20		EXIST. NOT IDENTIFIED	-	
-	LCS-500		20	1	11	-	-	-	12	1	20		EXIST. NOT IDENTIFIED	-	
-	LCP-500		20	1	13	-	-	-	14	1			SPACE	-	
-	SPACE				15	-	-	-	16	1			SPACE	-	
-	SPACE				17	-	-	-	18	1			SPACE	-	
TOTAL						0	0	TOTAL		0	0				
PHASE TOTAL						0	0	TOTAL LOAD (VA)		0					
						0	0	TOTAL LOAD (A)		0					

MODIFICATION (MODS) LEGEND:  
 EPD - GROUND FAULT CIRCUIT INTERRUPTER (30mA)  
 GFCI - GROUND FAULT CIRCUIT INTERRUPTER (5mA)  
 LOD - LOCK-ON DEVICE  
 LFD - LOCK-OFF DEVICE

NOTES:  
 22KAIC  
 100KA SPD



POWER RISER DIAGRAM

File: C:\MSH\HAZEN\PROJECTS\2016\17\Rubidoux\Drawings\Electrical\CONDUIT AND WIRE SCHEDULE.dwg  
 Plot Date: 10/26/2020 1:31 PM BY: ALAU

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. BUTTS
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381

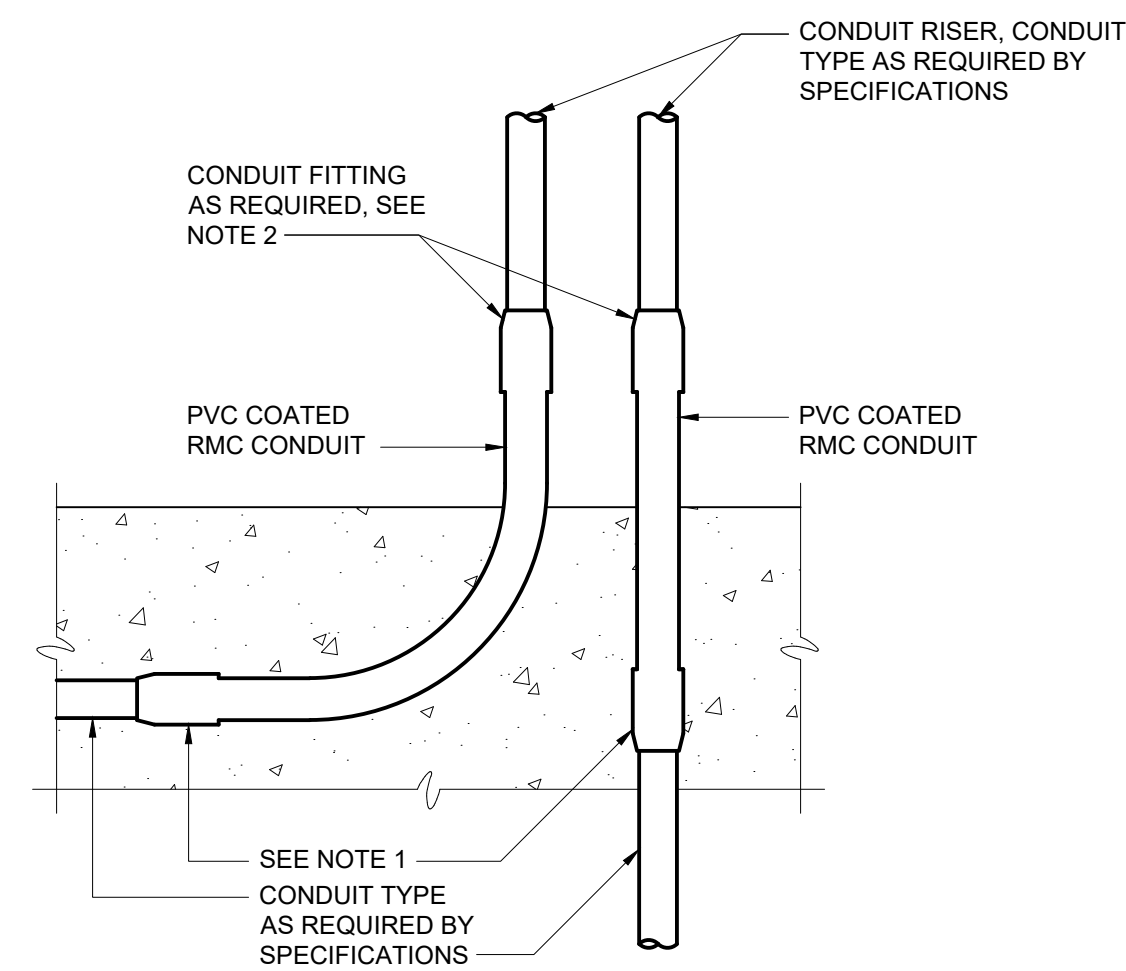


RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

