

BEAUMONT-CHERRY VALLEY WATER DISTRICT
WELL 25 WALL AND GATE CONSTRUCTION PROJECT
CONTRACT FOR PUBLIC WORK

1. Parties and Date

This Contract is entered into this ____ day of _____, 2019, between the BEAUMONT-CHERRY VALLEY WATER DISTRICT, a California Irrigation (Special) District ("District"), and _____ ("Contractor"), for the Work described as follows: Well 25 Wall and Gate Construction Project.

2. Consideration

In consideration of the mutual covenants hereinafter contained, District and Contractor agree to comply with the terms of this Contract and to faithfully perform their duties hereunder.

3. Duties of Contractor

3.1 Contractor agrees to furnish all labor, tools, and equipment necessary to complete the work hereinafter described. Contractor hereby guarantees that all work to be performed by it hereunder will be performed in a good and workmanlike manner. The Work to be performed by Contractor is described on Exhibit "A" attached hereto and by this reference incorporated herein. Pursuant to Public Contract Code Section 3300, Contractor shall possess an active and current Contractor's License, Class A or C-29 and C-10, which shall be maintained throughout the term of this Contract.

3.2 Contractor shall complete all work required herein on or before _____

3.3 Contractor shall furnish District with labor and material releases from all subcontractors performing work on, or furnishing materials for, the job prior to final payment by District.

3.4 Contractor shall furnish a performance bond in the amount of the full contract price, a payment bond in the amount of 50% of the full contract price, and a maintenance bond in the amount of the full contract price issued in forms consistent with industry standards by United States Treasury authorized bonding companies as approved by District, prior to commencement of the Work. Bonds shall be furnished on the forms attached at the back of this Contract, if Additive Bid Item is exercised. 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 twelve (12) months 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, including the test requirements for any part of the materials furnished hereunder which, during said twelve (12) month period, are found to be deficient with respect to any provision of the Contract. Contractor also agrees and does hereby hold District 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 District. If Contractor fails to replace all defective materials promptly, District may secure the service of others to do this work, and Contractor and his surety shall be liable to District for the cost, including removal and replacement thereof. The guarantees, indemnifications and agreements set forth above shall continue to be secured following completion of the project by Contractor providing a maintenance bond in the amount of 100% of the full contract price on a form commonly used in the industry and acceptable to the District, and for this purpose said bond shall remain in force for a period of one (1) year after the date of the final payment.

3.5 Copies of the prevailing rate of per diem wages for each craft, classification or type of worker needed to execute this Contract are available to interested parties upon request. If the total amount of this Contract is \$1,000 or more, Contractor agrees to pay such prevailing rates to each workman needed to execute the work required under this Contract and further agrees to comply with the penalty provisions of Section 1775 of the Labor Code in the event of its failure to pay prevailing rates. Pursuant to Section 1727 of the Labor Code, all wages and penalties withheld for failure of Contractor to pay such per diem wages shall be transferred by District to the State Labor Commissioner for disbursement, should Contractor fail to bring suit for recovery within ninety (90) days after completion of the Contract or acceptance of the work.

3.6 Contractor shall pay travel subsistence payments to each workman needed to execute the work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Section 1773.8 of the Labor Code.

3.7 When Contractor employs workmen in an apprenticeable craft or trade, Contractor shall comply with the provisions of Section 1777.5 of the Labor Code with respect to the employment of properly registered apprentices upon public works. The primary responsibility for compliance with said section for all apprenticeable occupations shall be with Contractor.

3.8 Contractor is advised that eight (8) hours labor constitutes a legal day's work. Pursuant to Section 1813 of the Labor Code, Contractor shall forfeit a penalty of \$25.00 per worker for each day that each worker is permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week, except when payment for overtime is made at not less than one and one-half (1-1/2) times the basic rate for that worker.

3.9 In accordance with the requirements of Labor Code Section 1776, Contractor shall keep accurate payroll records on forms provided by the Division of Labor Standards Enforcement, or keep payroll records containing the same information required by such forms, and shall make any such records available for inspection.

3.10 Contractor shall keep himself fully informed of all laws and regulations in any manner affecting the performance of the Contract work, and shall indemnify District and District's agents against any liability arising from violation of any such law or regulation.

3.11 Contractor shall at its own expense maintain at least the following insurance coverages throughout the performance of this Contract:

(a) Worker's compensation insurance coverages for all persons employed or to be employed in the performance of this Contract, which insurance shall at all times be maintained in strict accordance with the requirements of the current California Worker's Compensation Insurance Laws.

(b) General commercial liability insurance coverage of at least \$1,000,000 per occurrence and \$2,000,000 general aggregate insuring Contractor and naming District as an additional insured for all claims for bodily injury, personal injury and property damage, arising out of or in connection with any operations under this Contract.

(c) Automobile liability insurance coverage with a limit of liability of \$1,000,000 per accident Combined Single Limit.

(d) Course of construction insurance with a limit of liability equal to the full contract amount, unless waived in writing by District.

Prior to commencement of any work under this Contract, Contractor shall obtain and furnish to District a Certificate of Insurance as to each type of insurance required, which certificate shall be on the form provided to Contractor by District.

3.12 Contractor shall be responsible for all loss and damage which may arise out of the nature of the work agreed to herein, or from the action of the elements, or from any unforeseen difficulties which may arise or be encountered in the prosecution of the work until same is fully completed and accepted by District. However, Contractor shall be responsible for damage proximately caused by an act of God within the meaning of Section 4150 of the Government Code only to the extent of five percent (5%) of the contract amount.

3.13 Contractor shall indemnify and hold harmless District, its agents and employees, from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from performance of work under this Contract and which are attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom, caused in whole or in part by any negligent or willful act or omission of the Contractor or anyone directly or indirectly employed by him or for whose acts he may be liable.

3.14 Contractor shall be responsible for securing and paying for all permits and licenses necessary to perform the work described herein.

3.15 If the work entails trenching of five (5) feet or more in depth, Contractor shall make adequate provisions for shoring, bracing, sloping, or other protection from the hazard of caving ground.

3.16 As required by Public Contract Code Section 7104, Contractor shall promptly, and prior to disturbance of conditions, notify District of (a) any material discovered in excavation that Contractor believes to be a hazardous waste that is required to be removed to a Class I, Class II, or Class III disposal site; (b) subsurface or latent physical conditions at the site differing from those indicated by District; and (c) unknown physical conditions of an unusual nature at the site, significantly different from those ordinarily encountered in such contract work. Upon notification, District will promptly investigate the conditions to determine whether a change order is appropriate. In the event of a dispute, Contractor shall not be excused from any scheduled completion date but will retain all rights provided by the Contract or by law for resolving the dispute.

4. District's Responsibilities

4.1 As consideration for performance of the work required herein, District agrees to pay Contractor the total contract amount of _____, (\$_____), provided that such amount shall be subject to adjustment pursuant to written change orders signed in advance by District.

4.2 Contractor shall submit progress payment invoices to District at the end of each calendar month during the term of the Contract. All progress payment invoices shall be subject to approval by the District prior to payment by the District. Such progress payment invoices shall be made in accordance with Section 20104.50 of the California Public Contract Code, requiring District to make a determination of suitability of the payment request within seven (7) days of receipt of such request and further requiring District to make payment on properly submitted progress payment invoices within thirty (30) days in order to avoid interest payments to the Contractor upon such amounts.

4.3 When the Contractor determines that he has completed the work required herein, Contractor shall so notify District in writing and shall furnish all labor and material releases required by Section 3.3 of this Contract. District shall thereupon inspect the work and, if acceptable, shall pay to Contractor the contract price, less any amount which District may be authorized or directed by law to retain. Payment of retention proceeds due to Contractor shall be made no later than sixty (60) calendar days after such final acceptance by District, in accordance with Section 7107 of the California Public Contract Code. Contractor is hereby alerted to provisions of Section 7107 of the California Public Contract Code, requiring Contractor to pay each of its subcontractors from whom retention has been withheld, each subcontractor's share of the retention received, within ten (10) calendar days from the time that all or any portion of such retention proceeds are received by Contractor from District. District will allow Contractor to substitute qualified securities, deposited with District or a qualified escrow agent, in lieu of contract retentions in accordance with provisions of California Public Contract Code, Section 22300. The escrow agreement used in such instance shall be substantially similar to that form set out in Section 22300 of the Public Contract Code. District will provide this form to the Contractor upon request.

4.4 To the extent required by Section 4215 of the Government Code, District shall compensate Contractor for the costs of locating and repairing damage to underground utility facilities not due to the failure of Contractor to exercise reasonable care, and removing or relocating underground utility facilities not indicated in the construction drawings and for equipment necessarily idled during such work. Contractor shall not be assessed liquidated damages for delay caused by failure of District to provide for removal or relocation of such utility facilities.

5. Contractual Relationship

It is expressly agreed that Contractor is an independent contractor, and neither Contractor nor any of its employees shall be deemed employees of District. Contractor shall have full supervision over all workers on the job, including equipment, drivers, and operators, and neither District nor any of District's agents shall be held responsible for any action of Contractor under this Contract. Should any question arise regarding the meaning or import of any of the provisions of this Contract or written or oral instructions from District, the matter shall be referred to District's General Manager, whose decision shall be binding upon Contractor.

6. Assignment Forbidden

Contractor shall not assign or transfer this Contract or any right, title or interest herein without the prior written consent of District. If contractor attempts an assignment of this Contract or any right or interest herein, District may, at its option, terminate and revoke the Contract and shall thereupon be relieved from any and all obligations to Contractor or his assignee or transferee.

7. Time of Essence

Time is of the essence in the performance of this Contract. Contractor will be assessed liquidated damages in the amount of \$100.00 per calendar day for each day of unauthorized delay in completing performance.

8. Termination

This Contract may be terminated by District at any time by giving Contractor seven (7) days advance written notice. In the event of termination by District for any reason other than the fault of the Contractor, District shall pay Contractor for all work performed up to that time as provided herein. In the event of breach of the Contract by Contractor, District may terminate the Contract immediately without notice, may reduce payment to the Contractor in the amount necessary to offset District's resulting damages, and may pursue any other available recourse against Contractor.

9. Dispute Resolution

Any separate demand by Contractor for the payment of money or damages shall be resolved in accordance with Public Contract Code Sections 20104 et seq., if they apply. Copies of those sections are available upon request and by this reference are incorporated herein.

10. Attorney's Fees and Costs

If any action is necessary to enforce or interpret the terms of this Contract, the prevailing party shall be entitled to recover from the losing party attorney's fees in an amount determined to be reasonable by the court, together with costs and necessary disbursements.

11. Notices

Any notice required to be given under the terms of this Contract shall be sufficient and complete upon depositing the same in the United States mail, with postage prepaid and addressed as follows:

<u>DISTRICT</u>	<u>Contractor</u>
Beaumont-Cherry Valley Water	_____
District	_____
P.O. Box	_____
2037560 Magnolia Avenue	_____
Beaumont, CA 9223	_____

12. Counterparts

This Contract shall be executed in two (2) counterparts, each of which shall constitute an original.

13. Certification of License

Contractor certifies that as of the date of execution of this contract, Contractor has a current contractor's license of the classification indicated below Contractor's signature hereto.

IN WITNESS WHEREOF, each of the parties has caused this Contract to be executed on the day and year first above written.

(Contractor)

By: _____

Title: _____

Contractor's License Number & Classification

ATTEST:

Secretary

**BEAUMONT-CHERRY VALLEY
WATER DISTRICT**

By: _____
Daniel K. Jagers
General Manager

ATTEST:

Secretary to the Board

CERTIFICATION

LABOR CODE – SECTION 1861

I, the undersigned Contractor, am aware of the provisions of Section 3700 et seq. of the Labor Code which requires every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of the Code, and I, the undersigned Contractor, agree to and will comply with such provisions before commencing the performance of the work of this Contract.

Contractor

By: _____

Title: _____

EXHIBIT "A"

**BEAUMONT-CHERRY VALLEY WATER DISTRICT
WELL 25 WALL AND GATE CONSTRUCTION PROJECT**

SCOPE OF WORK-FEE SCHEDULE

The undersigned hereby proposes to furnish all labor, materials, equipment and methods necessary for constructing all Work specified in the Scope of Work-Fee Schedule amounts set forth below, and commence work within one (1) week of Notice to Proceed. The undersigned also acknowledges that all prices include sales tax and all other applicable taxes and fees. See attached data sheets for details related to well and pumping plant.

Item	Description	Qty	Unit	Unit Cost	Amount
101	Permits, insurance, and management.	1	L.S.	N/A	\$
102	Mobilize and demobilize crew and equipment necessary to construct new well 25 east masonry wall, rolling metal gate, and appurtenances.	1	L.S.	N/A	\$
103	Contract bonds, insurance and permits (not to exceed 3% of bid amount).	1	L.S.	\$	\$
104	Construct trench for wall foundation and all related work.	1	L.S.	N/A	\$
105	Construct concrete footing for wall, pilasters, concrete gate runner and all other miscellaneous concrete work. (See Appendix C, Sheet C-1)	1	L.S.	N/A	\$
106	Construct masonry concrete block wall, wall cap and pilasters as shown on the attached plans (approximately 176 L.F.), and all related work. (See Appendix C, Sheet S-7)	26.5	C.Y.	N/A	\$
107	Furnish and install 30' rolling gate at site entrance (east gate), appurtenances, and all related work.	1	L.S.	\$	\$
108	Furnish and install all electrical conduit, conductors, pull boxes, grounding systems, and appurtenances, and all related work necessary to install new gate operator power feed, traffic loops, and associated appurtenances.	1	L.S.	\$	\$
109	Furnish and install all protective coatings and paintings.	1	L.S.	\$	\$
110	Perform startup and testing of all equipment, controls, and instrumentation.	1	L.S.	\$	\$
111	Furnish operation and maintenance manuals for all equipment, controls, and instrumentation.	1	L.S.	N/A	\$

TOTAL AMOUNT (Sum of Fee Items 101 through 111):

_____ Dollars \$ _____
(words) (figures)

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

Vendor's Authorized Representative

Vendor (Company Name)

Signature

Name (Print)

Title (Print)

EXHIBIT A

WELL 25 WALL AND GATE CONSTRUCTION PROJECT

SPECIAL REQUIREMENTS

1. The Work

The Work shall include all labor, materials, equipment, and methods required to construct the east masonry wall, pilasters, and associated rolling metal gate and gate opener including installation of all electrical equipment, conduits, and conductors from the existing electrical cabinet lighting panel located in the pump building electrical room, wall penetration, trenching or wall mounting all conduits and electrical conductors from said lighting panel located within, to the gate location at the District's existing Well 25 domestic water well pumping plant in accordance with the Scope of Work-Fee Schedule.

Well 25 Wall and Gate Construction shall be as set forth on the attached Drawings for Well 25 Original Construction Drawings (attached in Appendix B hereafter). Contractor shall match color, pattern, cap, and features of existing Well 25 Facilities north, west and south wall.

2. Authorization to Proceed

Owner will provide an Authorization to Proceed Letter to the Contractor. The Contractor will then be authorized to begin Contract Work submittal document submission, material ordering, and construction scheduling.

3. Working Hours

Contractor shall perform all work between 7:00 AM and 5:00 PM, Monday through Friday. Contractor is notified that the District Office is normally closed on Fridays and any work that is performed that requires District participation, inspection or comment must be coordinated a minimum of two days (48 hours) in advance of said work. Contractor shall not work on Owner holidays. Said holidays are as follows:

- New Year's Day
- Martin Luther King Jr. Day
- Presidents Day
- Memorial Day
- Independence Day
- Labor Day
- Veterans Day - November 11
- Thanksgiving Day
- Day After Thanksgiving Day
- Christmas Day

When a legal holiday falls on a Saturday, it is observed on the preceding Friday, when it falls on a Sunday, it is observed on the following Monday.

4. Permits, Certificates, Laws, and Ordinances

Contractor shall, at his own expense, procure all permits, certificates, and licenses required of him by the State of California, County of Riverside, County of San Bernardino, California Regional Water Quality Control Board, South Coast Air Quality Management District, or any other authority or agency having jurisdiction for the 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.

5. Records

The Contractor shall keep records providing the following information for those items of work that are performed:

- A. A complete daily log and record of daily work completed B. As-Built Drawings/Submittals documenting final construction.

6. Project Completion Date

Project completion date shall be 45 days from the date of the Authorization to Proceed Letter issued by the District. The 45 day completion date will be adjusted as necessary to provide for actual material acquisition delays as required.

7. Liquidated Damages for Delay

Contractor shall pay to Owner, as fixed and agreed, liquidated damages for each calendar day's delay in the completion of all the work beyond the time agreed upon, the amount of \$100.00.

8. Contract Information/Drawings

The following Appendices are made a part of these Contract Documents:

APPENDIX LIST
(Attached in the back of these Contract Documents)

<u>Title</u>	<u>Appendix No.</u>
Specification 02825 – Ornamental Steel Fencing and Gates Technical Specifications	A
Specification 02829 – Electric Vehicular Slide Gate Operator Technical Specifications	
Specification 03100 – Basic Concrete Formwork	

Technical Specifications

Specification 03200 – Basic Concrete Reinforcement
Technical Specifications

Specification 03300 – Basic Concrete Technical Specifications

Specification 04200 – Basic Concrete Masonry Technical
Specifications

Specification 16050 – Basic Electrical
Technical Specifications

Well 25 Location Map, Site Location, and Site Photos B

Well 25 Well Block Wall Plan and Details (Well 25 Original
Construction Drawings with Project Related Work Activities
Generally Identified by Revision Block) C

Well No. 25 Drawing Sheets

Sheet No.	Drawing No.	Description
1	G-1	Title Sheet
4	C-1	Site and Grading Plan
5	C-2	Piping Plan
12	S-1	Structural Notes and Standard Details
13	S-2	Structural Standard Details
18	S-7	Sliding Gate Details
30	E-1	Electrical Symbols and Schedules
32	E-3	Electrical Details 1
34	E-5	Single Line Diagram & Main SWBD / MCC Elevation
39	E-10	Electrical Service Conduit Layout

9. Right to Change Work

District reserves the right to direct Contractor to cease work upon the well at any phase and to determine payment for work performed in accordance with the bid unit prices. District also reserves the right to either increase or decrease other related work in accordance with the aforementioned unit prices. Payment for all work shall be predicated upon work completed.

10. Payment Requests

Contractor shall submit all partial payment requests and final payment request to District. Payment requests shall be submitted by the 18th day of the month preceding the month in which payment will be made. On approval by the District, partial payments will be made by the first day of the month following the month in which request for payment is made.

All payment requests shall show all Scope of Work-Fee Items and sub items for the Contract Work. In addition, said requests shall show the percentage of completion of each Fee Item and sub 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.

11. Site Maintenance

- A. The Contractor shall at all times maintain the well site in a neat and orderly fashion, free from trash and construction waste materials. All cleared and waste material shall become the property of the Contractor and shall be disposed of by him outside the limits of the work in accordance with applicable ordinances and regulations of governmental agencies having jurisdictions.
- B. Unattended construction materials and equipment shall be left in a manner such that they do not constitute fire hazards, exposed to vandalism, or become a nuisance or danger due to forces of nature such as rain or wind.
- C. Existing improvements as designated by the District, whether on the construction site or on other property, shall be protected in place and shall be provided with adequate access.
- D. While construction is being conducted, the Contractor shall provide safety in the area of construction.
- E. Contractor shall remove any sediment deposited to city streets or storm water channels on a daily basis.

12. Data to be Submitted by Contractor

Contractor shall furnish District the following data and said data must be accepted by District prior to performing any Contract Work appurtenant to specific submittal items. Data (two copies) shall be submitted directly to the District for review and acceptance or rejection. Contractor shall submit five copies and one electronic copy in PDF format of accepted data the District for distribution of same.

- A. Material and Equipment Items with Manufactures Data and/or Materials Sheets
 - Masonry Block data sheets.
 - Concrete Mix Design proposed for foundations and gate runner.
 - Gate opener manufacturer's data sheets.
 - Electrical conduits and materials data sheets.
- B. Fabrication and Component Drawings with Diagrams
 - Metal rolling gate and appurtenances
- C. Construction Schedule

Construction Schedule

13. Contractor Cooperation and Coordination

Contractor shall cooperate with District and all jurisdictional agencies. Contractor shall establish a work schedule sufficiently in advance of work to permit coordination of work and special inspection for masonry walls with District and other agencies. Owner will have representatives on site to observe and verify compliance with Contract Documents. Contractor shall not operate any existing facilities, including opening or closing of pipeline valves.

14. Construction Water and Power

Owner will provide a reasonable quantity of construction water free of charge from Owner's existing potable water system. Contractor shall apply for an Owner supplied meter. Contractor shall furnish and install Owner approved backflow device (as necessary) and all necessary piping and appurtenances, including pumps and water trucks, necessary to convey water from Owner's meter to work location.

Contractor shall provide required power to perform all phases of work.

15. Specified Model Numbers

All model numbers used herein are provided for information only, to assist Contractor in selecting equipment that conforms to Specifications. In case of any conflict between model numbers given herein and the descriptive specifications or performance specified, the descriptive specifications and performance specified shall govern.

**APPENDIX A
SPECIFICATION SECTION**

**Specification Section 02825
Ornamental Steel Fencing and Gates Technical Specification**

**Specification Section 02829
Electrical Vehicular Slide Gate Operator**

**Specification Section 03100
Basic Concrete Formwork Technical Specification**

**Specification Section 03200
Basic Concrete Reinforcement Technical Specification**

**Specification Section 03300
Basic Concrete Technical Specification**

**Specification Section 04200
Basic Concrete Masonry Technical Specification**

**Specification Section 16050
Basic Electrical Technical Specification**

**Specification Section 01300
Contractor Submittals and Requests Technical Specifications**

SECTION 02825

ORNAMENTAL STEEL FENCING AND GATES

PART 1 - GENERAL

1.01 Project-Specific Description

Contractor shall furnish and install ornamental steel fencing system, including fence panels, rolling gate, swing gates, posts, footings, and accessories, as shown on the Drawings and as specified herein. V-wheeled rolling gate shall be manually operated (electric slide gate operator is not required for this project).

1.02 Related Work Specified Elsewhere

- A. Section 03300 – Cast-in-Place Concrete: Concrete footings for support of fence and gate posts.
- B. Section 02829 – Electric Vehicular Slide Gate Operator: Electric operator for ornamental steel gates (when specified).

1.03 Applicable Specifications and Standards

The following documents of issue in effect on the date of bid form a part of this specification to the extent specified herein:

- A. American Society for Testing and Materials (ASTM) Publications:
 - 1. ASTM A36 – Carbon Structural Steel.
 - 2. ASTM A123 – Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 4. ASTM A513 – Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
 - 5. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
 - 6. ASTM A787 – Electric-Resistance-Welded Metallic-Coated Carbon Steel Mechanical Tubing.
 - 7. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

8. ASTM D822 – Tests on Paint and Related Coatings Using Filtered Open-Flame Carbon-Arc Exposure Apparatus.
9. ASTM D1794 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
10. ASTM D3363 – Test Method for Film Hardness by Pencil Test.

1.04 Contractor Submittals

- A. All submittals shall be in accordance with Specification Section 01300, Contractor Submittals Technical Specifications.
- B. Submittals shall include, but not be limited to, the following:
 1. Product data for all fence and gate components and accessories.
 2. Shop drawings showing layout, dimensions, and spacing of all fence and gate components, interface with electric gate operator, and anchorage and installation details.
 3. Coating color chart of available fence and gate colors for selection by Owner.
 4. Sample: 8" x 10" minimum size sample of fence panel illustrating design, fabrication workmanship, and selected color coating.
 5. Copy of warranty specified in Paragraph 1.05.

1.05 Warranty

Manufacturer shall provide 10 years (minimum) warranty for factory finish against cracking, peeling, and blistering.

1.06 Quality Assurance

Ornamental steel fencing and gates shall be as manufactured by Builders Fence Company, Inc., or equal.

PART 2 - PRODUCTS

2.01 Fencing

- A. Fence framework, including pickets, rails, and posts, shall be manufactured from electrically welded pre-galvanized tubing conforming to ASTM A513 and having minimum yield strength of 45,000 psi. Zinc coating with a minimum weight of 0.90 ounces per square foot (coating designation G-90) shall meet the requirements of ASTM 653.

- B. Fence panel sections shall be capable of supporting a 1000-pound load applied at the mid-span with deflection limited to L/240 and no permanent deformation.
- C. Pickets, rails, and posts shall be the size and thickness shown on the Drawings. If not specified on the Drawings, size and thickness shall be as follows:
 - 1. Pickets shall be minimum 1" square tubing with 16-gauge wall thickness, built on 4" centers for 3" nominal space between pickets. Unless shown otherwise on the Drawings, each picket shall be provided with a point.
 - 2. Rails shall be minimum 2" square tubing with 14-gauge wall thickness.
 - 3. Posts shall be minimum 3" square tubing with 11-gauge wall thickness.
- D. Fence panel geometry, length, and height shall comply with the nominal dimensions shown on the Construction Drawings. Minor variations in dimensions may be necessary to accommodate actual field conditions and selected fence components.

Pickets, rails and posts shall be assembled in accordance with the manufacturer's approved shop drawings and the Construction Drawings. Prior to commencing fabrication, Contractor shall field verify all fence dimensions, including post locations and fence segment lengths.
- E. Pickets, rails and posts shall be Electro-MIG welded per the final approved shop drawings. All joints shall be fully welded (seal welded) to prevent corrosion from moisture. Kit type field assembled fence panels are not acceptable.
- F. Posts shall be provided with zinc plated press-on type steel caps. Post bases shall be drilled base plate or sleeve for mounting to concrete footing or pier as indicated on the Construction Drawings.

2.02 Gates

A. General

Contractor shall provide gates of type and size indicated on the Drawings. Manufacturer shall equip gates with all hardware and appurtenances as required for complete functional operation.

Gate framework, including pickets, rails, and posts, shall be manufactured from structural tubing conforming to ASTM A36/A500 and having a minimum yield strength of 46,000 psi or from electrically welded pre-galvanized tubing conforming to ASTM A513 and having a minimum yield strength of 45,000 psi. All gate framework shall be provided with zinc coating conforming to ASTM A123/A653 and having a minimum weight of 0.90 ounces per square foot (coating designation G-90). Sheet metals, as shown on the Drawings, shall be zinc coated conforming to ASTM A123/A653 and having a minimum weight of

0.90 ounces per square foot (coating designation G-90) with 20-gauge thickness.

B. Hinged Swinging Gates

1. Construction: Frames fabricated from minimum 3" square steel tubing with 11-gauge wall thickness. Frames shall be fully welded. All gate posts shall be provided with zinc plated press-on type steel caps. Unless shown otherwise on the Drawings, gate configuration shall be similar to fence sections. Gate pickets shall match fence pickets.
2. Gate Size: Gates shall be single or double with heights and widths as shown on the Drawings.
3. Hardware:
 - a. Hinges: Hinges shall be heavy duty barrel type with ball bearing, stainless steel pin, and grease fitting. Hinges shall be welded to gate frame and gate post. Hinge size and number shall be as determined by manufacturer. In general, provide three (3) hinges for each leaf up to 6' high and one (1) additional hinge for each additional 24" in height or fraction thereof. Hinges shall be manufactured to allow 90-degree opening of gate(s).
 - b. Latch: 3/4" diameter slide bolt to accommodate padlock, unless shown otherwise on the Drawings.
 - c. For double gates provide padlockable, 3/4" diameter solid steel center drop rod (cane bolt) assembly and strike.

C. V-Wheeled Rolling Gates

1. Construction: Frames fabricated from minimum 3" square steel tubing with 11-gauge wall thickness. Frames shall be fully welded. All gate posts shall be provided with zinc plated press-on type steel caps. Unless shown otherwise on the Drawings, gate configuration shall be similar to fence sections. Gate pickets shall match fence pickets.
2. Gate Opening and Size: Gate opening shall be as shown on the Drawings. Gate height shall match adjacent fence or wall heights. Gate length and travel distance shall be as required to accommodate the gate support system and electric gate operator. Unless specified otherwise, manual rolling gates shall be constructed to accommodate the addition of a future electric gate operator (reference paragraph 5 hereinafter for gate frame extension requirements).
3. Support Posts: Pair of guide posts constructed of minimum 6" square steel tubing with 3/16" wall thickness, solid steel cap, and adjustable guide rollers. Stop post constructed of minimum 6" square steel tubing with 3/16" wall thickness, solid steel cap, and V-guide bracket with

UHMWPE liner for receiving gate. Stop post V-guide bracket and gate frame shall be provided with a padlockable latch on all manual rolling gates.

4. Rolling Mechanism: Provide 4" (minimum) diameter solid steel wheels with V-shaped edge groove, grease fittings and needle bearings, mounted to gate frame and riding on ground set V-track. Provide recessed pocket in gate frame for mounting V-groove wheels and providing specified clearance between bottom of gate frame and finished grade. Unless shown otherwise on the Drawings, gate frame, wheel pockets, V-groove wheels shall be fabricated to provide 3" clearance between bottom of gate frame and finished grade.

Provide V-track angle suitable for vehicle loading. V-track angle shall be as designed by gate manufacturer, and shall be provided with welded 1/2" diameter by 5" long anchor hooks (each direction) at a maximum spacing of 18". V-track shall be hot dipped galvanized after fabrication.

Gate assembly shall be braced at top by adjustable guide wheels mounted with brackets to support posts.

5. When specified, gate manufacturer shall coordinate gate fabrication with supplier of electric gate operator (reference Specification Section 02829) to ensure size, weight, and design of gate is compatible with proposed operator. Rolling gates with electric gate operators shall be provided with gate frame extensions (24" minimum height) at the end of the gate for connection of operator drive chain. Gate frame extension members shall match main gate frame member sizes and construction.

2.03 Accessories

- A. Unless specified otherwise, all fence and gate hardware and accessories shall be carbon steel or malleable iron.
- B. All fasteners shall be Type 304 (or better) stainless steel.
- C. All ferrous metal hardware and accessories shall be hot dipped galvanized after fabrication and finish coated as specified herein.

2.04 Finish Coating

- A. Preparation: Upon completion of fabrication, all fence and gate assemblies shall receive a three stage pretreatment to clean and prepare galvanized surfaces for finish coating. First stage shall consist of iron phosphate surface pretreatment to clean and promote coating adhesion. Second stage shall consist of clean water rinse. Third stage shall consist of non-chromate conversion coating to seal all surfaces and provide additional corrosion protection.
- B. All fence and gate assemblies, including hardware and accessories, shall receive

an electrostatically applied zinc rich epoxy powder coat primer followed by colored polyester powder coat finish. Powder coating shall be heat cured to 450°F to chemically bond coating to metal substrate. Epoxy and polyester powder coating shall be applied at a minimum thickness of 3 mils for a total finished thickness of 6 mils (minimum). Polyester powder coat shall comply with the following requirements:

1. Minimum hardness measured in accordance with ASTM D3363: 2H.
 2. Direct impact resistance tested in accordance with ASTM D2794. Withstand 160 inch-pounds.
 3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95°F and 95 percent relative humidity and after 1000 hours less than 3/16" undercutting.
 4. Weatherability tested in accordance with ASTM D822: No film failure and 85 percent (minimum) gloss retention after 1-year outdoor exposure.
- C. Color: Finish color shall be as selected by Owner. Manufacturer shall submit color chart to Owner showing all available colors.

PART 3 - EXECUTION

3.01 General

- A. Prior to fabrication, field verify required fence and gate dimensions.
- B. Contractor shall install fencing in accordance with manufacturer's written installation instructions and approved shop drawings.
- C. Where specified, coordinate fence and gate installation with provision of gate operator specified in Specification Section 02829, Electric Vehicular Slide Gate Operator, including power supply, control devices, and routing of conduit and wiring.
- D. Verify areas to receive fencing are completed to final grades, elevations, and materials.
- E. Do not install bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.

3.02 Installation

Unless shown otherwise on the Drawings, fence and gate installation shall comply with the following requirements.

- A. Where independent concrete footings are specified, provide footings in accordance with requirements herein, Specification Section 03300, Cast-in-Place Concrete, and as shown on the Drawings and approved shop drawings.
 - 1. Post footing soil shall be firm and undisturbed.
 - 2. Minimum footing diameter:
 - a. Terminal fence posts and gate posts: 12".
 - b. Intermediate fence line posts: 10".
 - 3. Minimum post embedment:
 - a. Terminal fence posts and gate posts: 36".
 - b. Intermediate fence line posts: 30".
 - 4. Provide 3" minimum concrete beneath post bottom.
 - 5. Trowel finish around posts and provide slope to direct water away from posts.
- B. Where fence installation is specified in existing concrete slabs or structures, core drill existing concrete for embedment of fence and gate posts. Core drill hole shall be 2" (minimum) greater than post width.
- C. Where fence and gate post installation is specified in precast sleeves, provide grout to fill post and sleeve. Grout shall be non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing additives.
- D. Where surface mounting of posts is specified, provide flange type base plates with 4 holes. Anchor bolts shall be Type 304 stainless steel wedge anchors with size and embedment as required for design loads. Provide leveling nuts beneath base plate for post adjustment and fill space beneath plate with non-shrink grout, 3/4" minimum thickness.
- E. Fence and gate posts shall be installed plumb and level. Temporarily brace posts with 2 by 4 wood supports until concrete or grout is set.

F. Gates

1. Concrete footings for gate posts shall attain full design strength before gates are hung.
2. Install gates and adjust hardware for smooth operation.
3. Provide 12" diameter by 24" deep concrete center foundation for drop rod retainers at center of double swinging gate openings. Provide hot dipped galvanized steel sleeve in concrete foundation for receiving gate drop rod (cane bolt).
4. Provide concrete foundation (8" minimum thickness with #4 steel reinforcing at 12" on center, each way) for length of operation of V-wheeled rolling gate. Gate track shall be 1/4" thick (minimum) hot dipped galvanized steel angle with welded 1/2" diameter by 5" long anchor hooks (each way) at 18" maximum spacing. Gate track shall be embedded into concrete foundation.
5. Upon completion of gate installation, test gate and electric operator (where specified). Adjust safety and control devices to provide proper operation. Correct deficiencies and adjust. Open and close gate a minimum of ten times without any difficulties.

- G. Touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION

APPENDIX A
SECTION 02829
ELECTRIC VEHICULAR SLIDE GATE OPERATOR

PART 1 - GENERAL

1.01 Specific Project Requirements

Contractor shall furnish and install one (1) vehicular slide gate operator, complete with all drive and electrical components, to automatically move entrance gate and control its position in both the open and close directions. Gate operator shall be heavy-duty industrial slide type opener as specified herein, and as shown on the Drawings. Gate operator entry system shall be controlled by a Contractor supplied heavy-duty outdoor keypad. Contractor shall provide all conduits, heavy-duty outdoor keypad, and pedestal(s) as shown on the Drawings.

1.02 Related Work Specified Elsewhere

- A. Section 02825– Ornamental Steel Fencing
- B. Section 03300 – Cast-in-Place Concrete
- C. Section 16050 – Basic Electrical Technical Specifications

1.03 Codes and Standards

- A. Manufacturer shall conform to:
 - 1. UL325: Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - 2. UL991: Standard for Testing of Safety-Related Controls Employing Solid-State Devices.
- B. Contractor shall complete all electrical work in accordance with all local codes and the National Electrical Code.

1.04 Quality Assurance

Slide gate operator shall be as manufactured by Edko, Elite Access Systems, AGS, or equal.

1.05 Submittals

- A. All submittals shall be in accordance with the General Conditions, Section F - Labor and Construction.
- B. Submittals shall include, but not be limited to, the following:
 - 1. Product data for gate operator, components, and accessories.

2. Shop drawings showing layout and dimensions of rolling gate, gate operator, vehicle sensing loops, and gate operator entry system.
 3. Written confirmation that the proposed operator unit is adequate for the specified rolling gate (size, weight, and required pull force).
 4. Complete wiring connection diagram for gate operator and accessories.
 5. Gate operator safety literature and required warning signs. Warning signs shall be in compliance with requirements of UL325.
 6. Copy of warranty specified in Paragraph 1.06.
- C. Operation and maintenance manuals shall be provided in accordance with the General Conditions, Section F – Labor and Construction and Specification Section 01430.

1.06 Warranty

Gate operator shall be warranted by the manufacturer for a period of two years from date of acceptance by District against defects in materials or workmanship. Defective part(s) shall be repaired or replaced at no charge, at the manufacturer's option. The warranty shall be in printed form and shall be included in the Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 Vehicular Slide Gate Operator

A. General

Vehicular slide gate operator unit shall automatically open and close V-track (roller) gates, to provide convenience and security. Operator unit shall function with standard accessories including, but not limited to: radio controls, single and three button control stations, digital keypads, coded cards, vehicle sensing loops, telephone entry systems, key switch operators, and revenue control equipment. The gate operator shall be controlled by the entry system as specified in Section 1.01 "Specific Project Requirements". Unit shall operate on 115 Volt AC single power.

B. Design Criteria

Operator unit shall be sized as required for the specified V-track rolling gate and site conditions. Operator unit shall be completely assembled, pre-wired, and tested in the factory.

Operator unit manufacturer shall coordinate with gate manufacturer to insure that the selected operator and accessories will be suitable for the proposed gate. Operator unit shall open/close the gate at a rate not greater than 12 inches per second with the operator exerting a pull force of 75 pounds and when connected to a supply circuit of maximum rated voltage and rated frequency.

Operator unit supplier shall provide all required operator accessories and appurtenances, including vehicle sensing loops, entry system, and anti-entrapment sensors, to insure compatibility between accessories and operator and to provide sole source responsibility.

C. Mechanical Features and Components

Standard mechanical features and components shall include as a minimum:

1. Weatherproof high density polyethylene plastic cabinet or galvanized steel cabinet with automotive type powder coat finish.
2. Lockable access panel for manual disconnect and adjustable limit switches.
3. Heavy duty worm gear operator with oil bath lubrication.
4. 1-inch solid steel output drive shaft with heavy-duty ball bearings.
5. Roller chain and drive sprocket with chain guide(s) and gate attachment brackets.
6. Disconnect/release for manual operation of gate.
7. All welded interior steel framework, zinc chromate plated.

D. Electrical Features and Components

Standard electrical features and components shall include as a minimum:

1. High-starting torque, continuous duty 1/2 HP (minimum) motor, 115 VAC, 60 HZ, single phase with thermal overload protection.
2. Solid state controller with adjustable timers, LED indicators, and self diagnostics.
3. Adjustable motor current sensing to detect obstructions, with separate adjustments for opening and closing directions.
4. Controller housed in separate control box.
5. Power input "On/Off" switch.
6. Built-in 120 VAC duplex power receptacle for accessories.
7. Transformer for low voltage power.
8. Contacts for opening, closing and reversing accessories, as well as contact and non-contact obstruction sensing devices. Fuse protected 24 VAC and 24 VDC secondary power available on terminal strip to power accessory devices.
9. Adjustable precision snap-action type limit switches to control gate position.

E. Accessories

1. Vehicle in-ground loop sensors for free exit and safety, including all wiring and appurtenances.
2. Non-contact photoelectric sensors for anti-entrapment protection, including separate transmitter and receiver units, mounting arms, wiring, and appurtenances. Sensors shall prevent gate closure on vehicle within its path.
3. Provide dry contact to show gate closed position.

PART 3 - EXECUTION

3.01 General

Contractor shall install gate operator unit and accessories in accordance with manufacturer's written installation instructions and approved shop drawings. Contractor shall connect all necessary electrical power and control wiring, including furnishing of all necessary materials in addition to that provided in the specified equipment. Wiring materials and installation shall be in accordance with Specification Section 16050 and as shown on the Drawings.

3.02 Factory Inspection and Testing

- A. Manufacturer shall inspect and test each operator at factory to assure smooth, quiet operation.
- B. Manufacturer shall test all control inputs and safety features to insure proper function.

3.03 Installation

- A. Contractor shall provide conduit(s) with weatherproof metallic electrical junction box adjacent to gate operator, as shown on the Drawings. Provide PVC coated flexible conduit between junction box and gate opener.
- B. Contractor shall install inside and outside vehicle loop detector system, including saw cutting concrete pavement at dimensions and depths recommended by loop detector system manufacturer. Contractor shall install photoelectric sensors per manufacturer's recommendations.
- C. Contractor shall install all provided warning signs securely within view of both sides of the gate, as required by the manufacturer and UL 325.
- D. Prior to equipment operation, Contractor shall provide initial lubrication of all mechanical components, check all belts/chains and other moving parts for alignment and tolerances in accordance with the manufacturer's written instructions.

3.04 Startup and Instruction

- A. Contractor shall arrange for a qualified representative of the manufacturer to inspect the installation and perform start-up of the equipment and demonstrate required performance to the satisfaction of the District.
- B. Manufacturer's representative shall adjust the gate operator and accessories in accordance with the equipment installation manual and shall test the adjustments to verify correct settings for the installation. Each entrapment protection provision shall be tested separately and independently with the other entrapment protection provisions defeated.
- C. Contractor shall arrange for not less than one (1) hour of adequate instruction of Operators selected by the District at a time acceptable to the District and the manufacturer. Instruction shall be for operation and routine maintenance and repair of the gate operator and accessories.

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 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 the Contractor Submittals Technical Specifications, Section 01300.

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. 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: ± 1 inch
2. Depth of truss bars: + 0, - 1/2 inch
3. Stirrups, ties, and spirals: $\pm 1/2$ inch
4. All other bends: ± 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 Paragraph B 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 (dobbies) 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 re-cleaned.

END OF SECTION

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. Structural Concrete (or Class "A" Concrete). Concrete to be used in all cases except where noted otherwise in the Contract Documents.
 - 2. 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.
 - 3. 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 Technical Specifications.

A. Mix Designs

Prior to beginning the work, Contractor shall submit to Engineer, 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 Engineer. 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 Engineer 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 Engineer 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 insure 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 alkalies. A single brand of cement shall be used throughout

the work, and prior to its use, the brand shall be acceptable to the Engineer. 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 Engineer 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 Engineer, shall be non-reactive, and shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as specified in Paragraph 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 4 to 6 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 Engineer'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 Engineer. Concrete containing an admixture shall be first placed at a location determined by the Engineer. 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 Engineer. 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 BASF, 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 Paragraph 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 Engineer.

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.

<u>Type of Work</u>	<u>Min. 28-Day Compressive Strength (psi)</u>	<u>Max. Size Aggregate (in.)</u>	<u>Min. Cement per cu yd (sacks)</u>	<u>Max. W/C Ratio (by wt.)</u>
Structural Concrete (Class "A"):				
Walls, floor slabs, columns, and footings of hydraulic (water or wastewater) bearing structures	4,000	1	6.2	0.45
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 Engineer 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	3" (±1")
Other work	4" (±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 Paragraphs 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.
- 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 Engineer in accordance with Paragraph 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 Engineer.

- 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 Engineer. Added water must be incorporated by additional mixing of at least 35 revolutions.

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 Paragraph 2.08A 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 Engineer. 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 Engineer, 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 to remove laitance and to provide a uniform surface texture with approximately 1/4" of surface sandblasted off. 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 Engineer.

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 Engineer 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 Engineer 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 T2, 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 Paragraph 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 Engineer.

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 Engineer. Contractor shall notify Engineer 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 Paragraph 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 Paragraphs 2.01D.2 and 2.07B herein for water and Paragraph 2.08A herein for slump.

J. Cement and admixtures shall conform to Paragraph 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 Engineer. 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 Paragraph 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 Paragraphs 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 Paragraph 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 Paragraph 3.12 herein. After repairs are completed, surfaces shall be given an architectural finish in accordance with Paragraph 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 Engineer.
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 Engineer and treated and cured in accordance with in Paragraphs 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 Paragraph 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 Engineer. 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 Engineer 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 Paragraph	4

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
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, Paragraph 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, Paragraph 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, Paragraph 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 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 Engineer 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 Paragraph 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 Engineer. 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 Section 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 Engineer, 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 Paragraph 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 Paragraph 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 Paragraph 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 Paragraph 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 Paragraph 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 Engineer), 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 04200

BASIC CONCRETE MASONRY SPECIFICATIONS

PART 1 - GENERAL

1.01 General Requirements

- A. Contractor shall furnish all labor, material, and equipment and perform all operations necessary to execute all concrete masonry construction as required in the Contract Documents.
- B. Contractor shall make all preparations and do all work necessary to receive and adjoin other work.
- C. Contractor shall give the work his personal supervision and shall keep a competent foreman on the job at all times.
- D. Contractor shall inspect and verify position of all dowels required for masonry on other construction including foundations.
- E. Contractor shall arrange necessary storage space for construction materials at the job site.
- F. Contractor shall call for all inspections required in the course of his work.

1.02 Reference Codes, Specifications, and Standards

A. Codes

Whenever reference is made herein to Building Code, it shall mean the California Building Code (CBC), latest edition, of the California Building Standards Commission.

B. Specifications

Whenever reference is made herein to Standard Specifications, it shall mean the Standard Specifications for Public Works Construction, latest edition, as published by Building News Incorporated of Los Angeles, California.

C. Commercial Standards

Whenever reference is made herein to ASTM, it shall mean the Annual Book of ASTM Standards, latest edition, as published by the American Society for Testing and Materials.

1.03 Contractor Submittals

All submittals shall be in accordance with the Contractor Submittals Technical Specifications, Section 01300.

A. Certification

Concrete block manufacturer shall provide certified data demonstrating that the masonry units to be furnished will meet or exceed the requirements of this specification.

B. Samples

Prior to commencing with work, Contractor shall submit samples of the block units for Owner's approval of type and color.

C. Mix Designs

Prior to beginning the work, Contractor shall submit to Owner, for approval, proposed grout and mortar mix designs which shall show the proportions and gradations of all materials proposed for each mix 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 designs shall be borne by the Contractor.

1.04 Quality Assurance

A. All concrete masonry shall comply with the Building Code and reference material published by the Masonry Institute of America.