ELECTRICAL  
 CONDUIT AND WIRE SCHEDULE

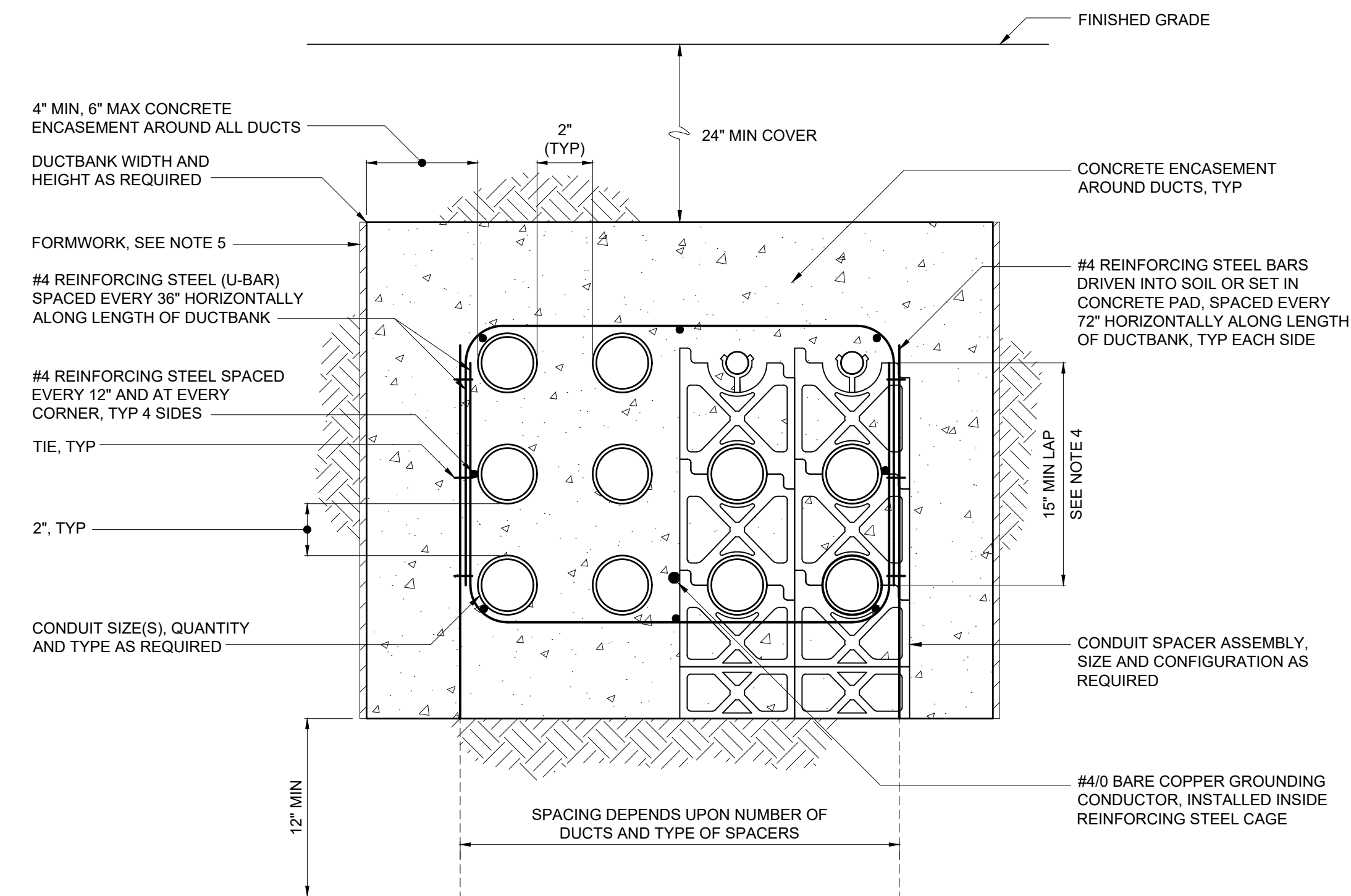
DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 28 of 36
	E-07



**NOTES:**

- FOR ENCASED PVC CONDUIT USE PVC TERMINAL ADAPTER. FOR ALL OTHER CONDUIT TYPES, USE PVC COATED RMC COUPLINGS.
- IF ANY THREADS OF THE PVC COATED RMC CONDUIT ARE EXPOSED AFTER INSTALLATION OF THE CONDUIT FITTING, THE CONDUIT FITTING SHALL BE PVC COATED TYPE WITH APPROPRIATE PVC SKIRTS. IF THE THREADS OF THE PVC COATED RMC CONDUIT ARE PROPERLY CUT SO THAT THEY ARE NOT EXPOSED AFTER INSTALLATION OF THE CONDUIT FITTING, THE CONDUIT MATERIAL SHALL BE AS REQUIRED BY THE SPECIFICATIONS, BASED ON THE MATERIAL OF THE CONDUIT RISER.

**CONDUIT EXITING CONCRETE ENCASEMENT  
E-26-0102**



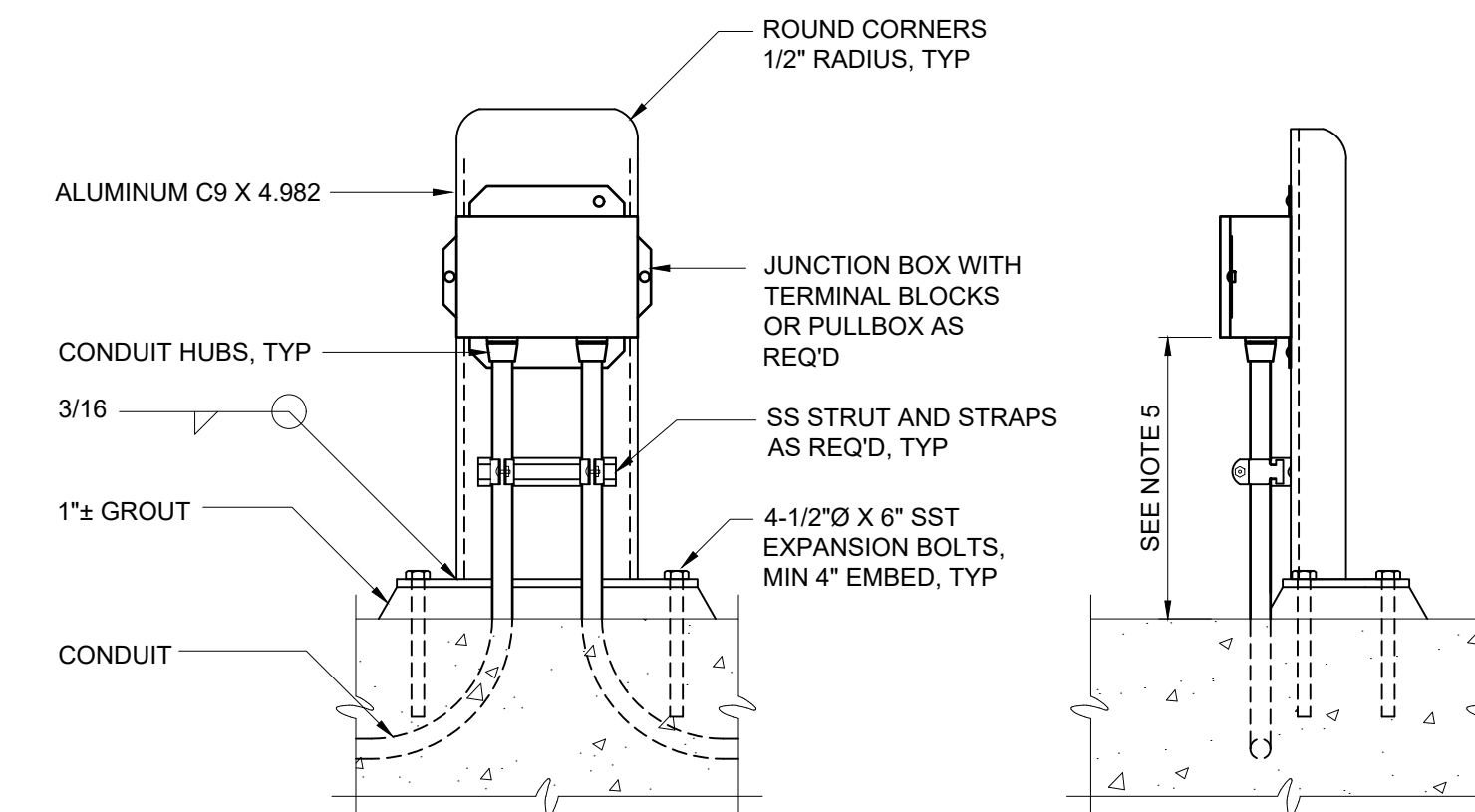
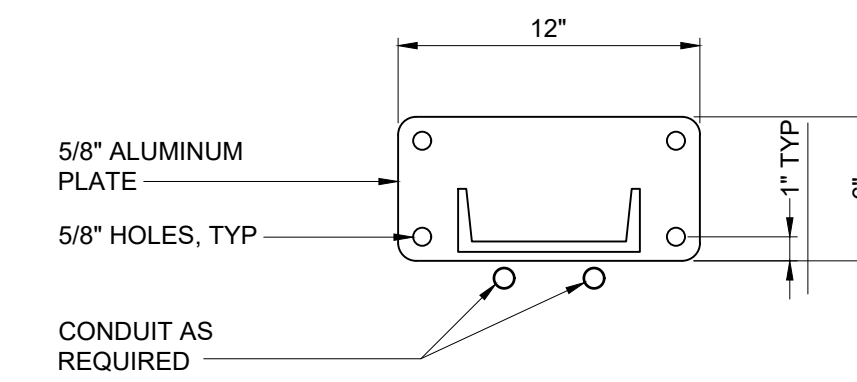
**NOTES:**