B. Sample Panel

Contractor shall build a sample panel, approximately 4 feet by 6 feet, for review and approval by Owner before any masonry construction is performed. Said sample panel may be part of the project and incorporated into the wall system. Full size concrete masonry units which have been selected and approved by the Owner to show color range, maximum texture range, bond, mortar, tooling of joints, and quality of workmanship shall be used in the sample panel. Sample panel shall remain on the project for comparison purposes with the actual masonry work.

If the sample panel is not part of the wall system, it shall be demolished and removed from the site after completion and acceptance for the project concrete masonry work, unless Contractor is directed otherwise by Owner.

C. Certified Delivery Tickets

Where ready-mix grout is used, Contractor shall provide certified delivery tickets at the time of delivery of each load of grout. 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.

D. Testing of Grout

1. Test Specimens and Samples

- a. Contractor shall take field samples on the first day of masonry construction, at any change in materials during construction, and whenever, in the judgment of the Owner, tests are necessary to determine the quality of the materials.
- b. Contractor shall prepare three grout specimens per sample. Each grout specimen shall be a square prism, nominally 3 inches or larger on the sides and twice as high as the width.

2. Procedures

- a. Contractor shall construct samples in the presence of the Owner or his representative. The same personnel who lays the block in the structure shall construct the grout specimens.
- b. Contractor shall prepare each specimen in a mold consisting of masonry units proposed for construction with the same moisture condition as those being laid. The units shall form a space with dimensions of 3-5/8 inches by 3-5/8 inches by 7-5/8 inches. The space shall be lined with a permeable paper (such as a paper towel) or porous separator to prevent bonding to the masonry units, but still allowing the excess water to be absorbed.

Contractor shall place a representative sample of the grout into the molds, puddle, and keep damp and undisturbed for 48 hours. After 48 hours, Owner's Representative will transport the specimens to a test laboratory for storage.

E. Testing of Mortar

1. Test Specimens and Samples

- a. Contractor shall take field samples on the first day of masonry construction, at any change in materials during construction, and whenever, in the judgment of the Owner, tests are necessary to determine the quality of the materials.
- b. Contractor shall prepare three mortar specimens per sample. After 48 hours, Owner's Representative will transport the specimens to a test laboratory for storage.

1.05 Product Storage

Contractor shall store and protect all materials as follows:

A. Masonry Units

Masonry units shall be carefully stacked prior to use and shall be properly protected from weather by cover or inside storage. All units shall be handled with reasonable care to prevent marring or damaging of faces, edges, and corners of units. All marred or damaged units shall be discarded.

B. Lime and Cement

Lime and cement shall be delivered in original packages and stored on platforms above ground, protected against moisture.

C. Aggregates

Aggregates shall be stored on platforms so as to exclude dirt.

D. Reinforcing Steel

Reinforcing steel shall be stored above ground to prevent bending or rusting.

PART 2 - PRODUCTS

2.01 Materials

All products shall conform to the following requirements:

A. Concrete Masonry Units

1. Masonry units shall be hollow load-bearing concrete masonry, Grade N, Type I units conforming to ASTM C90, latest, and manufactured in accordance with requirements of the Concrete Masonry Association Specifications.
2. Masonry units shall have maximum shrinkage of .08 of 1% from the saturated to the oven dry condition.
3. Unless specified otherwise on the Drawings, masonry units shall be medium-weight units (105 to 125 lb/cubic foot) manufactured by a member of the Concrete Masonry Association. Masonry units may be high temperature steam cured. Owner shall select color of masonry units.

B. Cement

1. Cement for mortar shall be Type I, II, or III Portland cement conforming to ASTM C150, latest.

2. Air-Entrained Portland Cement for mortar shall be Type I-A, II-A, or III-A conforming to ASTM C175, latest. (Note: When using air-entrained cements, mortar shall not contain more than 1/10 part lime putty.)
3. Plastic cement shall have less than 12% total volume in approved plasticizing agents and shall conform to all of the requirements for Portland cement in ASTM C150, latest, except with respect to limitations on insoluble residue, air-entrained, and additions subsequent to calcination.

C. Aggregate

1. Aggregate shall be clean, sharp, and well graded, and free from injurious quantities of dust, lumps, shale, alkali, surface coatings, and organic matter.
2. Sand shall conform to ASTM C144, latest.
3. Pea gravel shall be graded with 100% passing the 3/8 inch sieve and not more than 5% passing the No. 8 sieve.

D. Lime Putty

1. Lime putty shall be made from approved hydrated lime or quicklime and shall weigh not less than 83 pounds per cubic foot.
2. Hydrated lime shall conform to ASTM C207, latest.
3. Quicklime shall conform to ASTM C5, latest. Quicklime shall be slaked and then screened through a 16-mesh sieve. After slaking, screening, and before using, it shall be stored and protected for minimum 10 days.

E. Admixtures

Admixtures shall not be used in mortar or grout unless specifically approved by Engineer.

F. Reinforcing Steel

1. Reinforcing steel shall be Grade 60 deformed bars conforming to ASTM A615, latest, except that 1/4 inch ties may be plain bars.
2. Reinforcing steel shall be clean and free from loose rust, scale, and dirt, and coatings that reduce bond.

2.02 Mortar and Grout

A. Mortar

Mortar shall be freshly prepared and uniformly mixed in ratio 1 part portland cement, 1/4 part lime putty, and 3-1/2 parts sand. Mortar shall be Type S with a minimum compressive strength of 1,800 psi at 28 days, conforming to ASTM C270, latest.

B. Grout

1. Grout shall have minimum compressive strength of 2,000 psi at 28 days.
2. Grout shall be of fluid consistency and mixed in ratio 1 part cement, 3 parts sand for grout spaces less than 4 inches in any dimension. Grout shall be of fluid consistency and mixed in ratio 1 part cement, 2 parts sand, and 2 parts pea gravel for grout spaces greater than 4 inches.
3. Fluid consistency shall mean that consistency of fluid shall be enough for pouring and yet not so fluid that the constituent parts of the grout separate when grout is poured (slump equals 9 inches + 1 inch).

PART 3 - EXECUTION

3.01 Workmanship

- A. Masonry work shall be started only when horizontal and vertical alignment of foundation is within 1 inch of plumb or line.
- B. Contractor shall prevent grout and mortar stains. Contractor shall keep wall continually clean. If grout runs over, Contractor shall clean wall immediately.
- C. All masonry shall be laid true, level and plumb in accordance with the Construction Drawings.
- D. Contractor shall cut all masonry units accurately to fit all openings, conduit, ducts, and plumbing. All holes shall be neatly patched.
- E. Construction support shall not be attached to the wall except where specifically permitted by the Engineer.
- F. The top surface of the concrete foundation shall be clean and free of laitance and the aggregate exposed by sandblasting prior to starting masonry construction.
- G. Where no bond pattern is shown, walls shall be laid up in straight, uniform courses with regular half or running bond.
- H. All work, bond patterns, or special details shown on the Construction Drawings shall be accurately and uniformly executed.

3.02 Protection of the Work

- A. Contractor shall protect all sills, ledges, and offsets from mortar droppings or other damage during construction.
- B. Contractor shall prevent visible mortar and grout stains on the exterior of the work. Contractor shall remove stains immediately if they occur.

3.03 Masonry Units

- A. All masonry units shall be sound, free of cracks, or other defects that would interfere with the proper placing of the unit or impair the strength of construction.
- B. All masonry units shall be stored on the job so that they are kept off the ground and protected from the elements. Wetting of units is not permitted.
- C. Proper masonry units shall be used to provide for all windows, doors, bond beams, lintels, pilasters, and knockouts, with a minimum unit cutting.
- D. Where masonry unit cutting is necessary, Contractor shall utilize a masonry saw making all cuts neat and true.

3.04 Joints

- A. Starting joints on foundations shall be laid with full mortar coverage on the bed joints except that the area where grout occurs shall be free from mortar so that the grout will be in contact with the foundation.
- B. Mortar joints shall be straight, clean, and uniform in thickness and shall be tooled as specified.
- C. Contractor shall tool exposed wall joints with a round bar (or V-shaped bar) 2 feet long to produce a dense, slightly concave surface well bonded to the block at the edges.
- D. Tooling shall be done when the mortar is partially set but sufficiently plastic to bond. All tooling shall be done with a tool which compacts the mortar, pressing the excess mortar out of the joint rather than dragging it out.
- E. Where walls are to receive plaster, Contractor shall strike joints flush.
- F. Where joints are to be concealed under paint, Contractor shall fill joints flush and then sack to produce a dense surface without sheen.
- G. Unless otherwise specified, horizontal and vertical mortar joints shall be 3/8 inch thick with full mortar coverage on the face shells and on the webs surrounding cells to be filled.
- H. Vertical head joints shall be buttered well for a thickness equal to the face shell of the block and these joints shall be shoved tightly so that the mortar bonds well to both blocks. Joints shall be solidly filled from the face of the block to the depth of the face shell.
- I. If it is necessary to move a block so as to open a joint, Contractor shall remove block from wall and set in fresh mortar.
- J. Intersecting masonry walls and partitions shall be bonded by the use of steel ties at 24 inch centers maximum.

- K. Where stack bond is specified, approved metal ties shall be provided horizontally at 24 inch centers maximum.

3.05 Reinforcing

- A. When a foundation dowel does not line up with a vertical core, it shall not be sloped at more than one horizontal to six vertical. Dowels shall be grouted into a core in vertical alignment even though it is in an adjacent cell to the vertical wall reinforcing.
- B. Reinforcing bars shall be straight except for bends around corners or where bends or hooks are detailed on the Drawings.
- C. Reinforcing steel where spliced shall be lapped a minimum of 40 bar diameters.
- D. When full length vertical bars are used, they shall be held in position at top and bottom at intervals not exceeding 48 inches along the reinforcement.
- E. Horizontal reinforcing shall be laid on the webs of bond beam units and shall be solidly grouted in place. Reinforcing in channel units shall be spaced off the bottom of the unit.
- F. Vertical reinforcing shall have a minimum clearance of 1/2 inch from the masonry.
- G. Wire reinforcement shall be completely imbedded in mortar or grout. Mortar joints with wire reinforcement shall be at least twice the thickness of the wire.
- H. Wire reinforcement shall be lapped at least 8 inches at splices and shall contain at least 1 cross wire at each piece of reinforcement in the lap distance.

3.06 Grouting

- A. Reinforcing steel shall be in place and inspected by Engineer before grouting starts.
- B. Unless specified otherwise on drawings, all walls shall be solid grouted. Unless specifically allowed on drawings, height of grout pours shall not exceed 4 feet. All debris and projecting mortar shall be cleaned out before pouring grout. Pours shall be stopped 1-1/2 inches below the top of a course to form a key at pour joints.
- C. Contractor shall consolidate grout by mechanical vibration during placement before loss of plasticity in a manner to fill the grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration after 3 to 5 minutes to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated or puddled.
- D. Vertical cells to be filled shall have vertical alignment to maintain a continuous unobstructed cell area not less than 2 inches by 3 inches.
- E. When higher pours are specified, grout lifts shall not exceed 8 feet. A cleanout hole shall be provided at the bottom of each cell to be poured.
- F. Contractor shall grout beams over openings in a continuous operation.

- G. Contractor shall cover the tops of unfilled cell columns under a horizontal masonry beam with metal lath, or special units shall be used to confine the grout fill to the beam section.
- H. Contractor shall install all bolts, anchors, and similar wall inserts prior to grouting and solidly grout them in place.

3.07 Tolerances

- A. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 feet or more.
- C. Maximum Variation from Plumb: 1/4 inch non-cumulative; 1/2 inch.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.08 Cleaning and Protection

- A. Masonry walls are to be left bare or unpainted unless otherwise specified; Contractor shall prevent mortar splotches.
- B. Construction supports shall not be attached to the wall except where specifically permitted by Engineer.
- C. All forms shall be made tight (special attention is necessary for bottom form of block bond beams) and concrete and grout spilled on the wall shall be washed off immediately.
- D. Walls shall have their surfaces dampened for three days with a light fog spray during the mortar curing period. They shall not be saturated with water for curing or any other purposes.
- E. At the conclusion of work, Contractor shall clean down all masonry walls, remove his scaffolding and equipment used in the work, clean up all debris, refuse, and surplus material, and remove them from the premises.
- F. After a minimum of 30 days have passed but no longer than 60 days after completing all work, Contractor shall remove all efflorescence that has leached onto the walls from the grout and mortar.
- G. After all efflorescence has been removed, Contractor shall seal walls with one coat of water repellent clear sealant in strict accordance with the manufacturer's installation procedures as approved by the Engineer.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1.01 Description

The Contractor shall furnish all labor, equipment, and materials to provide complete and operable electrical system(s), all in accordance with the requirements of the Contract Documents.

1.02 Reference Codes and Standards

All electrical equipment and materials, including the design, construction, and installation thereof, shall comply with the following codes and standards (latest editions), as applicable. Where two codes or standards are at variance, the most stringent requirements shall govern:

- A. National Electric Code (NEC).
- B. Basic Electrical Regulations, Title 24, State Building Standards, California Administrative Code.
- C. Low Voltage Electrical Safety Orders, Title 8, Division of Industrial Safety, State of California.
- D. City and County Electrical Codes.
- E. American National Standards Institute (ANSI).
- F. National Electrical Manufacturers Association (NEMA).
- G. National Fire Protection Association (NFPA).
- H. Underwriters Laboratories, Inc. (UL).
- I. Occupational Safety and Health Act (OSHA) Safety and Health Standards (29CFR1910 and 29CFR1926), State Building Standards, and applicable local codes and regulations.

All equipment and material furnished by the Contractor shall be listed by and shall bear the label of Underwriters Laboratories, Inc. (UL) or of an independent testing laboratory acceptable to the local agency with jurisdiction over the electrical work.

1.03 Submittals

A. Shop Drawings

In accordance with Contractor Submittals Technical Specifications, Contractor shall submit complete information, drawings, and technical data for all equipment and components, including, but not limited to, the following:

1. Catalog data including catalog cut sheets, bulletins, brochures, etc. Applicable sizes, model numbers, and options shall be clearly marked and delineated.
2. Connection diagrams, terminal diagrams, and internal wiring diagrams.
3. Equipment and material temperature limitations.
4. Drawings for all grounding work not specifically shown.
5. Nameplates for all electrical panels, including nameplate material, lettering height, and proposed inscriptions.

B. Operation and Maintenance Manuals

Contractor shall submit detailed Operation and Maintenance Manuals for each item of equipment in accordance with the Contractor Submittals Technical Specifications.

C. Record Drawings

Contractor shall maintain and keep current a complete record set of construction drawings showing every change from the Contract Drawings and Specifications and the exact locations, sizes, and types of equipment and material installed. Record drawings shall show all conduit runs (sizes and number), circuits, and conductors (sizes and numbers). Record drawings shall show depths and routing of all concealed and below grade electrical installations. Record drawings shall be available to the Owner during construction and shall be delivered to the Owner upon project completion.

1.04 Delivery, Storage, and Handling

A. Delivery

Deliver electrical materials and equipment in manufacturer's original cartons and containers with seals intact. Deliver conductors on sealed reels. Deliver large multi-component equipment in sections to facilitate field handling and installation.

B. Storage

Unless designed for outdoor exposure, store electrical equipment and material of the ground and under cover. Equipment and material shall be protected from weather, corrosion, contamination, and deterioration. Dents, marred finishes, and other damage shall be repaired to its original condition or replaced as directed by the Owner.

C. Handling

All equipment and material shall be handled in accordance with the manufacturer's recommendations. Large or heavy items shall be lifted at the points designed by the manufacturer. Equipment and material shall be handled and installed as necessary to prevent damage.

1.05 Public Utilities

- A. Contractor shall obtain electrical service requirements from public utility furnishing electrical power to the project. Contractor shall coordinate installation of power service with public utility. Contractor shall obtain, at his expense, all permits, licenses, and inspections required for electrical construction work by public utilities having jurisdiction.
- B. Contractor shall furnish and install all service conduit, fittings, transformer pad(s), manholes, vaults, grounding, and conductors not furnished by the serving utility.

PART 2 - PRODUCTS

2.01 General

All equipment and materials shall be new, shall be listed by UL, and shall bear the UL label, where UL requirements apply. All equipment and material shall be of industrial grade and be capable of long term, reliable, and trouble-free service. Similar equipment and material items shall be products of the same manufacturer.

2.02 Grounding

- A. Grounding and grounding components shall comply with the applicable requirement of the NEC, Article 250.
- B. Grounding cable shall be stranded copper and shall be sized in accordance with Code requirements when sizes are not shown on the Drawings. Contractor shall submit shop drawings for all grounding work not shown on the Drawings.
- C. Grounding rods shall conform to ANSI/UL 467 and shall be copper-clad steel, 3/4-inch (minimum) in diameter and 10 feet (minimum) in length. Rods shall be driven in the ground at least 9' -6" deep.

Provide the number of rods required to obtain proper ground resistance, as applicable to all manholes, padmount switches, transformers, service entrances, etc.

- D. Ground rod mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers and lockwashers shall be made of silicon bronze and supplied as a part of the connector body and shall be of the two bolt type.

Split bolt connector types are not allowed.

The connectors shall meet or exceed the requirements of UL 467 and be clearly marked with manufacturer and conductor size.

- E. Ground rod compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99% by IACS standards.

The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision. The connectors shall be clearly marked with the manufacturer and conductor size.

The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors. Each connector shall be factory filled with an oxide-inhibiting compound.

2.03 Manholes and Pull Boxes

- A. Manholes and Pull-Boxes shall be of precast concrete, designed for H-20 traffic loading. Concrete sections shall be modular with tongue and groove joints. A continuous waterproof gasket shall be provided at all section and slab joints. Manhole and Pull-Box minimum inside dimensions shall be as shown on the Drawings. Manholes and Pull-Boxes shall be equipped with galvanized steel pulling irons opposite each ductbank entrance. Manholes and Pull-Boxes shall be provided with a sump opening and one (1) one-inch ground rod opening in the base section. Sump opening shall be provided with cast iron perforated cover. Manhole and Pull-Boxes shall be placed on a 12" thick crushed rock base.
- B. Manhole covers shall be cast iron, 30" round (minimum), designed for H-20 traffic loading, and supported on the necking section. Pull-Box covers shall be full size, hot dipped galvanized, checkered plate steel suitable for H-20 traffic loading (unless noted otherwise), and bolted down to cast-in-place hot dipped galvanized steel frames with stainless steel hardware. Manhole and Pull-Box covers shall be marked "High Voltage Electric", unless noted otherwise.
- C. Manholes and Pull-Boxes shall be provided with cable supports as required to support cable at 3-foot (minimum) intervals. Cable supports shall be fabricated from hot dipped galvanized or fiberglass strut channel and attached to slotted galvanized steel channel cast-in-place inserts. Provide glazed porcelain insulators with channel clamps for support channels. Strap cable to insulators with plastic tie wraps. All phase and ground cables in each circuit shall be kept together and contained on/in the porcelain cable supports. No phase cable shall be run separate from the other two phases and ground.
- D. Manholes and Pull-Boxes shall be provided with knockouts for connections to all underground conduit and ductbanks. Ductbank entrances shall be grouted flush with non-shrink grout. Non-shrink grout shall match thickness of precast wall or be a minimum of 3" thick (whichever is thicker). Ducts and conduits shall be terminated with flush-end bells.
- E. One ground rod shall be provided for each manhole and pull-box, unless otherwise noted.

Provide #4/0 bare stranded copper ground wire completely around the inside perimeter of each manholes and pull-box and anchor to walls. Connect the ground wire to the ground rod. Bond the bare copper ground wire to any splice shield wires, ground wires, cable racks, cover frames, sump frames and other metal items in the manholes. All separate ground wires accompanying circuits shall be grounded in each manhole passed through.

- F. Manholes and Pull-Boxes shall be manufactured by Brooks, Quikset, or equal.

2.04 Conduit

A. General

Each length of conduit shall bear the UL label and be a minimum size of 3/4", unless noted otherwise. Elbows shall be standard radius sweeps meeting the requirements of the NEC.

B. Rigid Steel Conduit

1. Rigid steel conduit shall be Schedule 40 steel, pipe size, finished inside and out by hot-dipped galvanizing, and shall conform with ANSI C80.1 and UL. All rigid steel conduit in direct contact with the ground or concrete shall be protected by double wrapping with 20 mil PVC tape.
2. Couplings shall be galvanized steel.
3. Insulating Bushings: threaded malleable iron with thermoplastic liner.
4. Insulated Grounding Bushings: threaded malleable iron body with insulated thermoplastic liner throat and "lay-in" ground lug with compression screw.
5. Insulated Metallic Bushings: threaded malleable iron body with plastic insulated throat.
6. Running threads are not acceptable.

C. PVC Coated Rigid Steel Conduit

1. Conduit shall be Schedule 40 steel, pipe size, finished inside and out by hot-dipped galvanizing, and shall conform with ANSI C80.1 and UL. A PVC coating of 40 mils (minimum) thickness shall be bonded to the outer galvanized surface of the conduit and a urethane coating shall be applied to the interior surface of the conduit. The bond between the PVC coating and the conduit surface shall be greater than the tensile strength of the plastic. A PVC jacketed coupling shall be furnished with each length of conduit. PVC coated rigid steel conduit and fittings shall be manufactured by Robroy, Occidental, or equal.
2. Conduit fittings shall be PVC coated and furnished by the same manufacturer as the conduit to provide a complete and compatible protective system. PVC coated fittings and couplings shall have specially formed sleeves to tightly seal to conduit PVC coating. The sleeves shall extend beyond the fitting or coupling

a distance equal to the conduit outside diameter or two inches, whichever is greater.

D. Rigid Non-Metallic Conduit

1. Conduit shall be UL listed, sunlight resistant, Schedule 40 polyvinyl-chloride (PVC) conduit, rated for 90⁰ C conductors, and manufactured to NEMA TC-2 standards.
2. Couplings and connectors shall be of the same manufacturer as the conduit and shall be joined as recommended by the manufacturer. All PVC conduits shall be terminated with approved connectors or end bells.

E. Electrical Metallic Tubing (EMT)

Electrical Metallic Tubing (EMT) is not permitted.

F. Liquid-Tight Flexible Metallic Conduit

1. Conduit shall be liquid tight and shall have an interlocking flexible galvanized steel core with permanently bonded continuous exterior gray PVC jacket. Exterior jacket shall be moisture and oil-proof, and UV protected. A copper bonding conductor shall be included between the segments. Interior surfaces shall be smooth and offer minimum drag to pulling conductors. Liquid-tight flexible metallic conduit shall be as manufactured by Anaconda, Electroflex, or equal.
2. Connectors shall be the screw clamp or screw-in (Jake) variety with cast malleable iron bodies and threaded male hubs with insulated throats or insulated bushings. Liquid-tight fittings shall be of cadmium plated cast malleable iron, with insulated throat, with provisions for grounding.

2.05 Non-Metallic Cable Tray

A. General

Non-metallic cable tray shall be ladder-type conforming to applicable sections of NEMA FG-1 and ASTM E-84. Non-metallic cable tray system shall be constructed of fire-retardant polyester resin. All composite material shall be provided with an ultra-violet light inhibiting chemical additive and meet ASTM E-84, maximum 25 flame spread (Class 1 rating).