- CONCRETE SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION 03 30 00.
- REINFORCING STEEL AND TIES SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION 03 21 00. OVERLAP FOR REINFORCING STEEL SPLICES ALONG THE DUCTBANK LENGTH SHALL BE 15", MINIMUM.
- CONDUIT SPACERS ARE REQUIRED IN ACCORDANCE WITH SPECIFICATION SECTION 33 71 19. HORIZONTAL SPACING OF CONDUIT SPACER ASSEMBLIES ALONG LENGTH OF DUCTBANK SHALL BE AS SHOWN IN THE TABLE.
- FOR DUCTBANKS LESS THAN 15" IN HEIGHT, THE LAP SHALL BE THE HEIGHT OF THE DUCTBANK.
- IN POOR SOIL CONDITIONS, DUCTBANKS SHALL BE FORMED WITH FORMING MATERIALS TO MAINTAIN 4" MINIMUM ENCASEMENT. WHERE SOIL CONDITIONS PERMIT AND THE EXCAVATION IS MAINTAINED FOR A 4" MINIMUM TO 10" MAXIMUM ENCASEMENT, THE FORMWORK CAN BE OMITTED.

**MAX SPACING BETWEEN CONDUIT SPACER ASSEMBLIES**

CONDUIT SIZE	SPACING
1"	3 FT
1 1/4-2"	5 FT
2 1/2-3"	6 FT
3 1/2-5"	7 FT
6"	8 FT

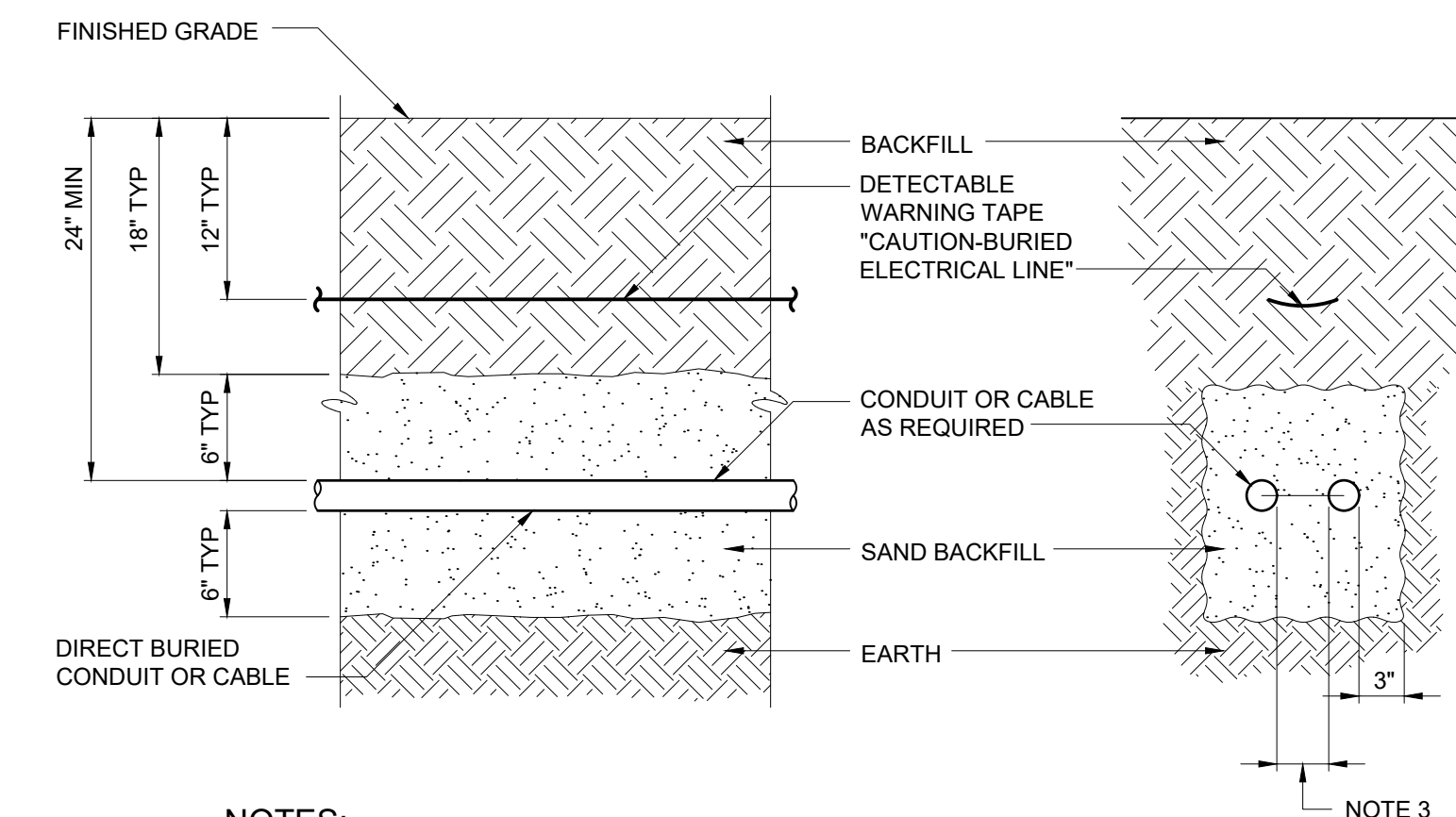
**TYPICAL DUCTBANK SECTION  
E-33-0101**



**NOTES:**

- COAT ALUMINUM SURFACES IN CONTACT WITH CONCRETE PER SPECIFICATIONS.
- CONSTRUCT 1-2" DIAMETER X 2-6" DEEP FOUNDATION WHERE MOUNTING SURFACE IS NOT AVAILABLE.
- USE SST WASHERS, LOCKWASHERS, NUTS AND BOLTS FOR MOUNTING EQUIPMENT AND STRUT SUPPORTS TO CHANNEL. DRILL EQUIPMENT MOUNTING TABS AS NECESSARY TO COORDINATE WITH CHANNEL WIDTH.
- REFERENCE STANDARD DETAIL E-26-0102 WHERE CONDUIT EMERGES FROM CONCRETE.

**ABOVE GRADE JUNCTION BOX  
E-26-0404**



**NOTES:**

- CONDUIT SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION 26 05 33.13.
- BACKFILL THAT CONTAINS LARGE ROCKS, PAVING MATERIALS, CINDERS, LARGE OR SHARPLY ANGULAR SUBSTANCES, OR CORROSIVE MATERIAL SHALL NOT BE USED.
- MAINTAIN A MINIMUM OF 2" BETWEEN POWER, CONTROL, AND INSTRUMENTATION CONDUITS OR CONDUCTORS.

**TYPICAL DIRECT BURIED CONDUIT & CABLE  
E-33-0104**

FILE: C:\MS09\HAZEN\PROJECTS\20160103\ED-01\_Saved by ALAU.dwg Date: 12/15/2021 1:08 PM  
 PLOT DATE: 12/15/2021 1:13 PM BY: ALAU

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	A. BUTTS
DRAWN BY:	A. LAU
CHECKED BY:	C. THUNHORST
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"
REV	ISSUED FOR DATE BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY CHRIS THUNHORST, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO E21381

**Hazen**  
HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

ELECTRICAL  
STANDARD DETAILS

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 29 of 36
	ED-01

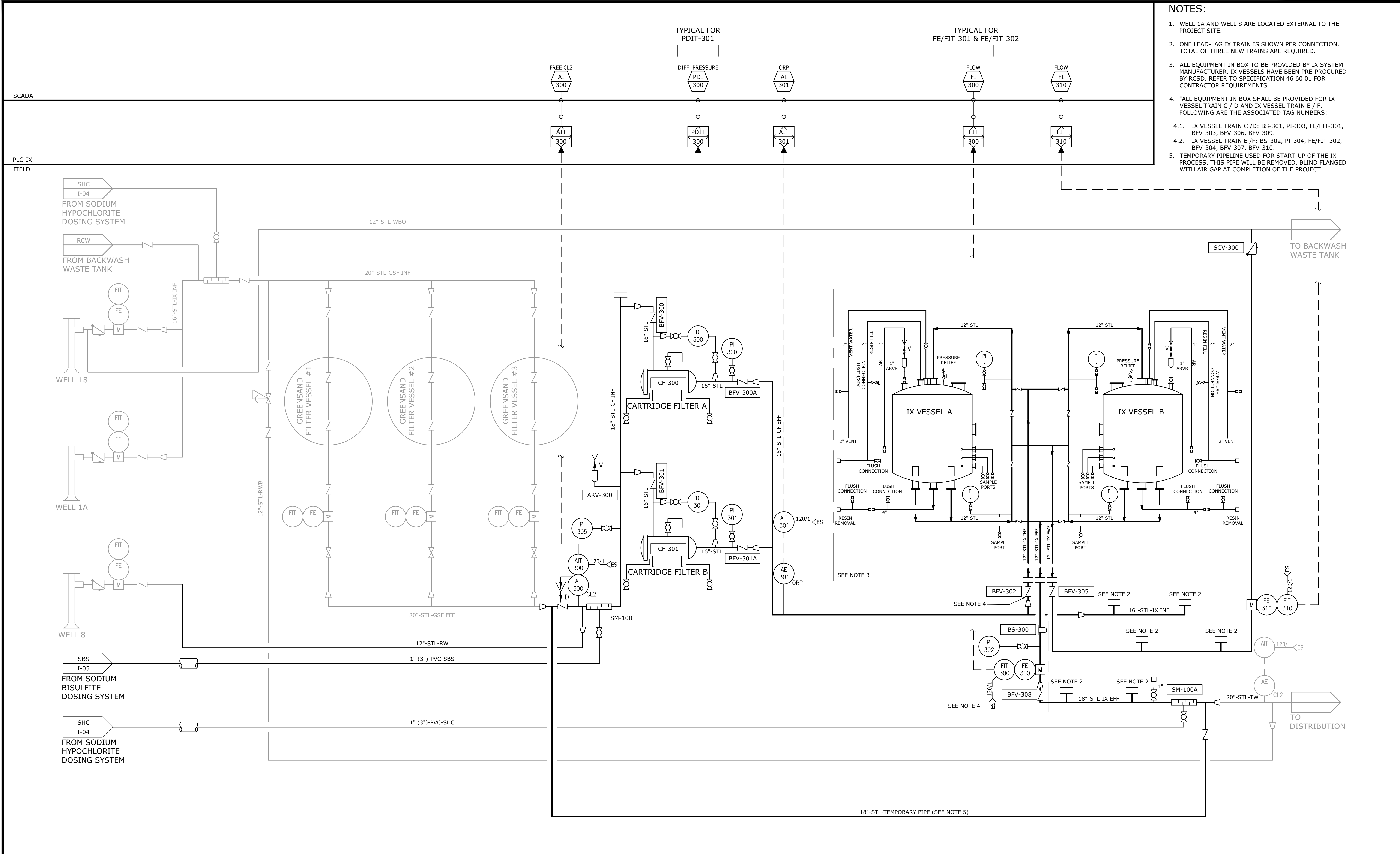






**NOTES:**

1. WELL 1A AND WELL 8 ARE LOCATED EXTERNAL TO THE PROJECT SITE.
2. ONE LEAD-LAG IX TRAIN IS SHOWN PER CONNECTION. TOTAL OF THREE NEW TRAINS ARE REQUIRED.
3. ALL EQUIPMENT IN BOX TO BE PROVIDED BY IX SYSTEM MANUFACTURER. IX VESSELS HAVE BEEN PRE-PROCURED BY RCSD. REFER TO SPECIFICATION 46 60 01 FOR CONTRACTOR REQUIREMENTS.
4. "ALL EQUIPMENT IN BOX SHALL BE PROVIDED FOR IX VESSEL TRAIN C / D AND IX VESSEL TRAIN E / F. FOLLOWING ARE THE ASSOCIATED TAG NUMBERS:
  - 4.1. IX VESSEL TRAIN C / D: BS-301, PI-303, FE/FIT-301, BFV-303, BFV-306, BFV-309.
  - 4.2. IX VESSEL TRAIN E / F: BS-302, PI-304, FE/FIT-302, BFV-304, BFV-307, BFV-310.
5. TEMPORARY PIPELINE USED FOR START-UP OF THE IX PROCESS. THIS PIPE WILL BE REMOVED, BLIND FLANGED WITH AIR GAP AT COMPLETION OF THE PROJECT.