Cable tray load class shall be selected based upon the weight of specified cables/conductors shown on the Drawings with a 25% additional weight allowance for future cables/conductors while maintaining a minimum safety factor of 1.5.

The non-metallic cable tray system shall be as manufactured by Enduro Composite Systems, Inc., or equal.

B. Construction

Unless specified otherwise, cable tray shall conform to the following dimensional requirements:

Nominal Width	= 12" minimum
Cable Loading Depth	= 4" minimum
Rung Spacing	= 6"
Fitting Radius	= 12" minimum

Cable tray side rail members shall turn inward. Rungs and side members shall be connected by both mechanical and chemical (adhesive) means. All bonded connections shall be sanded to maximize adhesion and structural integrity. The cable tray interior shall be clear of all projections or sharp objects. All straight sections and fittings shall be pre-drilled to accept connector plates. All cut ends and drilled holes (factory and field) shall be sealed with resin coating.

All fittings shall be designed and installed so as to have the same load carrying capacity as straight sections. Unless specified otherwise, all fittings shall be concentric curved molded type, not mitered.

C. Connections, Accessories, and Supports

Connector plates shall be fiberglass and designed to transfer cable tray loads to the support system. Fasteners for connector plates shall be Type 316 stainless steel or FRP studs and hex nuts as required.

Where specified on the Drawings, cable trays shall be provided with fiberglass flat covers.

Cable tray support systems shall be constructed of polyester or vinyl ester resin strut channels (single or double channel as necessary) and appurtenances. Support spacing shall be in accordance with the cable tray manufacturer's printed recommendations for the specified loads.

Cable tray manufacturer shall provide all clamps, support assemblies, and appurtenances necessary for the installation of a complete cable tray system.

2.06 Non-Metallic Wireway

A. General

Non-metallic wireway shall be solid bottom type construction with minimum wall thickness of 0.1875 inches. Covers and cover splice plates shall be snap-on type construction requiring no installation fasteners.

The wireway system shall conform to the applicable sections of NEC Article 362.

The non-metallic wireway system shall be as manufactured by Enduro Composite Systems, Inc., or equal.

B. Construction

Wireways, covers, and connector plates shall be pultruded utilizing polyester resin with UV light inhibiting additives and exterior nexus veil coverage.

All composite material shall meet ASTM E84, maximum 25 flame spread rating.

All cut ends and drilled holes (factory and field) shall be sealed with resin coating.

C. Connections, Accessories, and Supports

Connector plates shall be fiberglass and designed to transfer wireway loads to the support system. Fasteners for connector plates shall be Type 316 stainless steel or FRP studs and hex nuts as required.

Wireways shall be provided with fiberglass flat snap-on/snap-off covers.

Wireway support systems shall be constructed of polyester or vinyl ester resin strut channels (single or double channel as necessary) and appurtenances. Support spacing shall be in accordance with the wireway manufacturer's printed recommendations for the specified loads.

2.07 Conductors and Cable

A. General

Cables and wires shall be new, stranded conductors, solid copper, not smaller than #12 AWG (except shielded control wire) unless otherwise shown on Drawings. Insulation shall bear manufacturer's trademark, insulation designation, voltage rating, and conductor size at regular intervals. Each type of cable or wire shall be the product of a single manufacturer.

B. Conductors

Conductors for power service, power feeders, power circuits, and lighting feeders, lighting circuits, and control circuits shall be stranded copper, rated 600 volt, with 75°C THWN insulation, UL approved, for installation underground, in concrete, in masonry, or in wet locations. Minimum conductor size shall be # 12 AWG.

C. Shielded Cable

Shielded cable shall consist of minimum three #16 AWG, stranded, tinned-copper conductors, individually insulated with 25 mils of polyethylene and 100% aluminum foil tape. Unless otherwise shown on the Drawings, shielded cable shall be used for all 4-20 MA signals. Cable shall be manufactured by Belden, or equal.

D. Color Coding

System conductors shall be factory color coded by integral pigmentation with a separate color for each phase and neutral, or by an approved colored marking tape at all terminations and in all junction boxes, pull-boxes, and manholes. Each voltage system

shall have a color coded system that shall be maintained throughout the project. Approved colored marking tape is as follows:

<u>System</u>	<u>Service</u>	<u>Color</u>
120V, 1 Phase, 2 Wire	Line	Black
	Neutral	White
208V, 3 Phase, 4 Wire	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral	White
480V, 3 Phase, 4 Wire	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
	Neutral	White
All	Ground	Green & Bare Copper

2.08 Switches and Relays

A. Toggle Switches

Local single pole switches shall be flush tumbler type AC rated, quiet type, heavy duty, 20 amp minimum, rated 120/277 volt, back or side wired with binding screws. Switches shall conform to NEMA WD-1 specifications. Two pole three way and other switches shall be similar. Switches shall be as manufactured by Hubbell, Bryant, or equal.

B. Relays

Control relays shall be rated 120VAC with minimum 10A contacts, unless otherwise noted on the Drawings. All control relays and relay timers shall be DIN rail mounted, with instantaneous reversible contacts, 8 or 11 pin base type only.

2.09 Local Push-Button Control Stations

A. Local push-button control stations consisting of selector switches, pilot light, and push buttons shall be heavy duty, oiltight/watertight, as manufactured by Square D Company, Allen Bradley, Cutler Hammer, or General Electric.

B. Control station enclosures shall be as follows, unless otherwise indicated on the Drawings or specified:

- | | | |
|----|-------------------------------|---|
| 1. | Nonhazardous Indoor Locations | NEMA 12 |
| 2. | Hazardous Indoor Locations | NEMA 7 |
| 3. | Outdoor Locations | NEMA 4X (316 Stainless Steel) |
| 4. | Hazardous Outdoor Locations | NEMA 4 and NEMA 7 (316 Stainless Steel) |
| 5. | Indoor Area with Chemicals | NEMA 4X (316 Stainless Steel) |

- C. Field located, maintained "stop" push buttons (where specified) shall be red mushroom head, push-to-stop, pull-to-reset, with maintained contacts.

2.10 Pilot Devices

- A. Pilot devices consisting of oiltight/watertight push buttons, selector switches, pilot light, and incidental items shall be as manufactured by Square D Company, Allen Bradley, Cutler Hammer, or General Electric.
- B. Pilot devices shall be heavy duty, suitable for mounting in control stations or on switchgear, switchboards, variable frequency drives, motor control centers, control panels, and other electrical equipment.
 - 1. Casting shall be durable one-piece construction with chrome-plated octagonal mounting nuts.
 - 2. Push buttons shall be heavy duty plastic.
 - 3. Pilot light lenses shall be shatter resistant plastic, push-to-test.

2.11 Receptacles

A. General Purpose

General purpose receptacles shall be duplex, 3-wire grounding type, rated 125 /250 volt, AC, 20 amp minimum, NEMA 5-20R, back or side wired with binding screws, as manufactured by Hubbell, Bryant, G.E, or equal.

B. Ground Fault Interrupter (GFI)

GFI receptacles shall be NEMA 5-20R configured and shall mount in a standard device box. Units shall trip at 5 milliamperes of ground current and shall comply with NEMA WD-1-1.10 and UL 943. GFI receptacles shall be capable of individual protection as well as downstream protection.

2.12 Device Boxes, Junction Boxes, and Fittings

A. Device Boxes (General Purpose - Indoors or Outdoors)

Unless otherwise noted on the Drawings, device boxes shall malleable iron constructed with zinc or cadmium plating and enamel finish, minimum single gang size, deep box type, with treaded hubs and solid gasketed cover. Device boxes shall be properly sized for required circuitry or splicing. Surface mounted boxes shall be furnished with mounting lugs. Where located outdoors, device boxes shall be waterproof. Device boxes shall be Crouse-Hinds FD, Appleton FD, or equal.

B. Junction Boxes (General Purpose - Indoors or Outdoors)

Unless otherwise noted on the Drawings, junction boxes shall be malleable iron constructed, rain tight, dust tight, minimum size 4"x4"x3", drilled and tapped or field installed with slip holes (alternate hub plates are acceptable). Junction boxes shall be

properly sized for the number and sizes of conductors and conduit entering the box and required splicing. Provide feet where necessary for surface mounting. Junction boxes shall be Crouse-Hinds WAB, Appleton RS, or equal.

C. Device Boxes (Wet or Corrosive Locations)

Where specified on the Drawings, device boxes shall be constructed of 316 stainless steel, minimum single gang size, deep box type, with gasket and 316 stainless steel solid cover. Device boxes shall be properly sized for required circuitry or splicing. Surface mounted boxes shall be furnished with mounting lugs or feet. Device boxes shall be NEMA 4X as manufactured by BEL Products, Inc., Cushing Manufacturing Co., or equal.

D. Junction Boxes (Wet or Corrosive Locations)

Where specified on the Drawings, junction boxes shall be constructed of 316 stainless steel, with gasket and 316 stainless steel solid cover. Junction box minimum size shall be 4"x4"x3". Junction boxes shall be properly sized for required circuitry or splicing. Provide feet where necessary for surface mounting. Junction boxes shall be NEMA 4X as manufactured by BEL Products, Inc., Cushing Manufacturing Co., or equal.

E. Fittings

Conduit fittings shall be provided where shown on the Drawings or required to facilitate installation of the electrical conduit and equipment.

1. Metallic fittings shall be constructed of malleable iron with zinc or cadmium plating and enamel finish, with gasket and cast cover. Fittings shall be Condulet Type as manufactured by Crouse-Hinds, Appleton, or equal.
2. Non-metallic fittings shall be compatible with the non-metallic conduit used and shall be of the same manufacturer.
3. Fittings shall be of the shapes, sizes, and types required to facilitate installation or removal of conductors and cables from the conduit, cable tray, and wireway systems.
4. Connectors, couplings, locknuts, bushings, and caps used with Rigid Steel conduit shall be threaded and thoroughly galvanized. Bushings shall be insulated.
5. Metallic conduit unions shall be "Erickson" couplings, or approved equal. Running threads are not acceptable.
6. Connectors for liquid-tight flexible metallic conduit shall be liquid tight with insulating bushings and provision for ground continuity.

2.13 Disconnect Switches

A. Switch Interior

Dead-front construction with hinged arc suppressor and switch blades which are fully visible in the "OFF" position and with door open.

B. Switch Mechanism

Switches shall be quick-make and quick-break with arc quenching and ambient temperature compensated overload devices. Switch operating handle and mechanism shall be provided with a dual cover interlock to prevent unauthorized opening of the switch door in the "ON" position or closing the switch mechanism while the door is open. Switch operating handle shall be capable of being padlocked in the "OFF" position. Switches shall be manufactured by General Electric, Westinghouse, Square D, or equal.

C. Ratings

Switches shall be horsepower rated for the operating voltage and with fused or non-fused arrangements as shown on the Drawings.

D. Enclosures

Unless otherwise noted on the Drawings, for interior locations enclosures shall be NEMA 12 panels with hinged covers and padlockable hasps. Switches in exterior locations shall be provided with gasketed NEMA 3R enclosures with hinged covers and padlockable hasps.

2.14 Low-Voltage Cable Splices

Low-voltage cable splices and terminations shall be rated at not less than 600 Volts. Splices in conductors No. 10 AWG and smaller shall be made with an insulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A. Splices in conductors No. 8 AWG and larger shall be made with noninsulated, solderless, pressure type connector, conforming to the applicable requirements of UL 486A and UL 486B. Splices shall then be covered with an insulation and jacket material equivalent to the conductor insulation and jacket. Splices below grade or in wet locations shall be sealed type conforming to ANSI C119.1 or shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductors.

2.15 Miscellaneous Equipment and Material

A. Concrete Anchors

Type 304 (or better) stainless steel expansion anchors (wedge or sleeve) shall be used to for mounting all electrical conduit, boxes, and equipment. NO type of explosive anchor will be permitted.

D. Conduit Straps

Where specified on the Drawings, conduit straps shall be malleable iron constructed, one-hold type strap with cast clam-backs and spacers as required.

E. Channel (Unistrut) Supports

Unless otherwise specified, support channel (Unistrut) shall be single strut type, 1-1/2" x 1-1/2", 12 gauge hot dipped galvanized steel with 17/32" diameter bolt holes on 1-1/2" centers.

F. Nameplates

Nameplates shall be provided for all electrical stations and equipment furnished by the Contractor. Nameplates shall be engraved laminated plastic, with 1/4" high white lettering on black background. Nameplates shall indicate equipment and its function. Nameplates shall be securely fastened with stainless steel drive screws or escutcheon pins.

G. Panelboard Labeling

Panelboard circuits shall be labeled clearly indicating which piece of equipment, outlet, lighting, receptacle, etc. is powered by the respective circuit. Labeling shall be arranged in numerical order.

H. Conductor and Terminal Markers

Conductor and terminal markers shall be self-adhering, pre-printed cloth or vinyl.

PART 3 - EXECUTION

3.01 General

A. Prefabricated Material and Equipment

Installation of all prefabricated items and equipment shall conform to the requirements of the manufacturer's specifications and installation instructions. When code requirements apply to installation of materials and equipment, the more stringent requirements, code, or manufacturer's specifications and installation instructions shall govern the work.

B. Power Supplies to Mechanical Equipment

1. An electric power supply, including conduit, any necessary junction or outlet boxes, and conductors and connections shall be furnished and installed by Contractor for each item of mechanical equipment.
2. Circuit breakers or fused disconnect protection shall be provided for each separate item of mechanical equipment shown on the Drawings, or specified in the Basic or Technical Specifications.

3. Power supplies to individual items of equipment shall be terminated in a suitable outlet or junction box adjacent to the respective item of equipment, or a junction box provided by the manufacturer of the equipment. Sufficient lengths of conductor at each location shall be provided to permit connection to equipment without damaging the conductors.

3.02 Conduit Installation

A. General

1. Contractor shall install conduit and electrical equipment in locations that will cause minimal interference with the maintenance and removal of mechanical equipment. Conduits and connections are shown schematically on the Drawings. Contractor shall run conduit in a neat manner parallel or perpendicular to walls and slabs, and wherever possible, installed together in parallel runs supported with Unistrut type support system. All conduits shall be installed straight and true with reference to the adjacent work.
2. Unless noted otherwise on the Drawings, conduits shall be concealed underground, in wood-stud walls, or under concrete slabs and footings. Concealed conduits shall be run in as direct a route as possible and with bends of large radii. Floor penetrations shall be made only at specific approved locations; other penetrations are prohibited. Conduits shall be rigidly secured in position by means of approved clamps.
3. Locations of conduit runs shall be planned in advance of the installation and coordinated with the MCC and switchgear lineup furnished, ductwork, plumbing, ceiling, wall, and footing construction in the same areas, and shall not unnecessarily cross other conduits or pipe, nor prevent removal of nor block access to mechanical or electrical equipment.
4. Unless noted otherwise on the Drawings, belowgrade (buried) conduit shall be installed with a minimum of 30" cover. All conduit trenches shall be compacted to a minimum of 90% relative compaction. Compaction in the pipe zone shall be accomplished by water jetting imported sand, two sack sand slurry cement, or equal, placed to 6" above top of conduit. Buried conduit shall be installed using approved spacers and cradles, properly supported/anchored and at sufficient intervals to prevent movement during backfill operations (maximum spacing of five feet). Where a multiple number of conduits are installed in a duct bank with spacers and cradles, backfill shall be two sack sand cement slurry. Where change in direction is required, long radius elbows shall be installed. Prior to installation of conductors in underground conduits, a testing mandrel not less than six (6) inches long and with a diameter 1/4 inch less than the conduit diameter shall be drawn through after which a stiff bristle brush of the proper size for the conduits shall be drawn through until the conduits are free of all sand and gravel.

Belowgrade conduit shall be encased in concrete where specified on the Drawings.

5. Conduit cast in concrete, under concrete slabs or footings or in masonry walls, shall be a minimum 3/4" diameter PVC coated galvanized rigid steel. Conduits shall be cast in concrete or in masonry walls only where specified on the Drawings. Unless otherwise noted, conduits shall be installed beneath concrete slabs, footings, or trenches with a minimum of 6" clearance between conduit and bottom of concrete. Conduit backfill where installed beneath concrete shall be two sack sand cement slurry to subgrade.
6. Where conduit is stubbed through concrete slabs or footings into MCC/electrical panels, a minimum of 1-1/2" clearance shall be provided between rebar and conduit and a minimum of 1" clearance shall be provided 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.
7. Unless noted otherwise on the Drawings, exposed or above grade conduit shall be rigid steel. Conduits shall be supported by Unistrut-type supports anchored to walls or concrete pads/slabs at 6'-0" maximum spacing unless otherwise noted on the Drawings.
8. Unless otherwise noted, underground conduit shall be a minimum of 3/4" diameter Schedule 40 PVC, except that vertical risers and elbows shall be PVC coated galvanized rigid steel. Minimum cover shall be 30" unless shown otherwise on the Drawings.
9. All conduits shall, unless specified as flush, extend 2" above slab, grade, or wall. Spare conduits shall be provided with threaded caps or plugs and pull cords.
10. Spare conduits shall be provided with threaded cap and polyethylene pull rope with 100-pound (minimum) tensile strength.
11. All conduits shall be tightly sealed during construction by use of conduit plugs or "pennies" set under bushings. All conduit in which moisture or any foreign matter has collected before pulling conductors shall be cleaned and dried to the satisfaction of the Owner.
12. Conduits shall be securely fastened to cabinets, boxes, and gutters using locknuts (one inside and one outside enclosure for rigid conduit), and an insulating bushing or specified insulated connectors. Grounding bushings or bonding jumpers shall be installed on all conduits terminating at concentric knockouts.

B. Liquid-Tight Flexible Metallic Conduit

Liquid-tight flexible conduit shall be installed in all locations for connections to equipment, including, but not limited to: motors, HVAC equipment, automatic valves, and similar devices.

C. Rigid Non-Metallic Conduit

Unless noted otherwise on the Drawings, Schedule 40 PVC conduit may be used underground. PVC conduits shall not be run exposed.

D. Duct Banks

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 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 Contractor with Owner at least monthly.

Complete as-built electrical duct bank drawings shall be submitted to Owner upon completion of construction.

E. Supports

1. All raceway systems shall be secured to building structures using specified fasteners, clamps, Unistrut, and hangers spaced according to NEC requirements.
2. Exposed conduit shall be supported with channel supports spaced per NEC requirements (8'-0" maximum spacing) and within 18" of couplings, bends, boxes, etc., unless otherwise shown on the Drawings.
3. Multiple conduit runs shall be supported using "trapeze" hangers, consisting of approved channels suspended on steel rods from ceiling inserts located not more than eight (8) feet apart. Sizes of channels and rods shall be selected as recommended by the manufacturer for span and loading conditions.

F. Termination and Joints

1. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
2. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using approved connectors and hubs.
3. Expansion couplings shall be installed where any conduit crosses a building separation or expansion joint, including joints in footings and gradebeams.
4. Approved cable-sealing bushings shall be installed on all conduits originating from roof and terminating in switchgear, cabinets, or gutters inside the building.
5. Conduit bodies (condulets) are not acceptable as enclosures for splices.
6. At all conduit terminations and boxes, conductors shall be protected by a fitting equipped with a plastic bushing having a smoothly rounded insulating surface.

G. Labeling

Contractor shall field number and label all conduits and provide complete as-built drawings to Owner. All conduits within manholes/pull boxes shall be permanently labeled therein and labeled where they stub up to an MCC or panel.

3.03 Conductor and Cable Installation

A. General

1. Conductors shall not be installed in conduit runs until all work is completed for each individual conduit run. Care shall be taken in pulling conductors such that insulation is not damaged. UL approved pulling compounds shall be used.
2. Unless noted otherwise on the Drawings, all conductors or cables shall be installed in conduit or electrical enclosures.
3. All cables shall be installed and tested in accordance with manufacturer's requirements and warranty.

B. Splicing and Terminating

1. All aspects of splicing and terminating shall be in accordance with cable manufacturers published procedures.
2. All splices in outlet boxes with connectors as specified herein shall be made up with separate tails of correct color. At least six (6) inches of tails packed in box after splice is made up shall be provided.
3. All conductor and cable in panels, control centers and equipment enclosures shall be bundled and clamped.

C. Identification

1. All branch-circuits shall be securely tagged, noting the purpose of each. Conductors shall be marked with vinyl wrap-around markers. Where more than two conductors run through a single outlet, each circuit shall be marked with the corresponding circuit number at the panelboard.
2. Conductors size #6 AWG and larger shall be color coded using specified phase color markers and identification tags.
3. All terminal strips shall have each individual terminal identified with specified vinyl markers.
4. Inside of all junction box cover plates shall be identified via felt-tip pen or decal label, denoting the panel and circuit numbers and voltage contained in the box.
5. All receptacles and switches shall be decal labeled on the plate, denoting the panel and circuit number.

D. Connections to Circuit Breakers, Switches, and Terminal Strips; Stranded Copper Conductors

1. #12 through 8 AWG: Conductor shall be terminated in locking tongue style, pressure type, compression lugs, unless clamp type connection for stranded conductor is provided with device.
2. #6 AWG and larger: Conductor shall be terminated in one-hole flat-tongue style, compression type lugs, or by connectors supplied by the manufacturer.

E. Joints in Conductors in Dry Locations, Copper Conductors

1. #8 AWG and smaller: Conductors shall be twisted and secured with cap or twist-on, expandable spring type solderless connectors.
2. #6 AWG and larger: Conductor shall be joined with split bolt connectors or compression sleeves. Joints shall be insulated with rubber tape and protected with half-lapped layers of vinyl plastic electrical tape. Insulation may also be provided by UL listed pre-manufactured components such as heat-shrink or cold-shrink devices.

F. Joints in Conductors in Moist Locations, Copper Conductors

1. #8 AWG and smaller: Conductor shall be securely joined as specified above, then encapsulated in epoxy (Scotchcast or approved equal).
2. #6 AWG and larger shall be joined as specified above, and suitably water treated.

G. Grounding

Enclosures of equipment, raceways and fixtures shall be permanently and effectively grounded. A code-sized, copper, insulated green equipment ground shall be provided for all branch circuit and feeder runs. Equipment ground shall originate at panelboard ground bus and shall be bonded to all switch and receptacle boxes and electrical equipment enclosures. Ground terminals on receptacles shall be connected to the equipment grounding conductor by an insulated copper conductor.

H. Signal Wiring

Conductor used for alarm and control signal applications shall be identified at both ends and referenced to appropriate as-built drawings. Control wiring shall be numerically or otherwise coded in accordance with as-built control diagrams.

3.04 Installation of Boxes and Wiring Devices

A General

1. All outlets shall be surface mounted with walls, ceilings, and floors, except where specified to be finish flush.

2. No unused openings shall be left in any box. Close-up plugs shall be installed as required to seal openings.
3. Exposed outlet boxes and boxes in damp and wet locations shall be provided with gasketed cast metal cover plates.

B. Box Layout

Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Adjustments to locations shall be made as required by structural conditions and to suit coordination requirements of other trades.

3.05 Transformer Installation

- A. Primary shall be connected to minimum value taps during construction period and prior to initial building start-up.
- B. Voltage readings shall be made and tap connections adjusted to nominal voltage during final construction review and prior to building occupancy.
- C. Transformers shall be installed on vibration pads designed to suppress the transformer vibrations. Pads shall be selected and arranged in accordance with the weights of the transformers.
- D. Conduit connections that will prevent transmission of the transformer vibrations to the conduit system shall be installed.
- E. Transformers installed against a wall shall have readily accessible primary and secondary terminals.

3.06 Protection

Conduits, junction boxes, outlet boxes, and other openings shall be kept closed to prevent entry of foreign matter. Fixtures, equipment, and apparatus shall be covered and protected against dirt, paint, water, chemical or mechanical damage, before and during the construction period. Damaged fixtures, apparatus, or equipment shall be restored to original condition prior to final acceptance, including restoration of damaged shop coats of paint. Brightly finished surfaces and similar items shall be protected until in service. No rust or damage will be permitted.

3.07 Workmanship

- A. Preparation, handling, and installation shall be in accordance with manufacturer's written instructions and technical data particular to the product specified and/or approved, except as otherwise specified.
- B. Work shall be furnished and placed in coordination and cooperation with other trades.

- C. Work shall conform to the National Electrical Contractor's Association Standard of Installation for general installation practice.

END OF SECTION

APPENDIX A
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

In addition to submittal requirement set forth in Sections 1.02 through 1.09, hereafter, Contractor shall include submission in electronic media format as set forth in Section 1.10.

1.02 Construction Progress Schedule

Contractor shall submit to Owner a Construction Progress Schedule (CPS) 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 seven (7) days of Notice to Proceed, Contractor shall submit a CPS 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.
- 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 CPS monthly, flagging all slippages and missed mile posts.

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 CPS 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 CPS 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 CPS, 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. Unless otherwise specified in the Contract Documents, Contractor shall furnish for all equipment and materials to be furnished and installed for the project at least five (5) copies of each shop drawing for Owner's review and approval. Up to three (3) copies will be retained for Owner's use, and the remaining copies will be returned to Contractor.

The term "Shop Drawings" as used herein shall be understood to include all data covering all equipment, equipment components, fabricated materials, and furnished materials.

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.

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 three (3) sets of shop drawing submittals to Contractor with his comments noted thereon, within thirty (30) working days following their receipt by Owner. Alternatively, Owner may elect to provide his 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 his 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 \$140 per hour.

F. Corrections and Resubmittals

Contractor shall make all required corrections and shall resubmit the required number of 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 provide to Owner four (4) sets of detailed operation and maintenance (O&M) manuals for all mechanical and electrical equipment furnished. 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. 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 Maintenance Card (Copy of Form Attached)
9. Equipment Warranties
10. Name, Address, and Phone Number of Local Parts Distributor and Service Center.

- B. 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 \$140 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 Submission in Electronic Media Format

In addition to providing paper (i.e. hard) copies, all documents (CPSs, Progress Schedule, RFIs, RFCs, Submittals, Operations and Maintenance Manuals, 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 5 MB to 10 MB), the document shall be uploaded to the FTP site (if available), or saved onto a CD 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

In addition to submitting five (5) hard copies of all shop drawing submittals (see Part 1.03 herein), 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 using the latest version of Adobe Acrobat.

D. O&M Manuals

In addition to submitting six (6) hard copy sets of all O&M manuals (see Part 1.05 herein), Contractor shall submit six (6) copies of a single DVD containing the entire 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, plus one (1) hard copy. If required by Owner, provide one (1) CD (copy) containing the entire document with attachments.

**SAMPLE
BEAUMONT-CHERRY VALLEY WATER DISTRICT
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 26-1/12" 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: _____

**BEAUMONT-CHERRY VALLEY WATER DISTRICT
EQUIPMENT MAINTENANCE DATA SHEET**

PREVENTIVE MAINTENANCE PROGRAM		EQUIPMENT RECORD NUMBER		
EQUIPMENT DESCRIPTION		ELECTRICAL OR MECHANICAL DATA		
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 Relay Setting:	rpm:
MAINTENANCE AND LUBRICATION WORK TO BE DONE				Frequency*
SPARE PARTS LIST		FUSES/LAMPS/SEALS		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE				

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly; S - Semiannually; A - Annually

**SAMPLE
BEAUMONT-CHERRY VALLEY WATER DISTRICT
EQUIPMENT MAINTENANCE DATA SHEET**

PREVENTATIVE MAINTENANCE PROGRAM		EQUIPMENT RECORD NUMBER		
EQUIPMENT DESCRIPTION		ELECTRICAL OR MECHANICAL DATA		
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
MAINTENANCE AND LUBRICATION WORK TO BE DONE				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
SPARE PARTS LIST		FUSES/LAMPS/SEALS		
Quantity	Part & Part Number	Qty	Size	Type & Ordering Description
WARRANTY AND OPERATING REQUIREMENTS AND REFERENCE				
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
BEAUMONT-CHERRY VALLEY WATER DISTRICT
CONTRACTOR'S REQUEST FOR INFORMATION (RFI) # _____

To (Engineer):	
From (Contractor):	
Subject:	
Reference: Construction Drawing:	Specification (Section and Page):
REQUEST	
Information is requested as follows:	
Information Requested By (Name):	Date:
Response Requested By (Date):	
Received by Owner's Representative (Date):	
RESPONSE	
Response to Information Request:	
Response By (Name):	Date:

Final Distribution:

Page ___ of ___

SAMPLE
CONTRACTOR'S REQUEST FOR CHANGE (RFC) # _____

To (Engineer):	
From (Contractor):	
Subject:	
Reference: Construction Drawing: _____	Specification (Section and Page): _____
REQUEST	
The following change is requested:	
Change Requested By (Name): _____	Date: _____
Response Requested By (Date): _____	
Received by Owner's Representative (Date): _____	
Benefit to Owner:	
Benefit to Contractor:	
Cost and/or Schedule Impact:	
Change Order Required or Proposed? <u> </u> YES <u> </u> NO	
RESPONSE	
Response to Change Request: ⁽¹⁾	

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:

APPENDIX B

Well 25 Location Map, Site Location, and Site Photos

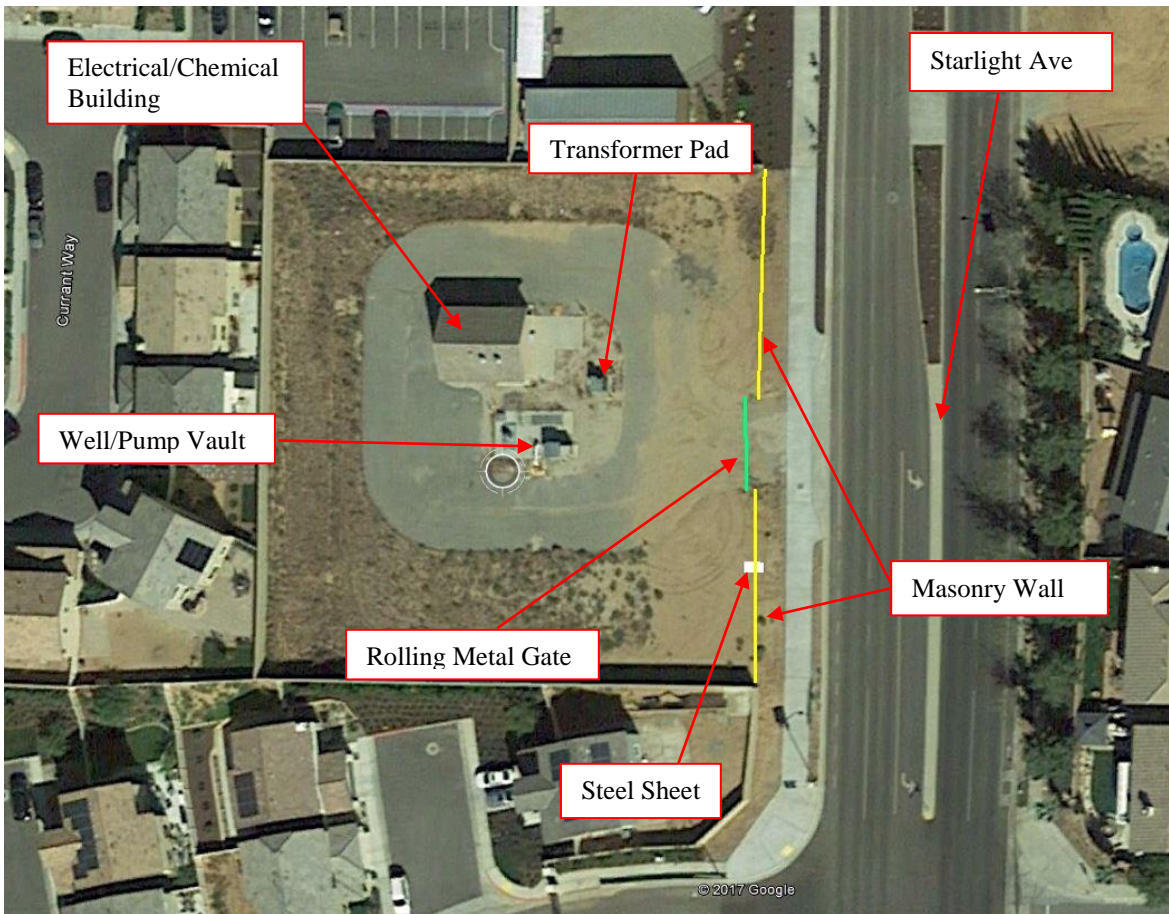
Well 25 Location Map



Well 25 Site Location



Well 25 Site Location



Well 25 Site Photos



Well 25 Facilities from Starlight Ave Looking West

EXISTING SOUTH WALL



EXISTING NORTH WALL



BEAUMONT CHERRY VALLEY WATER DISTRICT

RIVERSIDE COUNTY, CALIFORNIA

PLANS FOR THE CONSTRUCTION OF FACILITIES AND OUTFITTING

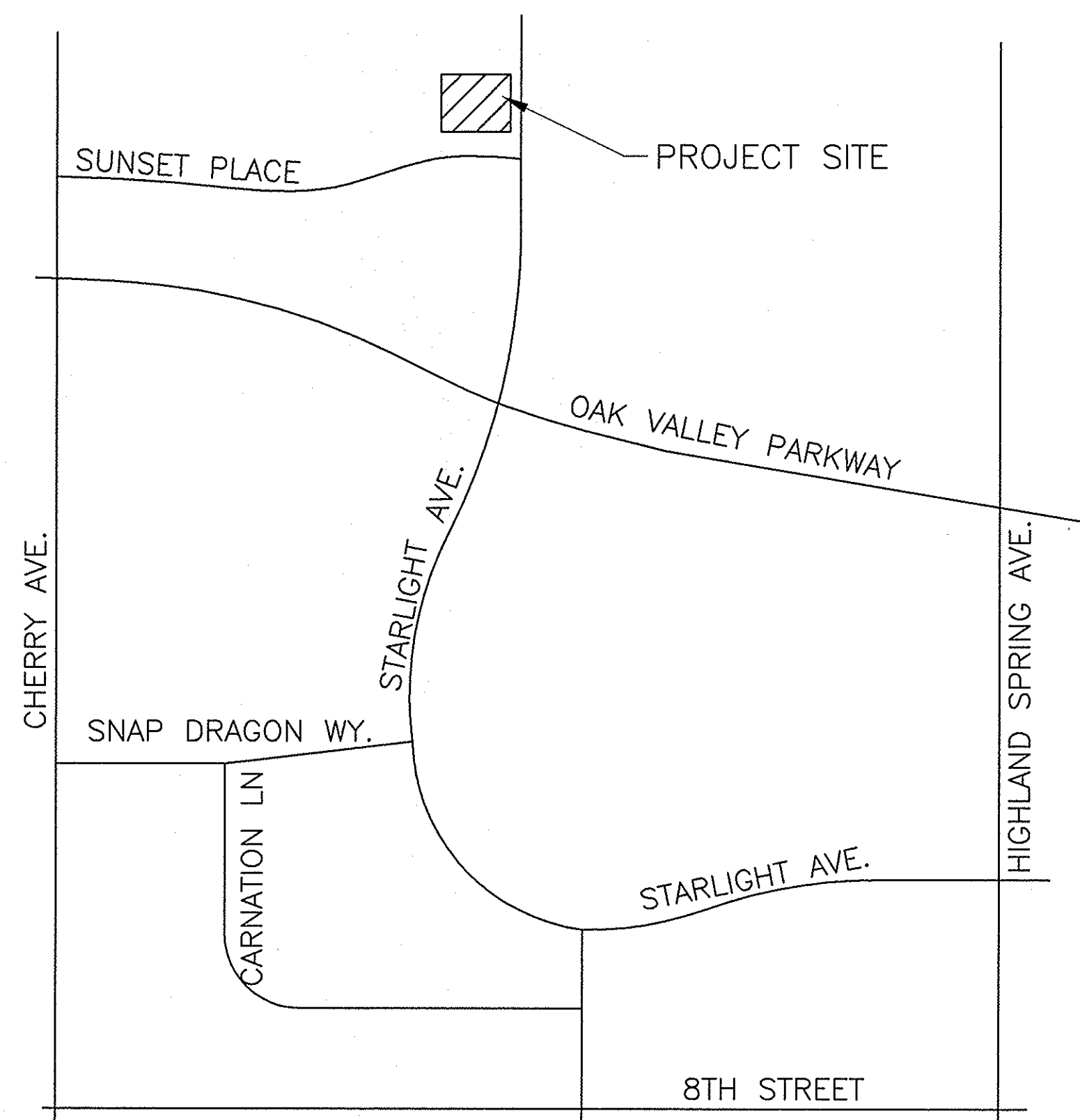
WELL NO. 25

2850 (INTERMEDIATE) ZONE

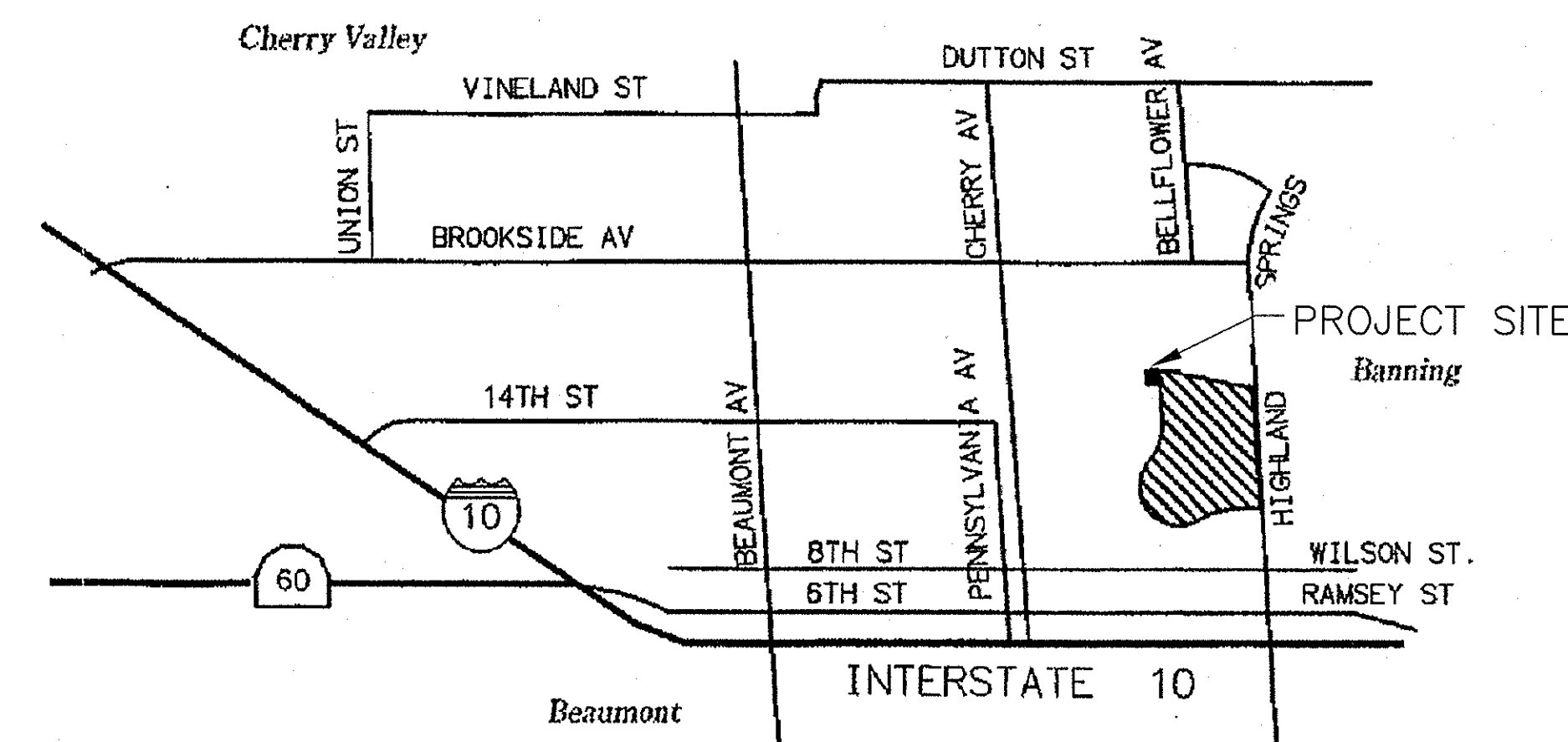
ORIGINAL PROJECT FACILITIES
CURRENT DRAWINGS

BOARD OF DIRECTORS

STELLA PARKS	PRESIDENT
DR. BLAIR BALL	VICE PRESIDENT
WILLIAM LASH	DIRECTOR
ALBERT CHATIGNY	DIRECTOR
MARQUEL DOPP	DIRECTOR
C.J. BUTCHER	GENERAL MANAGER



LOCATION MAP
N.T.S.



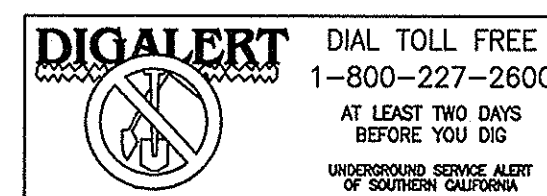
VICINITY MAP
N.T.S.

BENCHMARK DESCRIPTION

CITY OF BEAUMONT
BENCHMARK
NO. 05.A.82 MARKED: 5

TYPE: 1-3/8" BRASS CAP MONUMENT MARKED "CITY B.M. 5"
ELEVATION: 2631.257 (1982)
LOCATION: S.E. CORNER BEAUMONT AVENUE AND 14TH STREET
59' S'LY AND 33' E'LY OF CENTERLINE INTERSECTION
2' S'LY OF B.C.R.
ESTABLISHED FROM RIVERSIDE COUNTY BENCHMARK 603-98-68
SEE WILLDAN JOB NO. 61170

COORDINATE SYSTEM AND BEARINGS BASED ON
CALIFORNIA STATE PLAN NAD 83 ZONE 6



ENGINEER'S NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THIS PLAN. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.

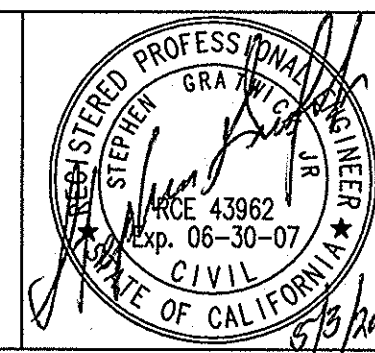
FOR INFORMATION ONLY

SEE DRAWINGS:

- C-1 - SITE AND GRADING PLAN
- C-2 - PIPING PLAN
- S-1 - STRUCTURAL NOTES AND STANDARD DETAILS
- S-2 - STRUCTURAL STANDARD DETAIL
- S-7 - SLIDING GATE DETAILS
- E-1 - ELECTRICAL SYMBOLS AND SCHEDULES
- E-3 - ELECTRICAL DETAILS 1
- E-5 - SINGLE LINE DIAGRAM & MAIN SWBD MCC ELEVATION
- E-10 - ELECTRICAL SERVICE CONDUIT LAYOUT

ISSUED FOR CONSTRUCTION

PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000



Job No.	723185
Designed	JV
Drawn	JV
Checked	SG
Approved	JCR
Reg. No.	
Date	04/07
Rev	Date Description
	04/07 ISSUED FOR CONSTRUCTION

Benchmark	SEE SHEET 1
Scale	NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. J. Rando
District Engineer