FILE: C:\BUREAU\TOM\H&S\PROJECTS\PFAS\PLANT OVERVIEW AND ION EXCHANGE P&ID.DWG  
 PLOT DATE: 10/23/2020 2:48 PM BY: ATOMHEM

REV	ISSUED FOR	DATE	BY

**PROJECT ENGINEER:** T. YOKOYAMA  
**DESIGNED BY:** N. BOYLE  
**DRAWN BY:** M. BURBA  
**CHECKED BY:** D. EDWARDS  
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

**Hazen**  
 HAZEN AND SAWYER  
 7700 IRVINE CENTER DRIVE, SUITE 200  
 IRVINE, CALIFORNIA 92618

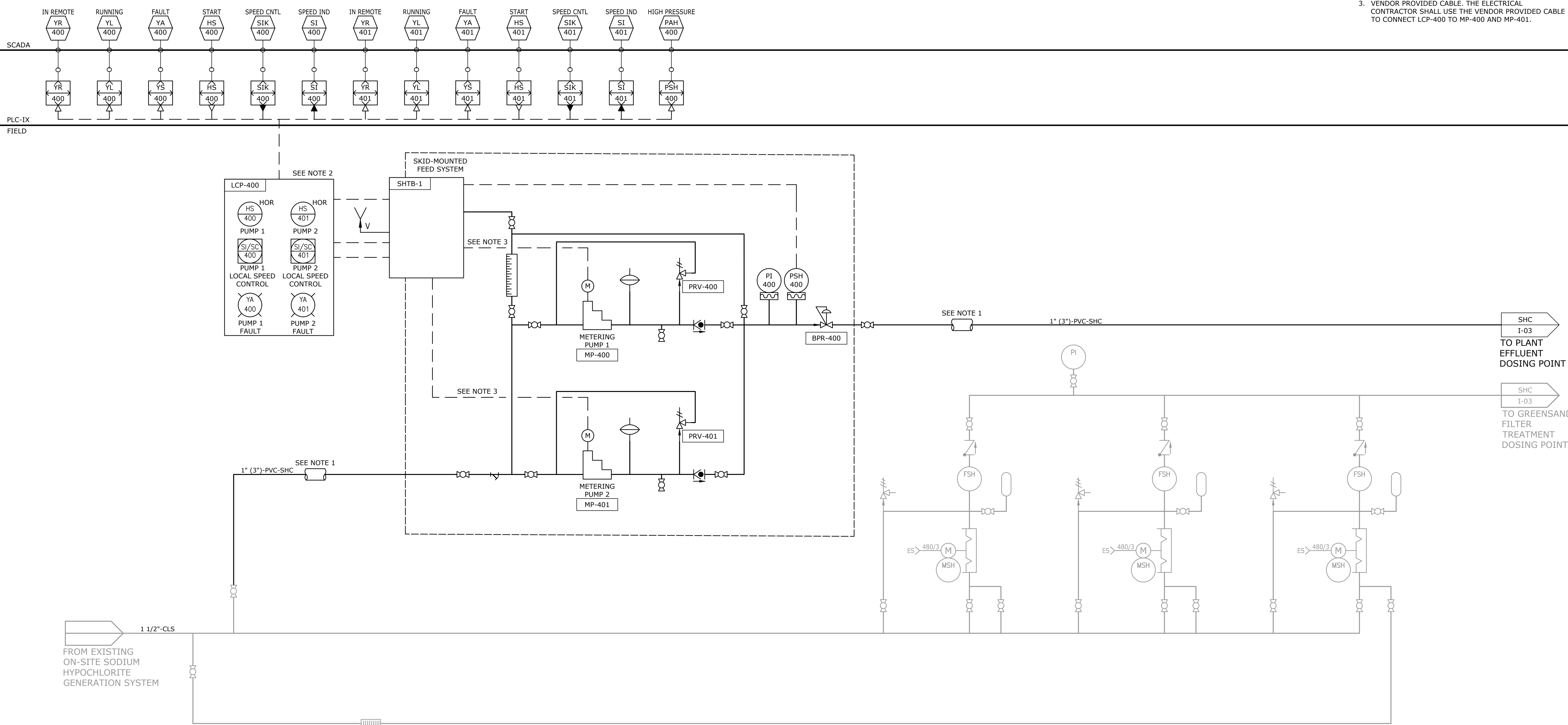
RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA  
**PFAS TREATMENT PROJECT**  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

**INSTRUMENTATION PLANT OVERVIEW AND ION EXCHANGE P&ID**  
 DATE: OCTOBER 2020  
 HAZEN NO.: 20168-000  
 CONTRACT NO.:  
 DRAWING NUMBER: SHEET 32 of 36  
**I-03**



**NOTES:**

1. ALL DOSING PIPING TO BE DOUBLE-WALLED PIPE, 1-INCH DIAMETER INSIDE 3-INCH DIAMETER PVC.
2. LCP-400 IS VENDOR PROVIDED.
3. VENDOR PROVIDED CABLE. THE ELECTRICAL CONTRACTOR SHALL USE THE VENDOR PROVIDED CABLE TO CONNECT LCP-400 TO MP-400 AND MP-401.



FILE: C:\BUREAU\DESIGN\HAPP\HAPP\LOCAL\AUTOCAD\DRAWING\PLANT\3D\COLUMBIAN\ON-SITE\SODIUM HYPOCHLORITE Dosing System.dwg  
 PLOT DATE: 10/26/2020 2:48 PM BY: ATUMHEIN

REV	ISSUED FOR	DATE	BY

PROJECT ENGINEER:	T. YOKOYAMA
DESIGNED BY:	N. BOYLE
DRAWN BY:	M. BURBA
CHECKED BY:	D. EDWARDS
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY NATHAN BOYLE, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO CH6799