R.C.E. No. 18034

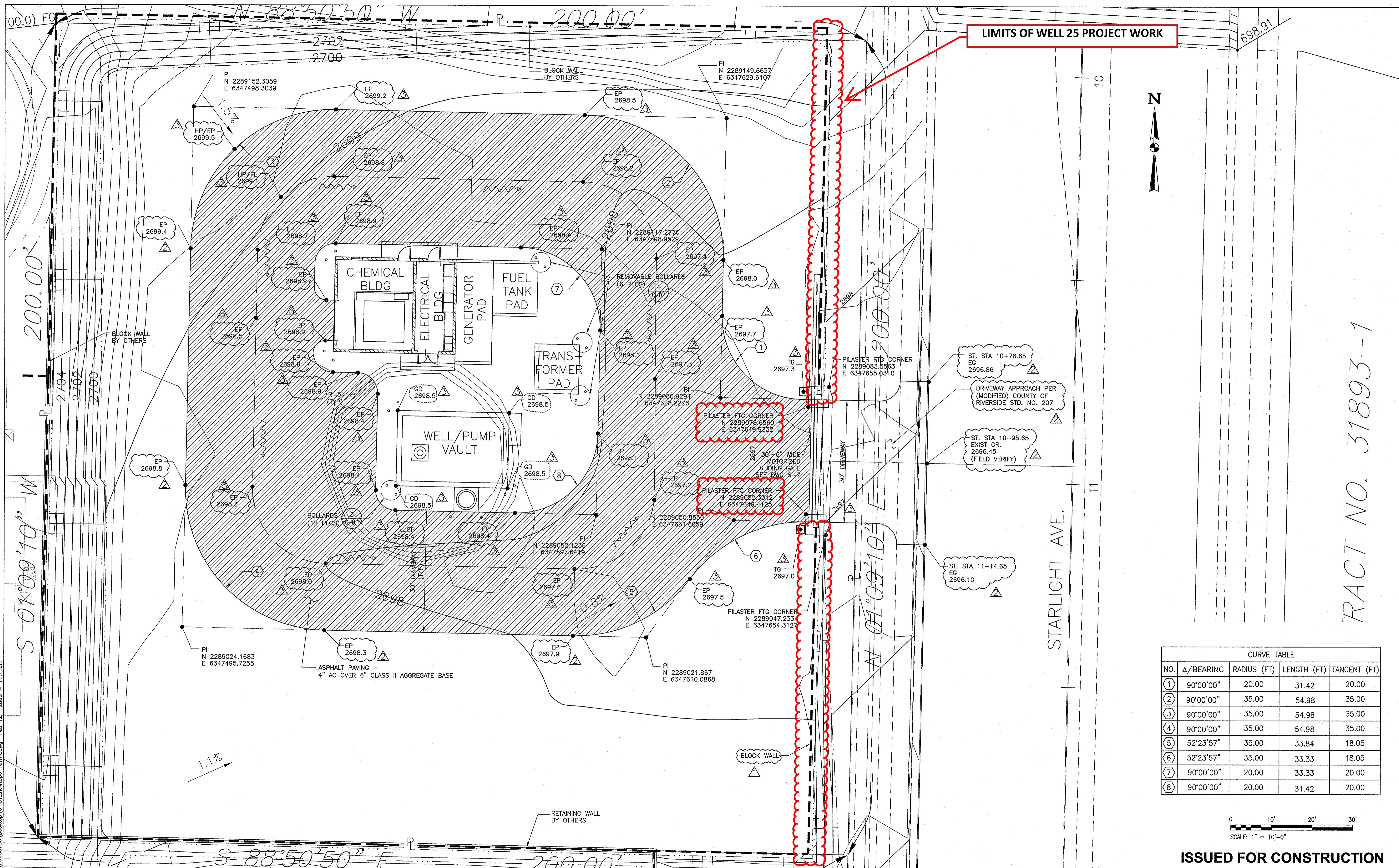
Adler
Date

BCVWD - WELL NO. 25

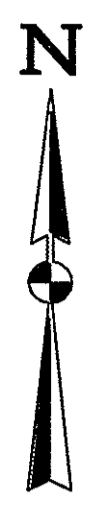
TITLE SHEET

Drawing No.
G-1

SHEET 1 OF 39

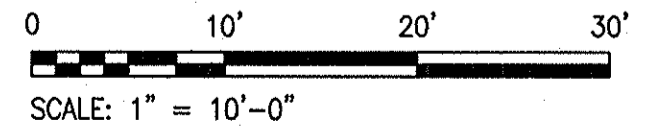


LIMITS OF WELL 25 PROJECT WORK



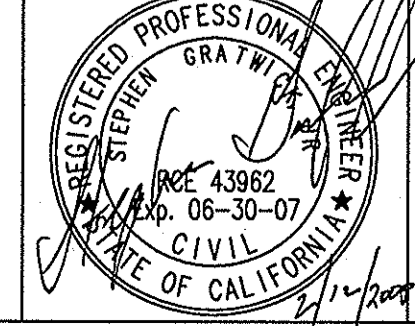
TRACT NO. 31893-1

CURVE TABLE				
NO.	Δ/BEARING	RADIUS (FT)	LENGTH (FT)	TANGENT (FT)
①	90°00'00"	20.00	31.42	20.00
②	90°00'00"	35.00	54.98	35.00
③	90°00'00"	35.00	54.98	35.00
④	90°00'00"	35.00	54.98	35.00
⑤	52°23'57"	35.00	33.84	18.05
⑥	52°23'57"	35.00	33.33	18.05
⑦	90°00'00"	20.00	33.33	20.00
⑧	90°00'00"	20.00	31.42	20.00



ISSUED FOR CONSTRUCTION

PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000



Job No.	723185
Designed	JV
Drawn	JV
Checked	SG
Approved	JCR
Reg. No.	
Date	

Rev	Date	Description	By
02/08		EP & EG GRADES	SG
07/07		EP & EG GRADES	SG
04/07		CONTRACTOR TO CONSTRUCT EASTERLY BLOCK WALL AND DRIVEWAY	SG

Benchmark
SEE SHEET 1

Scale
AS SHOWN

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. J. Rank
District Engineer

R.C.E. No. 18034

2/12/2008
Date

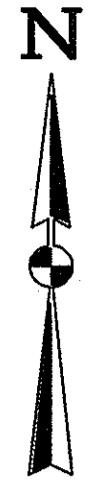
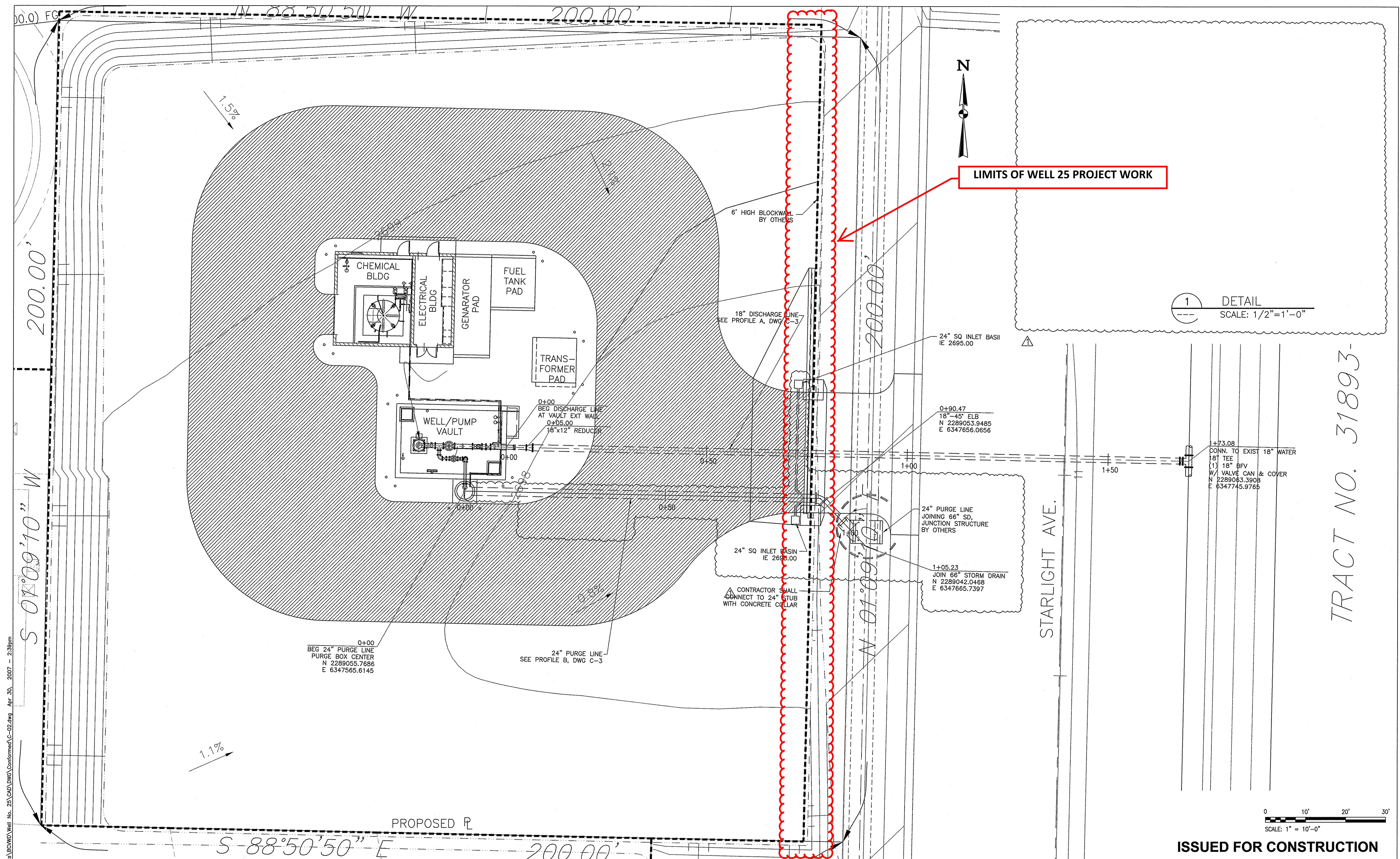
BCVWD - WELL NO. 25

SITE AND GRADING PLAN

Drawing No.
C-1

SHEET 4 OF 39

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LIMITS OF WELL 25 PROJECT WORK

1 DETAIL
SCALE: 1/2"=1'-0"

+73.08
CONN. TO EXIST 18" WATER
18" TEE
(1) 18" BFV
W/ VALVE CAN & COVER
N 2289063.3908
E 6347745.9765

0+90.47
18"-45" ELB
N 2289053.9485
E 6347656.0656

24" PURGE LINE
JOINING 66" SD,
JUNCTION STRUCTURE
BY OTHERS

1+05.23
JOIN 66" STORM DRAIN
N 2289042.0468
E 6347665.7397

24" SQ INLET BASIN
IE 2695.00

CONTRACTOR SHALL
CONNECT TO 24" STUB
WITH CONCRETE COLLAR

24" PURGE LINE
SEE PROFILE B, DWG C-3

0+00
BEG 24" PURGE LINE
PURGE BOX CENTER
N 2289055.7686
E 6347565.6145

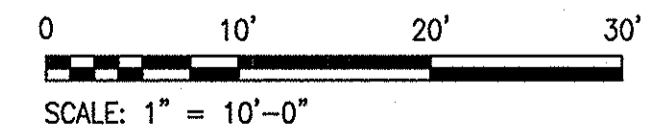
0+00
BEG DISCHARGE LINE
AT VAULT EXT WALL
0+05.00
18"x12" REDUCER

24" SQ INLET BASIN
IE 2695.00

18" DISCHARGE LINE
SEE PROFILE A, DWG C-3

6' HIGH BLOCKWALL
BY OTHERS

STARLIGHT AVE.

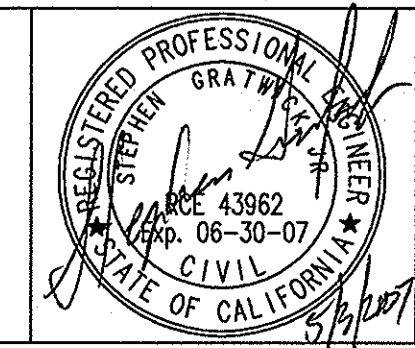


ISSUED FOR CONSTRUCTION

TRACT NO. 31893-

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PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000



Job No.	723185		
Designed	JV		
Drawn	JV		
Checked	SG		
Approved	JCR		
Reg. No.			
Date			
Rev	Date	Description	By
	04/07	DRAINAGE INLET BOXES WITH DRAIN LINES ADDED	SG
		PURGE LINE CHANGED TO 24", JUNCTION STRUCTURE BY OTHERS.	

Benchmark
SEE SHEET 1

Scale
AS SHOWN

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J.R. [Signature]
District Engineer

R.C.E. No. 18034

5/6/07
Date

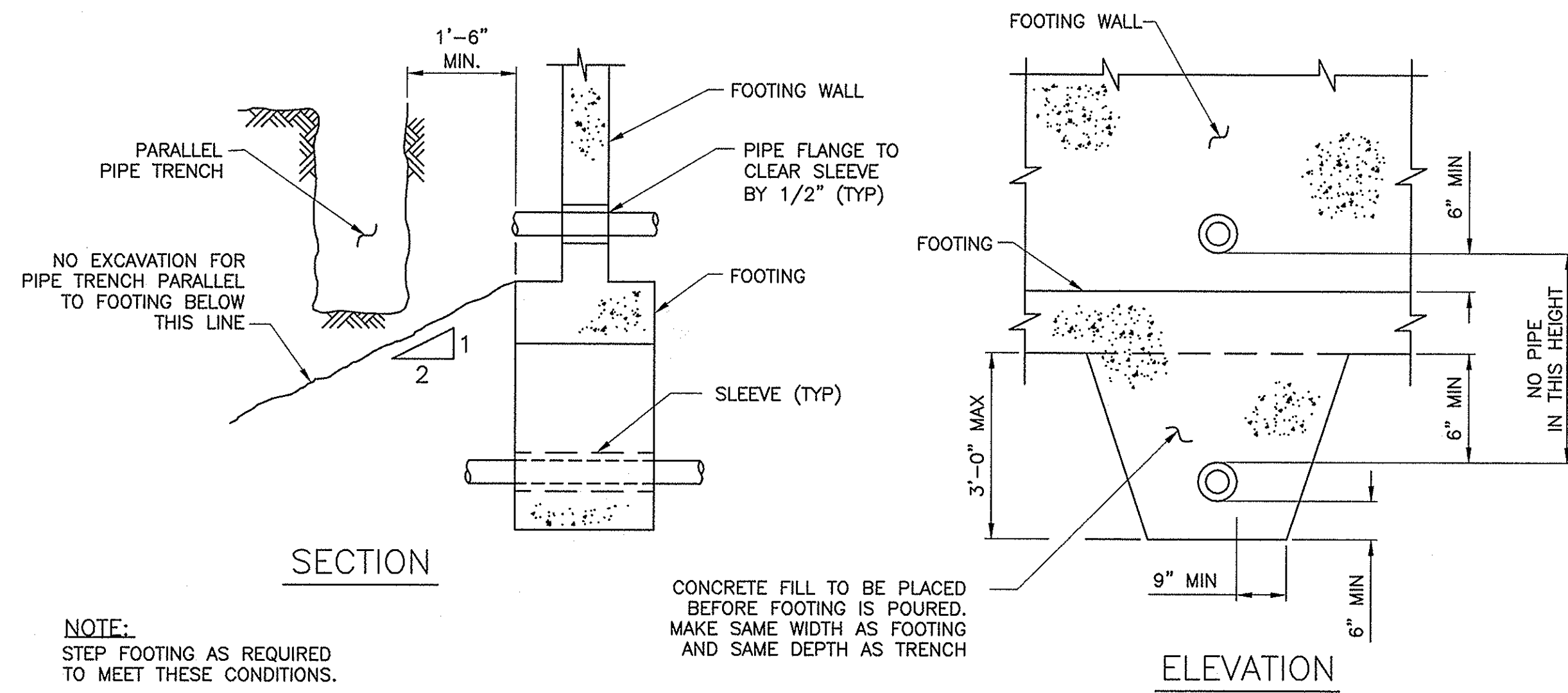
BCVWD - WELL NO. 25

PIPING PLAN

Drawing No. C-2

SHEET 5 OF 39

STRUCTURAL NOTES



TYPICAL PIPE DETAIL AT BUILDING FOOTING
SCALE: NONE

GENERAL:

- ALL STANDARD DETAILS MARKED "TYPICAL" SHALL BE USED WHEREVER APPLICABLE, UNLESS OTHERWISE INDICATED ON DRAWINGS.
- ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE CALIFORNIA BUILDING CODE, 2001 EDITION, AS MINIMUM REQUIREMENT.
- PIPE CONNECTION TO STRUCTURES SHALL BE AS SHOWN ON THE STANDARD DETAILS UNLESS OTHERWISE NOTED.
- CONTRACTOR SHALL PROVIDE ALL CONSTRUCTION JOINTS AS REQUIRED TO PERFORM THE WORK. THE PREFERRED LOCATIONS ARE SHOWN ON THE DRAWINGS. ADDITIONAL JOINTS, OR REVISED LOCATIONS FROM THOSE SHOWN, OR DELETION OF JOINTS SHOWN SHALL REQUIRE APPROVAL FROM THE ENGINEER.
- CONTRACTOR SHALL VERIFY ALL EQUIPMENT PAD SIZES, ANCHOR BOLT SIZES AND LOCATIONS, AND OTHER EMBEDDED ITEMS WITH EQUIPMENT MANUFACTURER'S APPROVED SHOP DRAWINGS PRIOR TO PLACING CONCRETE.
- SEE MECHANICAL, ELECTRICAL, AND CIVIL DRAWINGS FOR EQUIPMENT PADS NOT SHOWN ON STRUCTURAL DRAWINGS.
- CONTRACTOR SHALL APPLY 2 COATS OF STAIN PAINT ON ALL EXPOSED WOOD SURFACES AND CONNECTORS. COLOR SHALL BE DETERMINED BY OWNER.

FOUNDATION & SOIL DATA:

- FOUNDATION DESIGN IS BASED ON GEOTECHNICAL INVESTIGATION REPORT, OUTFIT FUTURE WELL #25, BEAUMONT CHERRY VALLEY WATER DISTRICT BY CONVERSE CONSULTANTS, MARCH 21, 2006.
- ALLOWABLE BEARING PRESSURES:
SHALLOW FOOTINGS..... 2000 PSF
MAT FOUNDATIONS 3000 PSF
- LATERAL SOIL PRESSURES:
ACTIVE SOIL PRESSURE = 35 PCF (LEVEL SUBGRADE)
AT REST PRESSURE = 55 PCF (LEVEL SUBGRADE)
PASSIVE EARTH PRESSURE = 320 PCF
LATERAL FRICTION FACTOR = 0.40
EQUIVALENT SEISMIC PRESSURE = 34H

INSPECTION:

CONTINUOUS INSPECTION SHALL BE PERFORMED BY A SPECIAL INSPECTOR AS DEFINED IN THE SPECIFICATIONS. CONTINUOUS INSPECTION WILL BE REQUIRED FOR THE FOLLOWING WORK:

- PLACING OF CONCRETE AND REINFORCING STEEL FOR CONCRETE WITH 28-DAY STRENGTH IN EXCESS OF 2500 PSF.
- PLACING OF MASONRY UNITS AND REINFORCING STEEL FOR CONCRETE BLOCK MASONRY.
- STRUCTURAL FIELD WELDING.
- INSTALLATION OF DEFERRED BOLTING DEVICES (DBD).

CONCRETE:

- CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 318-95 AND ACI 350R.
- UNLESS OTHERWISE NOTED OR SPECIFIED, ALL STRUCTURAL CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF:
A. CLASS I, 4000 PSI FOR ALL VAULT STRUCTURES
B. CLASS II, 3000 PSI FOR ALL STRUCTURAL FOOTINGS, STRUCTURAL SLABS, SLABS ON GRADE.
C. CLASS III, 2000 PSI FOR ALL NON-STRUCTURAL WORK
- ALL KEYWAYS IN CONSTRUCTION JOINTS SHALL BE ROUGH AND THOROUGHLY CLEANED FOR BOND.
- DOWELS SHALL BE WIRED OR OTHERWISE HELD IN POSITION. THEY SHALL NOT BE SHOVED INTO FRESHLY PLACED CONCRETE.
- REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH ANY PIPE, PIPE FLANGE OR METAL PARTS EMBEDDED IN CONCRETE. A MINIMUM OF 2 INCHES CLEARANCE SHALL BE PROVIDED AT ALL TIMES.
- EMBEDDED HEADED WELD STUDS SHALL CONFORM TO ASTM A108.
- ALL STAIRS AND LADDERS RESTING ON GRADE SHALL BE PROVIDED WITH FOUNDATION PADS PER TYPICAL DRAWING DETAILS, UNLESS OTHERWISE NOTED.
- ALL REINFORCING STEEL, ANCHOR BOLTS, DOWELS AND OTHER INSERTS AND EMBEDS SHALL BE SECURED IN POSITION, INSPECTED AND APPROVED PRIOR TO PLACING CONCRETE.

STRUCTURAL STEEL:

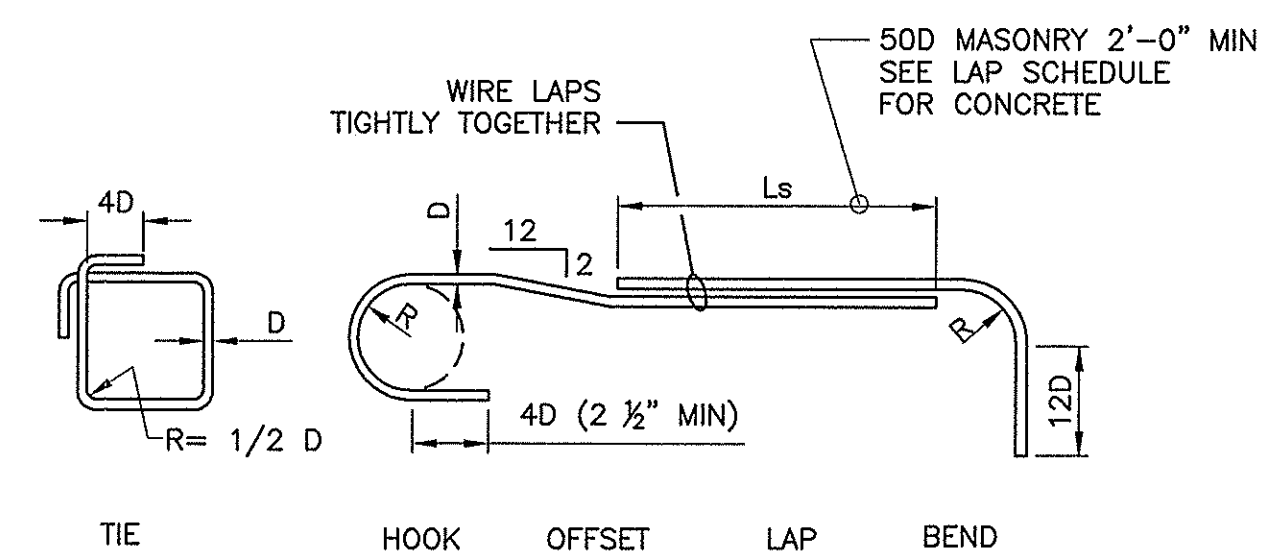
- ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 FOR ANGLES AND PLATES AND A-992 FOR WIDE FLANGE SHAPES.
- ALL PIPE SHALL BE ASTM A-53, GRADE "B".
- ALL TUBULAR STEEL SECTIONS SHALL CONFORM TO ASTM A-500 GRADE "B" (FY = 46 KSI).
- DETAILS, CONNECTIONS, AND DESIGN SHALL CONFORM TO THE LATEST EDITION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS. FABRICATION AND ERECTION SHALL CONFORM TO THE LATEST EDITION OF THE CODE STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
- ALL WELDS SHALL BE MADE IN CONFORMANCE WITH THE LATEST EDITION OF THE STANDARD CODE FOR ARC AND GAS WELDING OF THE AMERICAN WELDING SOCIETY. ALL WELDERS SHALL BE CERTIFIED. USE E-70 SERIES ELECTRODES OR BETTER. E70T-4 ELECTRODES ARE NOT ALLOWED.
- NO STRUCTURAL STEEL SHALL BE FABRICATED OR ERECTED UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED BY THE STRUCTURAL ENGINEER.
- NO FIELD CUTTING OR BURNING OF STRUCTURAL STEEL WILL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.
- BASE PLATES SHALL BE LEVELED WITH DOUBLE NUTS. NO LEVELING PLATE ALLOWED.

MASONRY:

- MASONRY UNITS OF CONCRETE SHALL CONFORM TO ASTM C90 GRADE N-1 f'm=1500, ASTM C140 AND ASTM C42C, MEDIUM WEIGHT BLOCKS.
- MORTAR MIX SHALL BE TYPE "S", WITH ONE PART CEMENT AND 1/4 TO 1/2 PART HYDRATED LIME OR LIME PUTTY BY VOLUME. AGGREGATE MEASURED IN A DAMP, LOOSE CONDITION SHALL BE NOT LESS THAN 2 1/4 AND NOT MORE THAN 3 TIMES THE SUM OF THE SEPARATE VOLUME OF CEMENTIOUS MATERIALS.
- GROUT MIX SHALL BE 1 PART BY VOLUME OF PORTLAND CEMENT AND 0 TO 1/10 PARTS BY VOLUME OF HYDRATED LIME OR LIME PUTTY. AGGREGATE MEASURED IN A DAMP, LOOSE CONDITION SHALL BE :
A. FINE GROUT: SAND, 2-1/4 TO 3 TIMES THE SUM OF THE VOLUME OF THE CEMENTIOUS MATERIALS
B. COARSE GROUT: SAND, 2 TIMES, AND PEA GRAVEL, NOT MORE THAN 2 TIMES THE SUM OF THE VOLUME OF THE CEMENTIOUS MATERIALS
FINE GROUT IS USED FOR NARROW, LESS THAN 2", GROUT SPACE.
SUFFICIENT WATER SHALL BE ADDED TO CAUSE THE GROUT TO FLOW INTO THE CELLS OF THE MASONRY.
GROUT SHALL ATTAIN A MINIMUM STRENGTH OF 2000 PSI AT 28 DAYS.
- SOLID GROUT ALL CELLS.
- ALL CMU BLOCK WALLS SHALL BE CONSTRUCTED WITH RUNNING BOND PATTERN.
- CONTINUOUS DEPUTY INSPECTION REQUIRED, THEREFORE FULL ALLOWABLE STRESS VALUES ARE USED IN DESIGN.

ISSUED FOR CONSTRUCTION

COMPRESSION LAP SPlice LENGTH (COLUMNS ONLY)= 30D



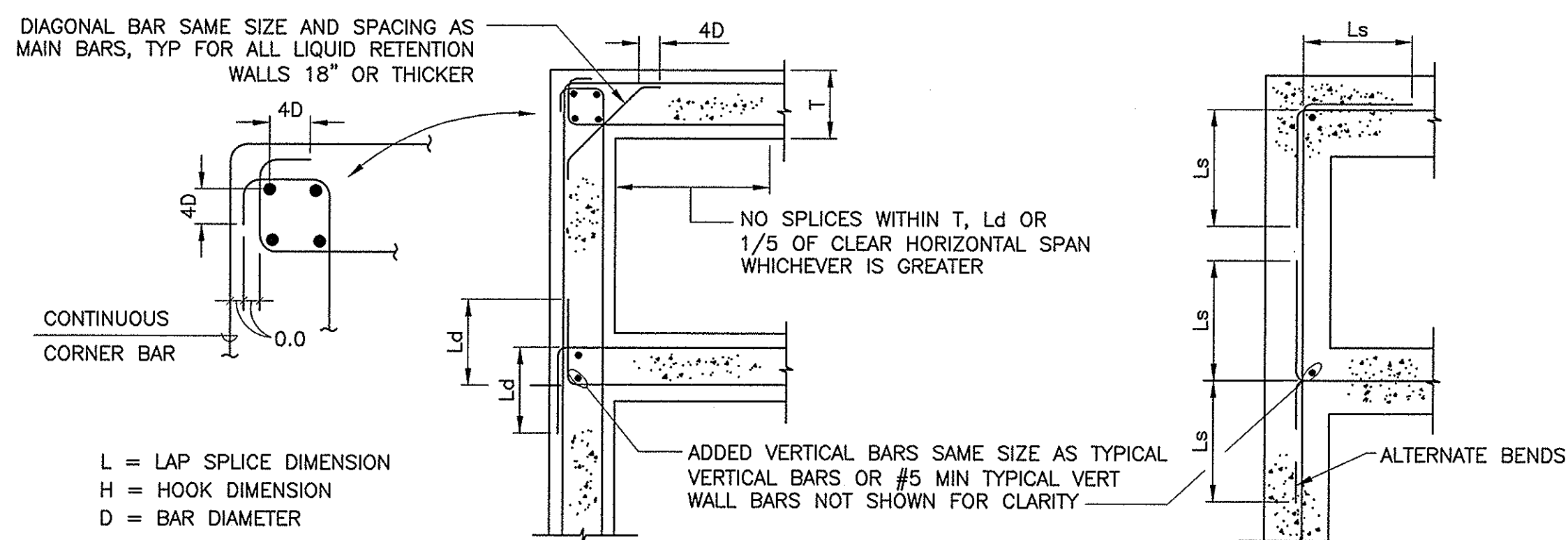
TYPICAL REINFORCING BAR DETAIL
SCALE: NONE

BAR SIZE	Ld * (IN)		SPlice LENGTH, Ls (IN)	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	20	15	25	20
#4	25	19	32	25
#5	31	24	40	31
#6	37	29	48	37
#7	54	42	70	54
#8	62	48	80	62
#9	70	54	91	70
#10	77	60	100	77
#11	85	66	111	85

- * Ld = BAR DEVELOPMENT LENGTH FOR:
- f_y = 60 ksi; F_c = 4000 psi
 - CLEAR SPACING BETWEEN BARS ≥ 3D
 - CONCRETE COVER ≥ 2D
 - VALUES OF Ld* AND CORRESPONDING SPlice LENGTHS SHALL BE 1.4 TIMES THE TABULATED VALUE WHEN CLEAR SPACING BETWEEN BARS IS LESS THAN 3D, AND 2 TIMES THE TABULATED VALUE WHEN THE CLEAR SPACING BETWEEN BARS IS 2D
 - CONFORMANCE WITH ACI 12.2.3.1, WHERE APPLICABLE

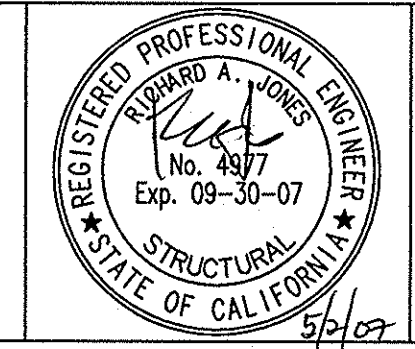
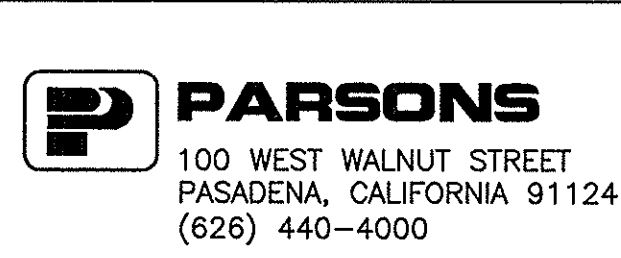
REINFORCING STEEL:

- ALL REINFORCING STEEL SHALL BE NEW BILLET STEEL DEFORMED BARS AND SHALL CONFORM TO ASTM A615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
- THE CLEAR COVER OVER REINFORCING SHALL BE AS FOLLOWS:
A. CONCRETE CAST AGAINST EARTH 3"
B. FORMED CONCRETE AGAINST EARTH, WEATHER OR WATER 2"
C. CONCRETE SLABS & WALLS NOT EXPOSED TO WATER 3/4"
D. CONCRETE WALL SURFACES WITH ARCHITECTURAL TREATMENT FROM OUTSIDE FACE 3-1/2"
- ALL REINFORCING STEEL TO BE WELDED SHALL CONFORM TO ASTM A706, GRADE 60.
- ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" ACI 315, LATEST EDITION.



TYPICAL CONCRETE WALL CORNER AND INTERSECTION REINFORCING
SCALE: NONE

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Job No. 723185	Designed RJ	Drawn JV	Checked RJ	Approved JCR	Reg. No.	Date
Rev	Date	Description	By			

Benchmark	SEE SHEET 1
Scale	NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. D. [Signature]
District Engineer

R.C.E. No. 18034

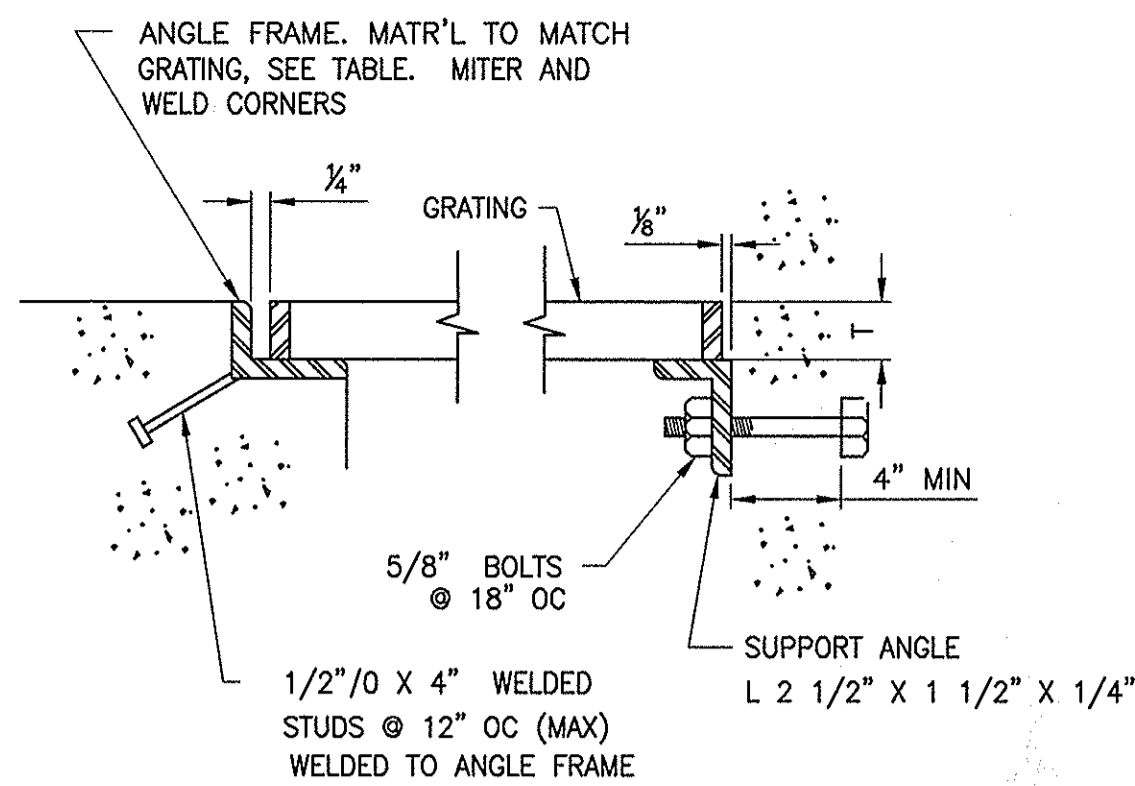
[Signature]
Date

BCVWD - WELL NO. 25

STRUCTURAL NOTES AND STANDARD DETAILS

Drawing No. S-1

SHEET 12 OF 39



ALUMINUM GRATING (1)

BEARING BARS: DEPTH T X 3/16" @ 1 3/16" OC

CROSS BARS @ 4" OC

USE ALUM ANGLE SUPPORTS AND SS BOLTS

GALVANIZED STEEL GRATING (2)

BEARING BARS: DEPTH T X 3/16" @ 1 3/16" OC

CROSS BARS @ 4" OC

USE STEEL ANGLE SUPPORTS AND BOLTS

GALVANIZE AFTER FABRICATION

GRATING FRAME TABLE

TYPE	GRATING DEPTH T	FRAME ANGLE	TYPE	GRATING DEPTH T	FRAME ANGLE
1	1"	1 3/4" X 1 1/4" X 1/4"	5	2"	*2 1/2" X 2 1/2" X 1/2"
2	1 1/4"	2" X 1 1/2" X 1/4"	6	2 1/4"	2 1/2" X 2 1/2" X 1/4"
3	1 1/2"	1 3/4" X 1 3/4" X 1/4"	7	2 1/2"	3" X 2 1/2" X 1/2"
4	1 3/4"	2" X 2" X 1/4"	8		

GRATING OF DEPTH T AS NOTED ON DRAWINGS SHALL BE AS SPECIFIED HEREIN

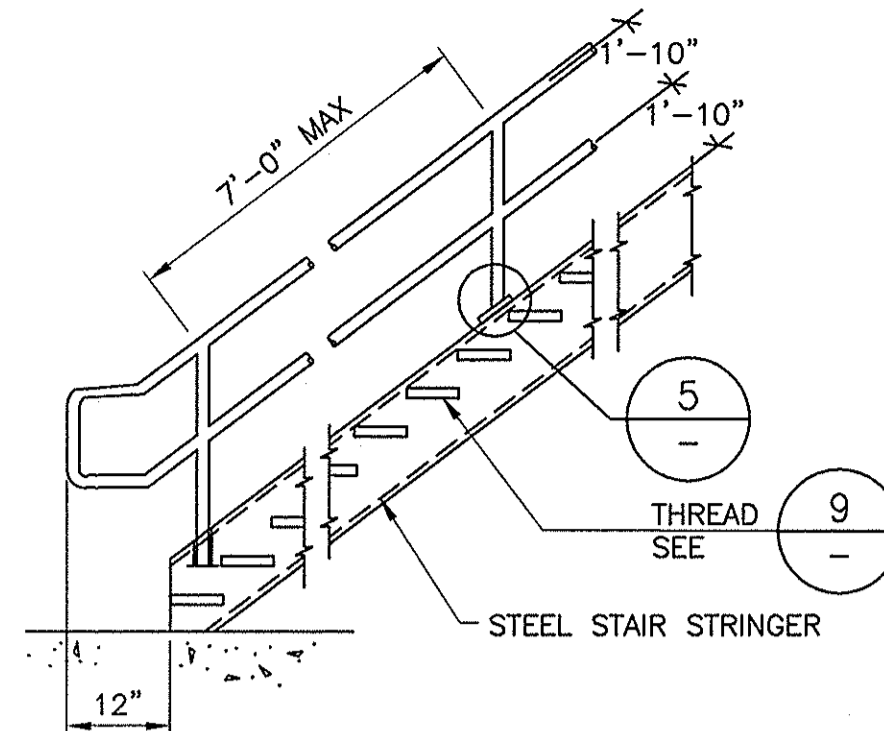
ALL ENDS AND OPENINGS SHALL BE Banded

ALL GRATINGS SHALL BE SECURED IN PLACE WITH REMOVABLE FASTENERS, SEE DETAIL

WEIGHT OF GRATING SECTION SHALL NOT EXCEED 80 LBS

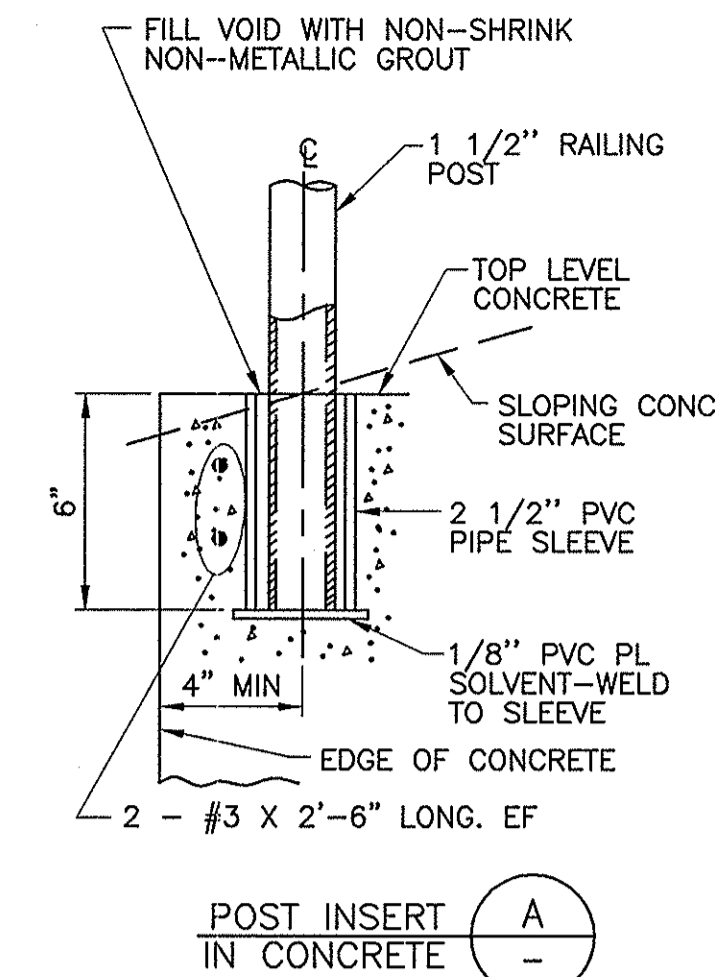
(6)

* OR USE 2 1/2X2 1/2X1/4 W/ 1/4" SHIM PLATE WELDED TO BOTTOM

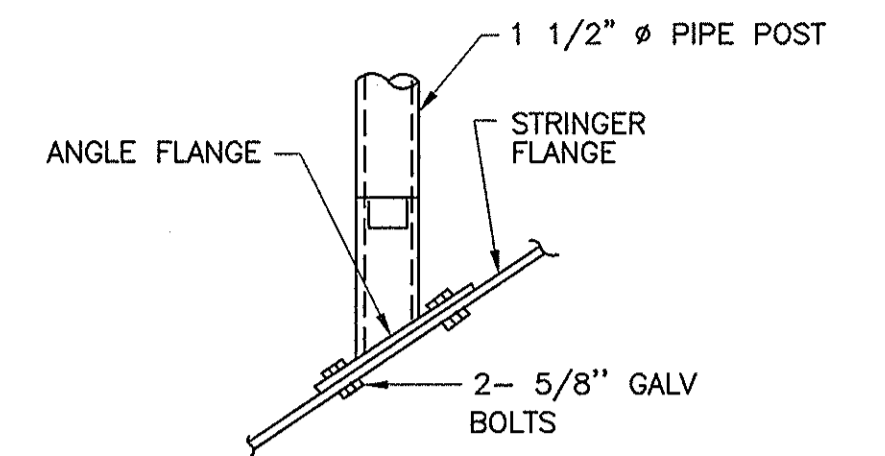


GALVANIZED STEEL RAILING (3)

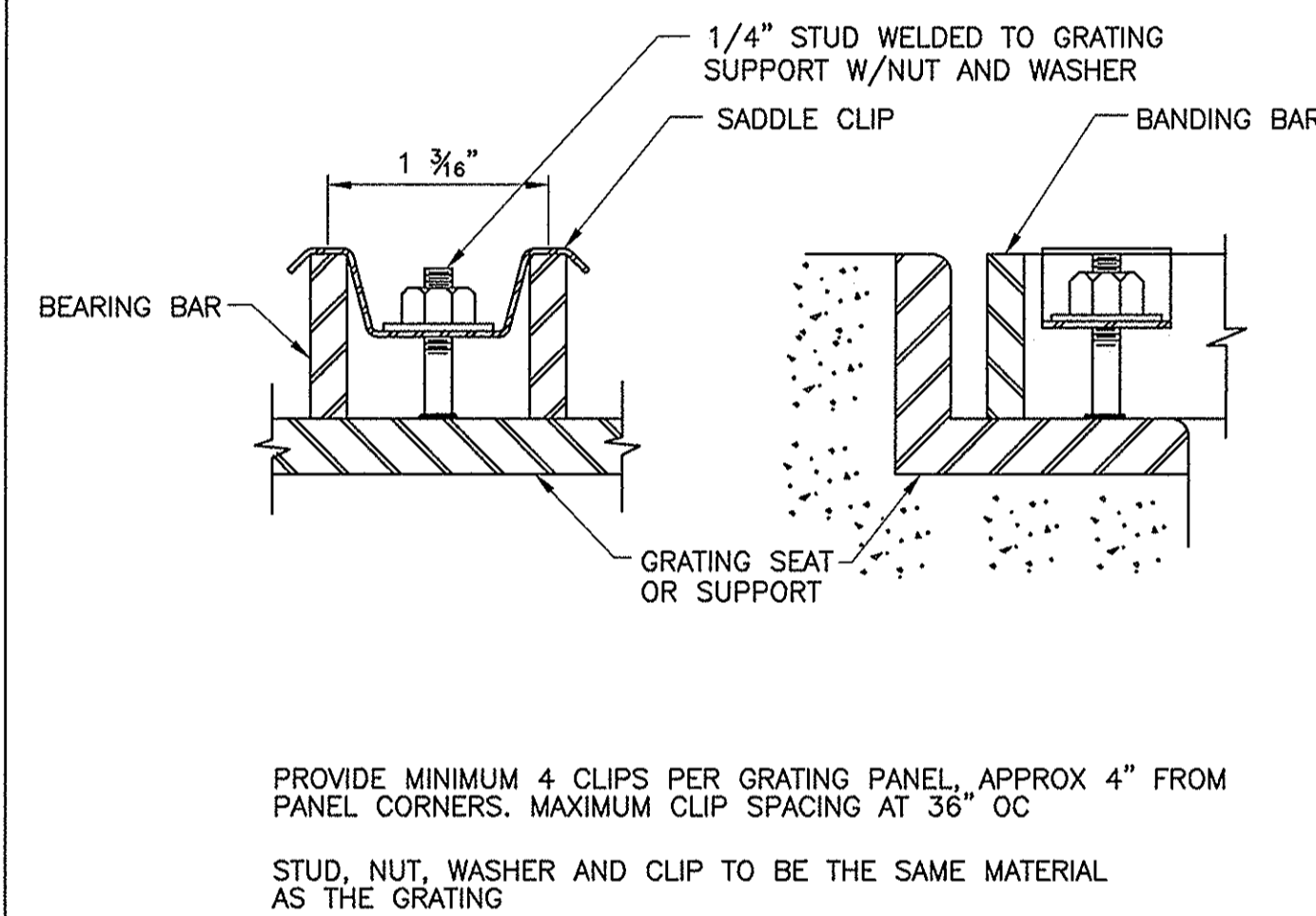
1 1/2" SCHEDULE 40 STANDARD PIPE RAILING AND POSTS GALVANIZED AFTER FABRICATION.