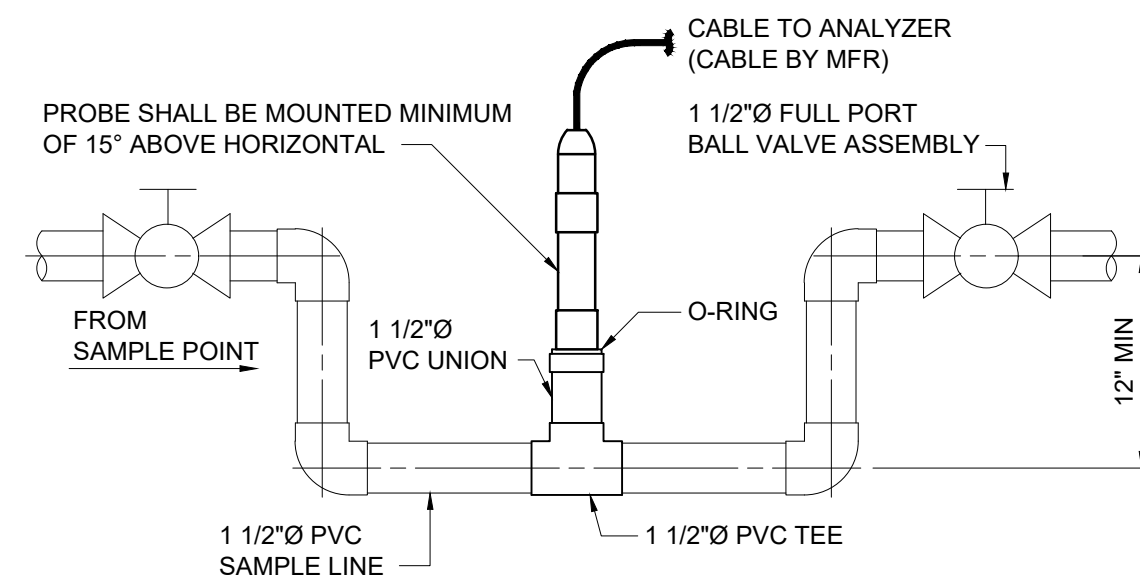
RUBIDOUX COMMUNITY SERVICES DISTRICT  
 JURUPA VALLEY, CA  
 PFAS TREATMENT PROJECT  
 AT MN PLANT #2  
 (LELAND THOMPSON WATER TREATMENT FACILITY)

INSTRUMENTATION  
 SODIUM HYPOCHLORITE  
 DOSING SYSTEM

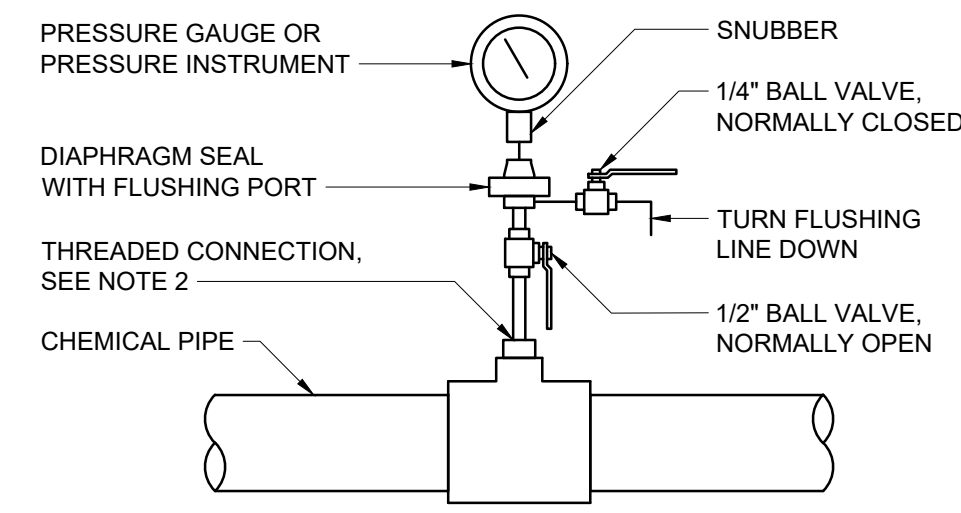
DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 33 of 36
	I-04





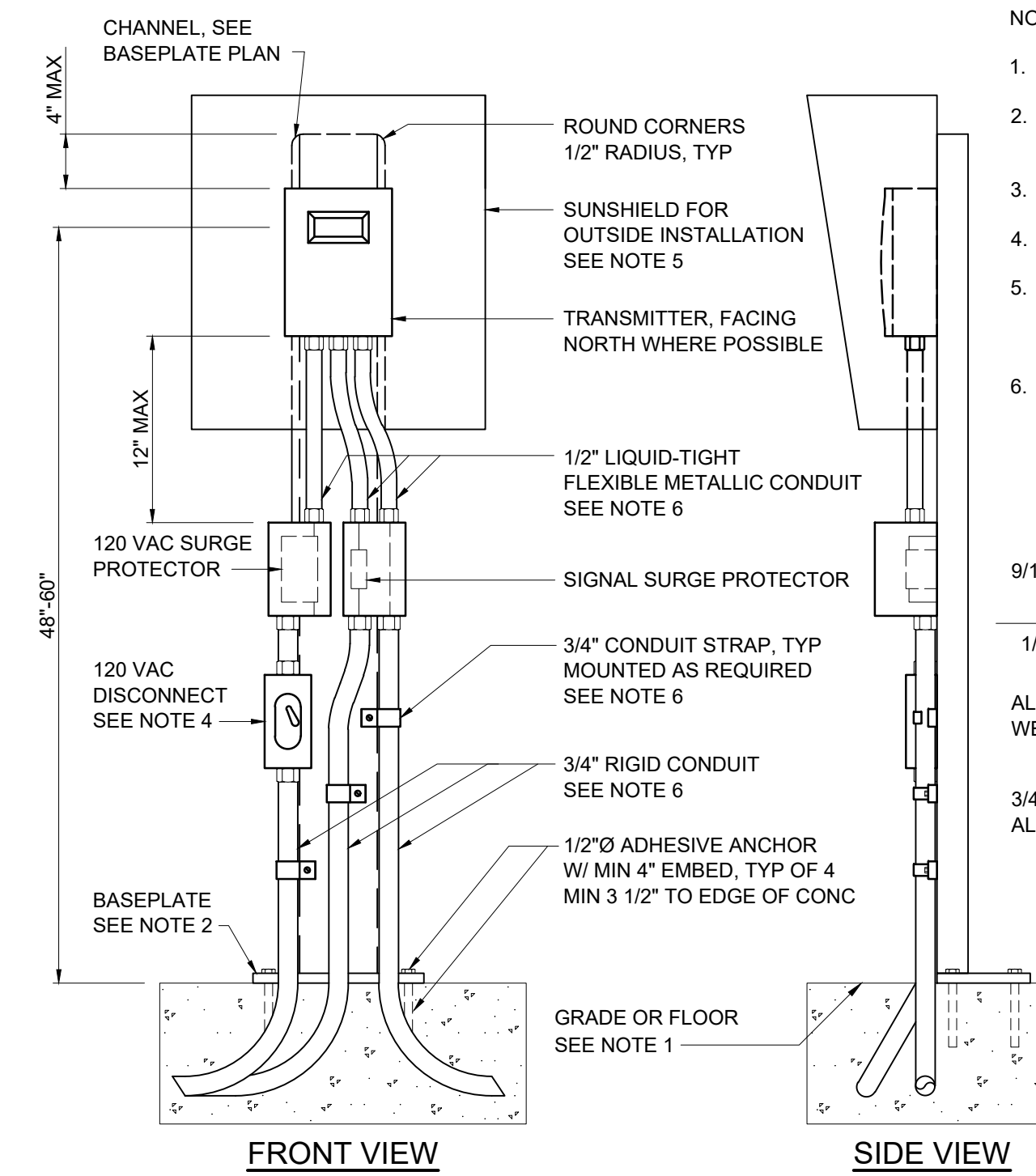


INLINE pH/ORP PROBE  
I-40-0503



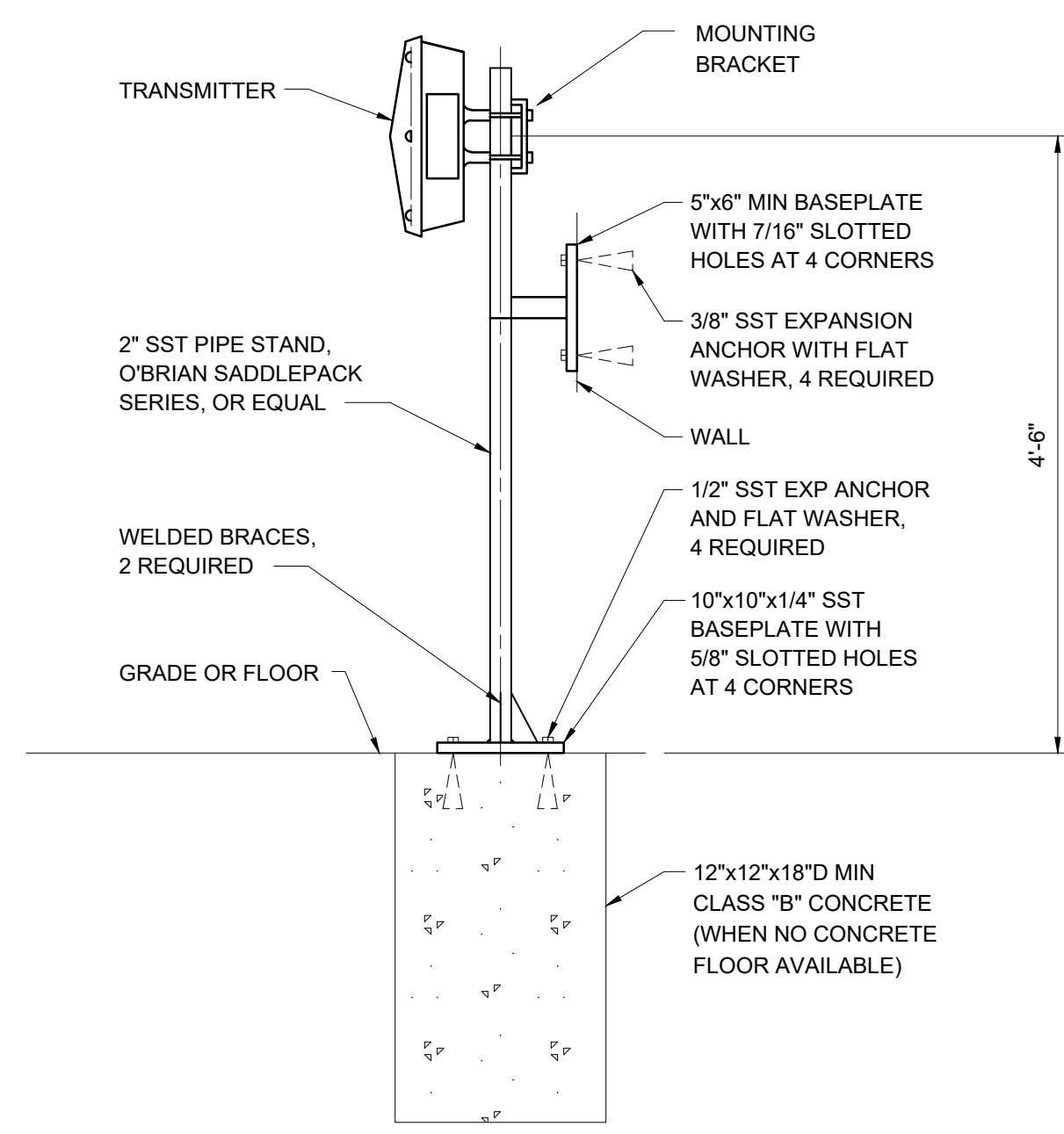
- NOTES:
1. ALL COMPONENTS SHALL BE 316 SST OR HASTELLOY C, DEPENDENT ON CHEMICAL COMPATIBILITY STANDARDS. FITTINGS SHALL BE THREADED, BALL VALVES SHALL BE FULL PORT WITH LEVER STYLE HANDLE.
  2. ASSEMBLY SHALL BE MOUNTED TO CHEMICAL PIPE WITH A THREADED FACTORY WELDED BOSS ON SST PIPE SYSTEMS, OR TEE WITH APPROPRIATE SIZED REINFORCED THREADED BUSHING FOR PVC OR CPVC PIPE SYSTEMS.
  3. FLUSHING LINE, VALVE HANDLES AND GAUGE/INSTRUMENT ARE SHOWN ROTATED FOR CLARITY. CONTRACTOR SHALL ARRANGE COMPONENTS FOR EASY ACCESS TO VALVE HANDLES, WITH GAUGE ORIENTED FOR PROPER READING FROM OPTIMUM OPERATOR STANCE. GENERALLY, FLUSHING LINE SHOULD BE ORIENTED ON THE OPPOSITE SIDE OF THE GAUGE.

DIAPHRAGM SEAL FOR  
CHEMICAL SERVICE  
I-40-0803

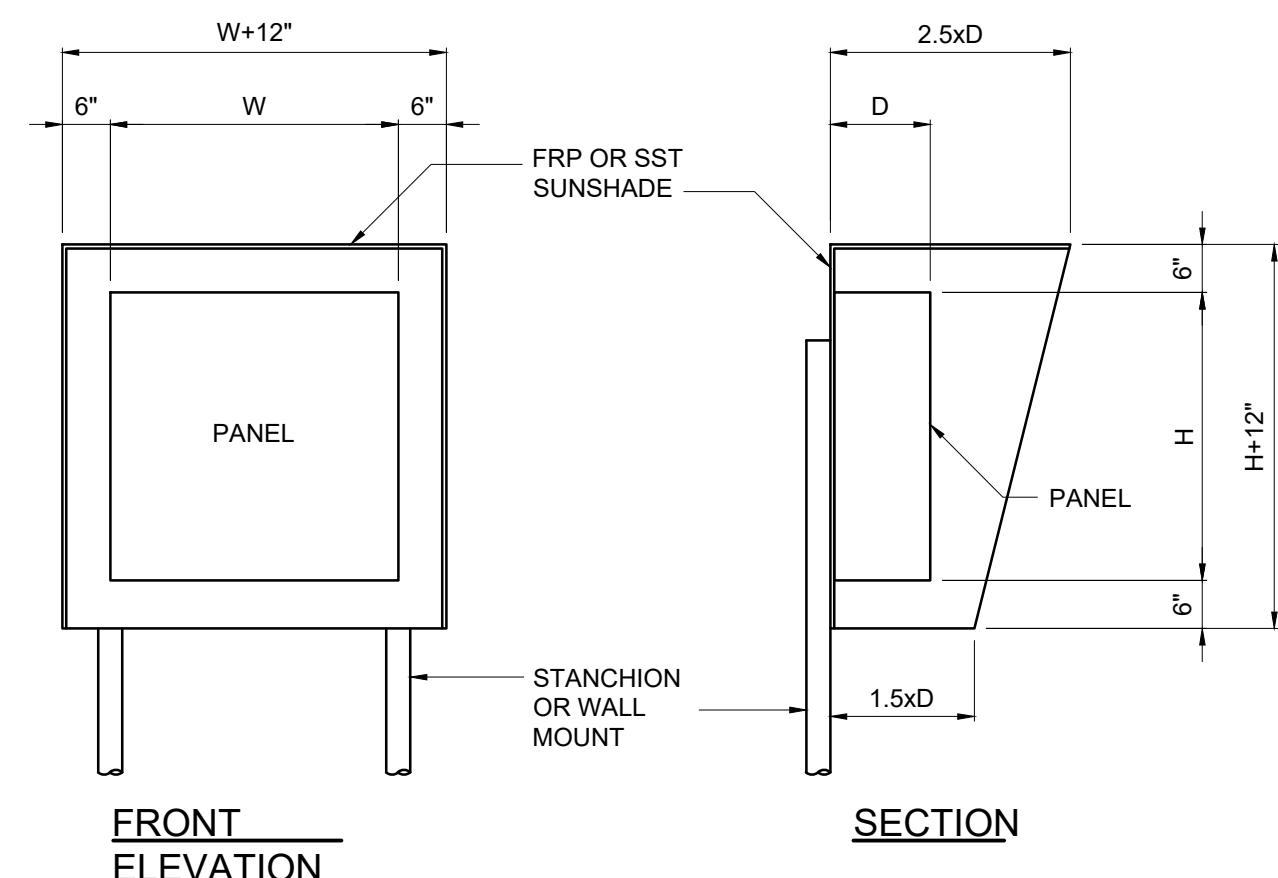


- NOTES:
1. WHEN NO CONCRETE IS AVAILABLE, POUR CLASS "B" CONCRETE SLAB, 30"x30"x18" MINIMUM.
  2. COAT ALUMINUM SURFACES IN CONTACT WITH CONCRETE IN ACCORDANCE WITH DIVISION 9 REQUIREMENTS.
  3. ALL BOLTS, NUTS, AND WASHERS SHALL BE TYPE 316 STAINLESS STEEL.
  4. APPLETON FSC CAST ALUMINUM BOX WITH FSK-1VS COVER, OR EQUAL.
  5. REFER TO DETAIL, I-40-1003 FOR SUNSHIELD DIMENSION REQUIREMENTS. IF TRANSMITTER REQUIRES SIDE ACCESS, CUT 6" Ø HOLE IN SUNSHIELD WHERE NECESSARY TO PROVIDE ADEQUATE ACCESS.
  6. CONDUIT TYPE AND MATERIALS OF CONSTRUCTION FOR SUPPORTS AND HARDWARE SHALL BE AS REQUIRED FOR THE AREA IN WHICH IT IS INSTALLED.

4-WIRE TRANSMITTER  
MOUNTED IN CONCRETE SLAB  
I-40-0901



TYPICAL PIPE STAND TRANSMITTER  
MOUNTED ON FLOOR OR WALL  
I-40-0905



- NOTES:
1. PANELS SHALL BE PROVIDED WITH SUNSHADES AS SPECIFIED OR AS SHOWN ON THE DRAWINGS.
  2. SUNSHADES SHALL BE FRP, STYLE E AS MANUFACTURED BY O'BRIEN CORPORATION, OR EQUAL, OR FABRICATED FROM 10 GAUGE TYPE 304 STAINLESS STEEL. WHERE PRACTICAL, PANELS AND INSTRUMENTS SHALL BE MOUNTED IN A NORTH FACING DIRECTION.
  3. CONTRACTOR SHALL VERIFY PANEL SIZE BEFORE CONSTRUCTION OF SUNSHADE AND MODIFY AS REQUIRED TO PROTECT PANELS FROM THE EFFECTS OF SOLAR HEAT GAIN.
  4. SUNSHADES SHALL BE SUITABLE FOR WALL OR STAND MOUNTING.

SUNSHADE FOR OUTDOOR PANELS  
I-40-1003

FILE: C:\BUREAU\BUREAU\APP\PROJECTS\LOCAL\AUTODESK\AUTODESK\LOCAL PLANT 3D\CAD\DRAWING\DRAWING\I-40-0905.DWG DATE: 10/20/2020 3:47 PM PLOT DATE: 10/20/2020 10:56 AM BY: MBURBA

PROJECT ENGINEER:	T. YOKOYAMA		
DESIGNED BY:	N. BOYLE		
DRAWN BY:	M. BURBA		
CHECKED BY:	D. EDWARDS		
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE	0 1/2" 1"		
REV	ISSUED FOR	DATE	BY

RECORD DRAWING

THIS DRAWING WAS ORIGINALLY APPROVED FOR CONSTRUCTION, SEALED, AND SIGNED ON 10-23-2020 BY NATHAN BOYLE, A LICENSED ENGINEER IN THE STATE OF CALIFORNIA, NO CH6799

**Hazen**

HAZEN AND SAWYER  
7700 IRVINE CENTER DRIVE, SUITE 200  
IRVINE, CALIFORNIA 92618

RUBIDOUX COMMUNITY SERVICES DISTRICT  
JURUPA VALLEY, CA

PFAS TREATMENT PROJECT  
AT MN PLANT #2  
(LELAND THOMPSON WATER TREATMENT FACILITY)

INSTRUMENTATION  
STANDARD DETAILS 2

DATE:	OCTOBER 2020
HAZEN NO.:	20168-000
CONTRACT NO.:	
DRAWING NUMBER:	SHEET 36 of 36
	ID-02