RAILING, GUARDRAIL AND HANDRAIL SUPPORT DETAILS (4)

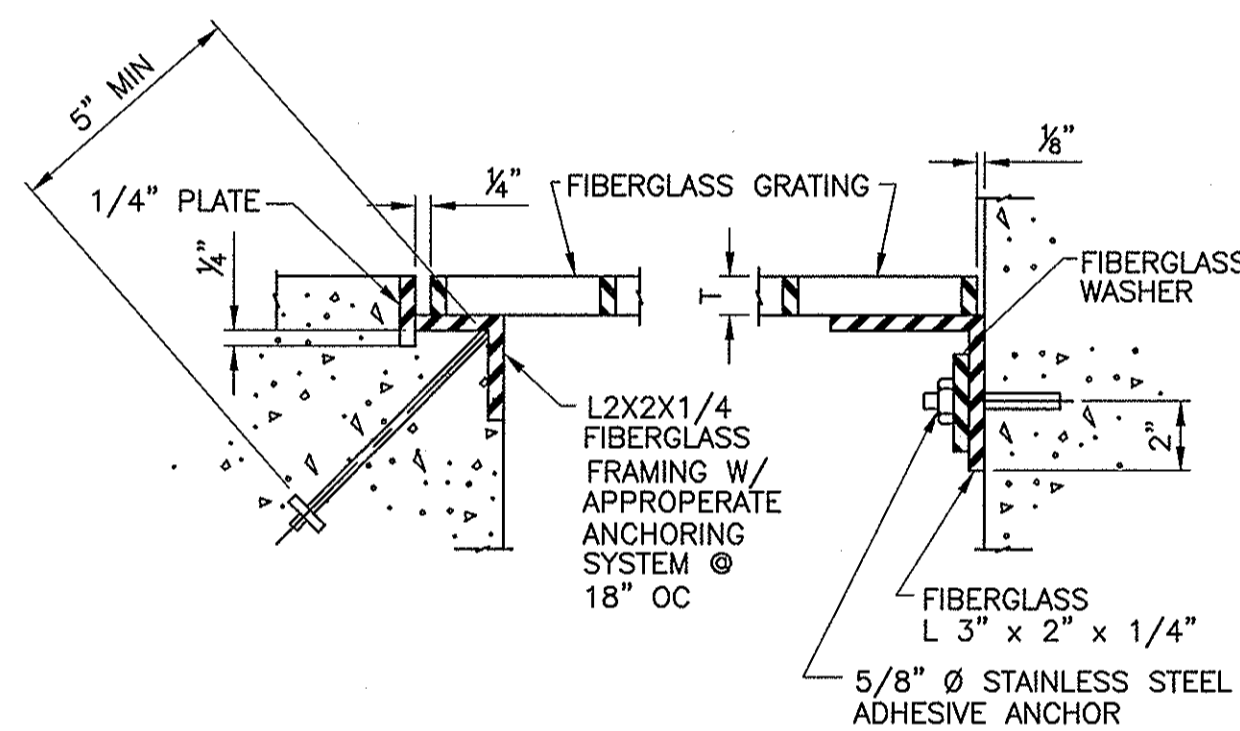


HANDRAIL POST DETAILS (5)

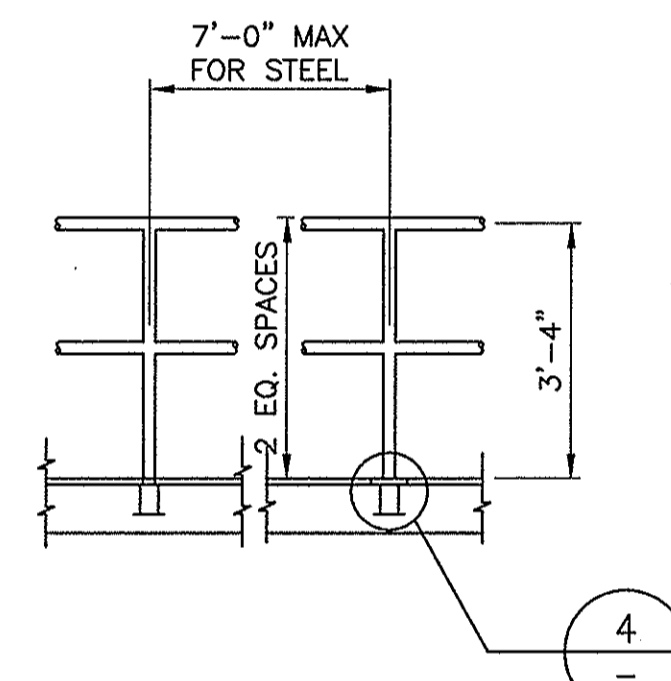


GRATING ANCHOR DETAIL (6)

- NOTES:
- ALL CUT EDGES SHALL BE SEALED WITH RESIN
 - ALL GRATING SHALL BE SECURED IN PLACE WITH REMOVABLE FASTENERS SIMILAR TO DETAIL
 - BONDING: USE EPOXY ADHESIVE BONDING AGENT
 - WEIGHT OF EACH SECTION OF GRATING SHALL NOT EXCEED 60 POUNDS
 - ALL FRAME COMPONENTS SHALL BE FIBERGLASS
 - AT THE CONTRACTOR'S OPTION SPECIFICALLY DESIGNED PROTRUDED EMBEDDED FRAMES SHALL BE SUBMITTED FOR ACCEPTANCE BY THE ENGINEER.
 - T TO BE DETERMINED BY GRATING MFR

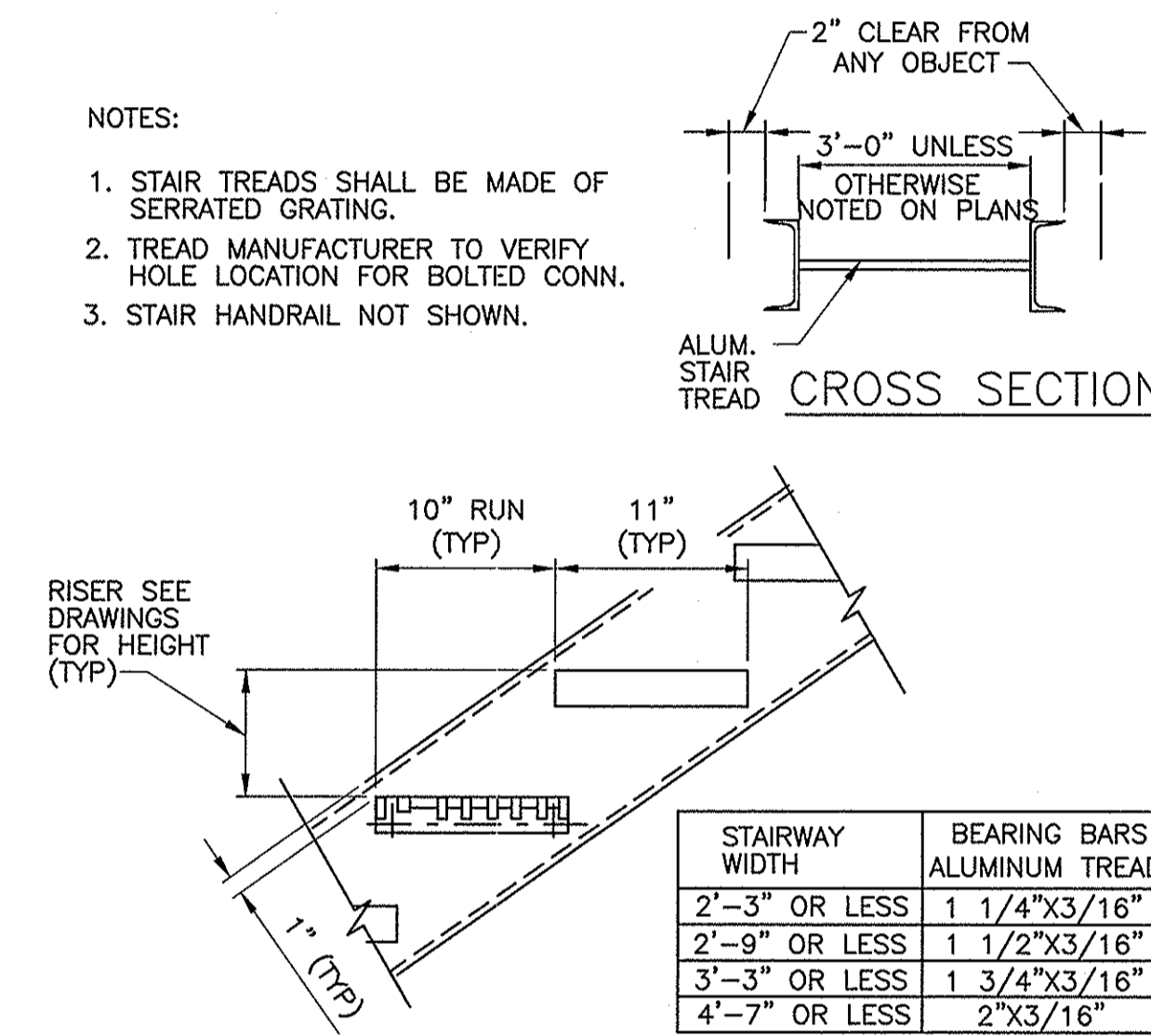


FIBERGLASS GRATING DETAILS (7)

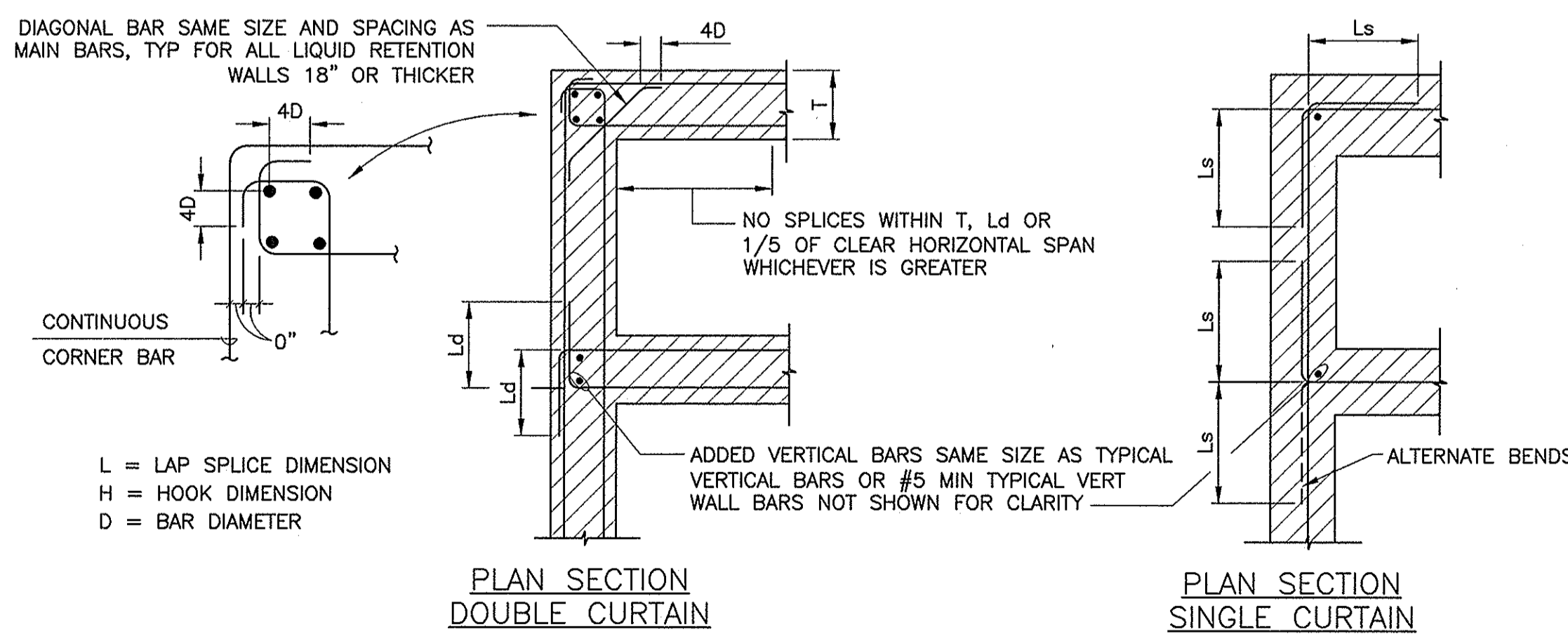


GALVANIZED STEEL RAILING (8)

1 1/2" SCHEDULE 40 STANDARD PIPE RAILING AND POSTS GALVANIZED AFTER FABRICATION.



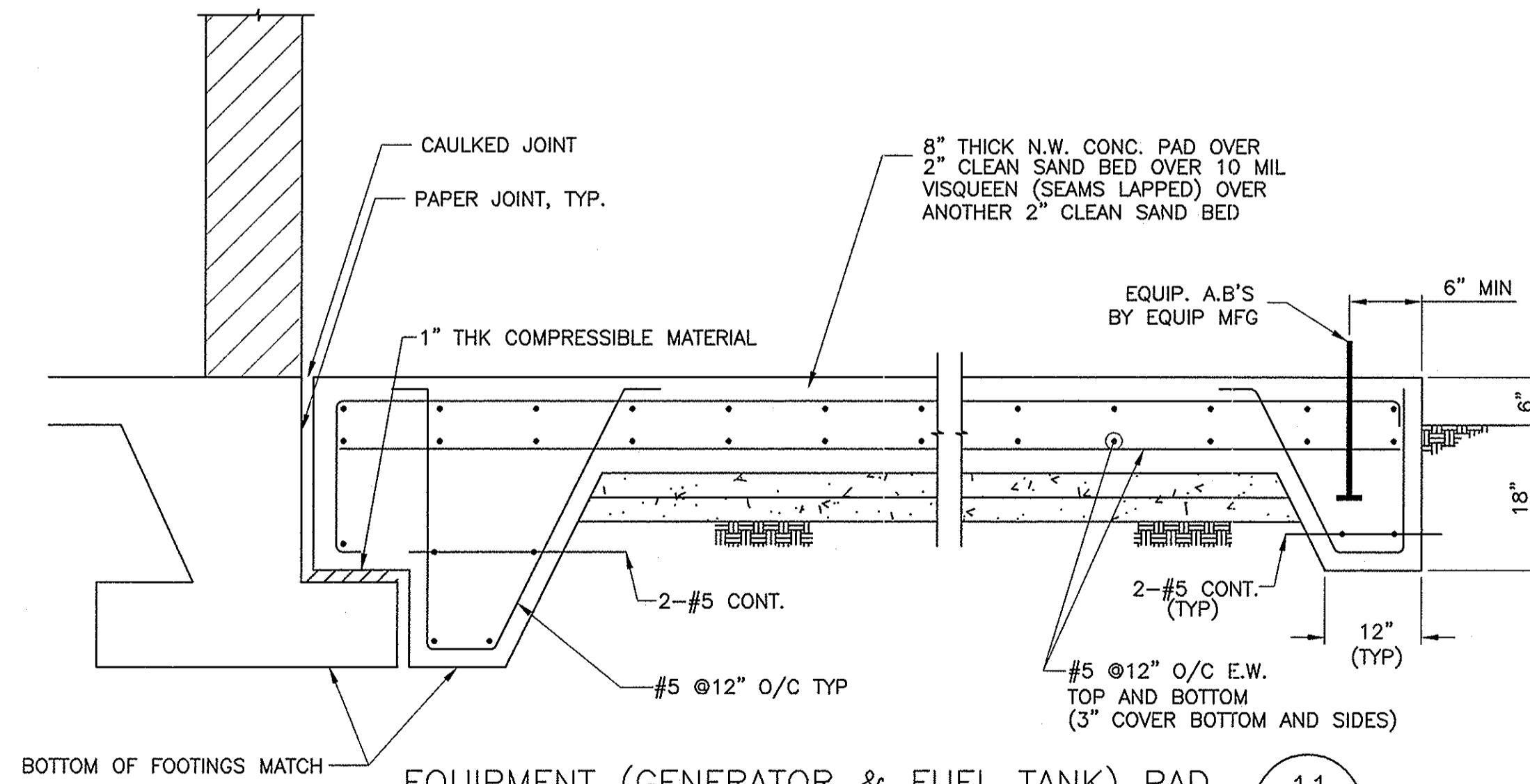
STAIR DETAIL (9)



TYPICAL MASONRY WALL CORNER AND INTERSECTING DETAILS (10)

MASONRY LAP SPLICE SCHEDULE

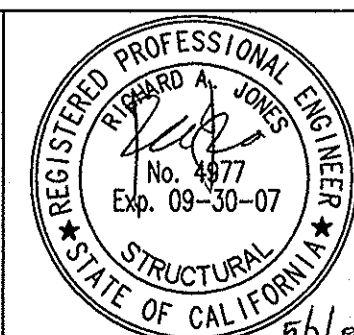
BAR SIZE	Ld (inch)	Ls (inch)
#3	18	23
#4	24	31
#5	30	39
#6	36	47
#7	42	55
#8	48	62
#9	54	70
#10	60	78
#11	66	86



- NOTES:
- 28-DAY COMPRESSIVE STRENGTH, f'c, SHALL BE NO LESS THAN 3000 PSI
 - REINFORCED STEEL SHALL CONFORM TO ASTM A615 GRADE 60 (Fy=60 KSI)
 - EQUIPMENT PLAN DIMENSIONS PER PLANS.

ISSUED FOR CONSTRUCTION

PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000



Job No. 723185
Designed RJ
Drawn JV
Checked RJ
Approved JCR
Reg. No.
Date

04/07 EQUIPMENT PAD DETAIL ADDED
Rev Date Description

Benchmark SEE SHEET 1
Scale NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. P. ...
District Engineer

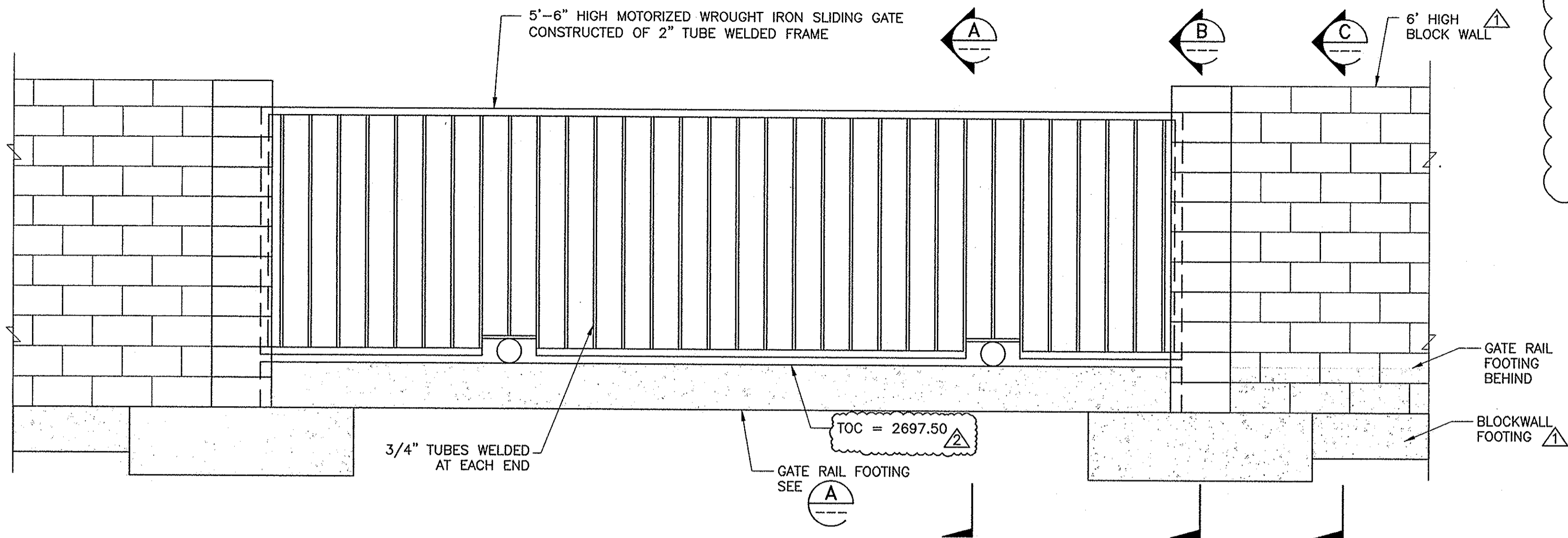
R.C.E. No. 18034

s. kelso
Date

BCVWD - WELL NO. 25
STRUCTURAL STANDARD DETAILS

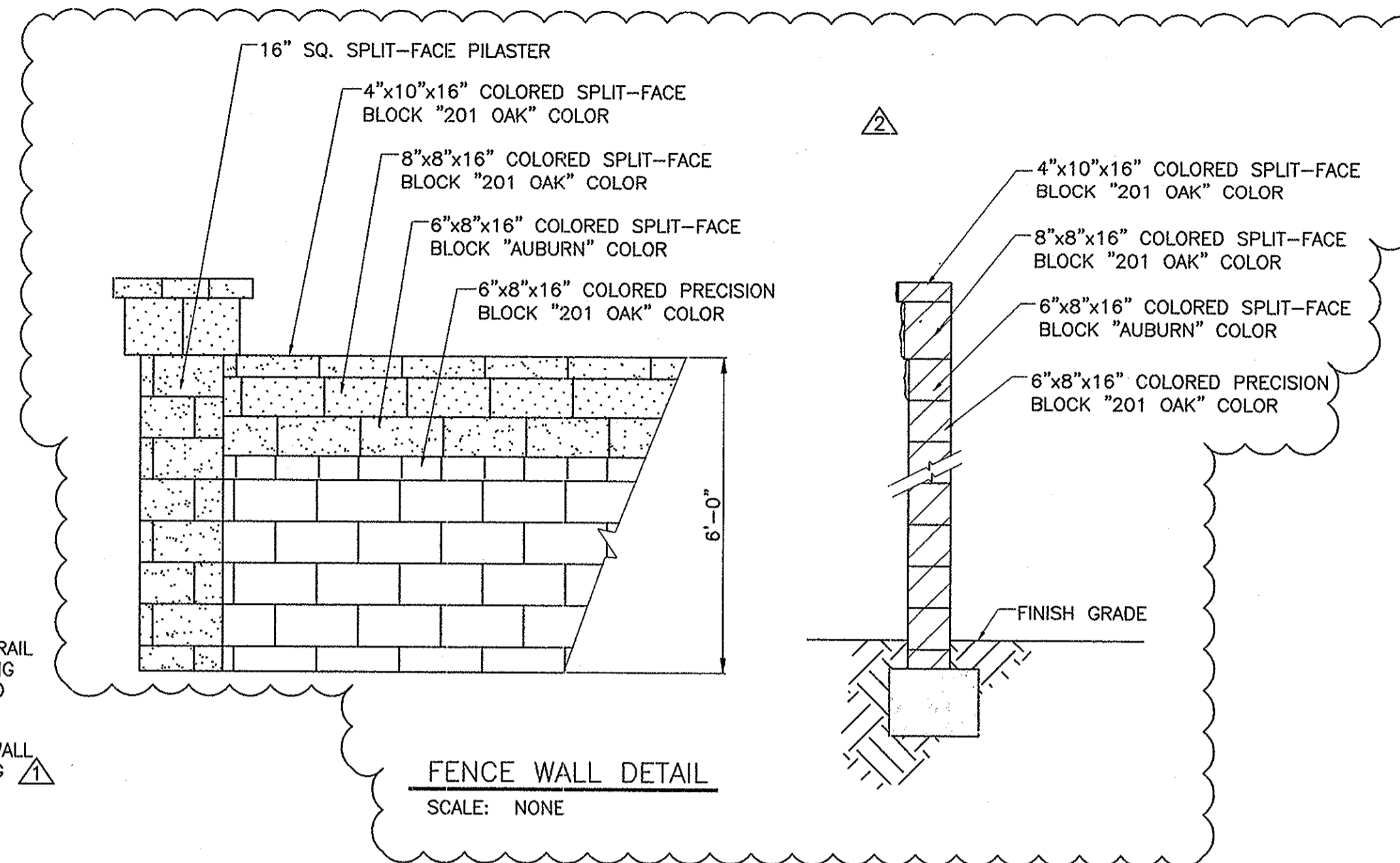
Drawing No. S-2
SHEET 13 OF 39

NOTE:
ALL STRUCTURAL MEMBERS OF GATE
SHALL BE SCH 40 SQUARE TUBES PAINTED
PER SECTION 09900, SYSTEM A.

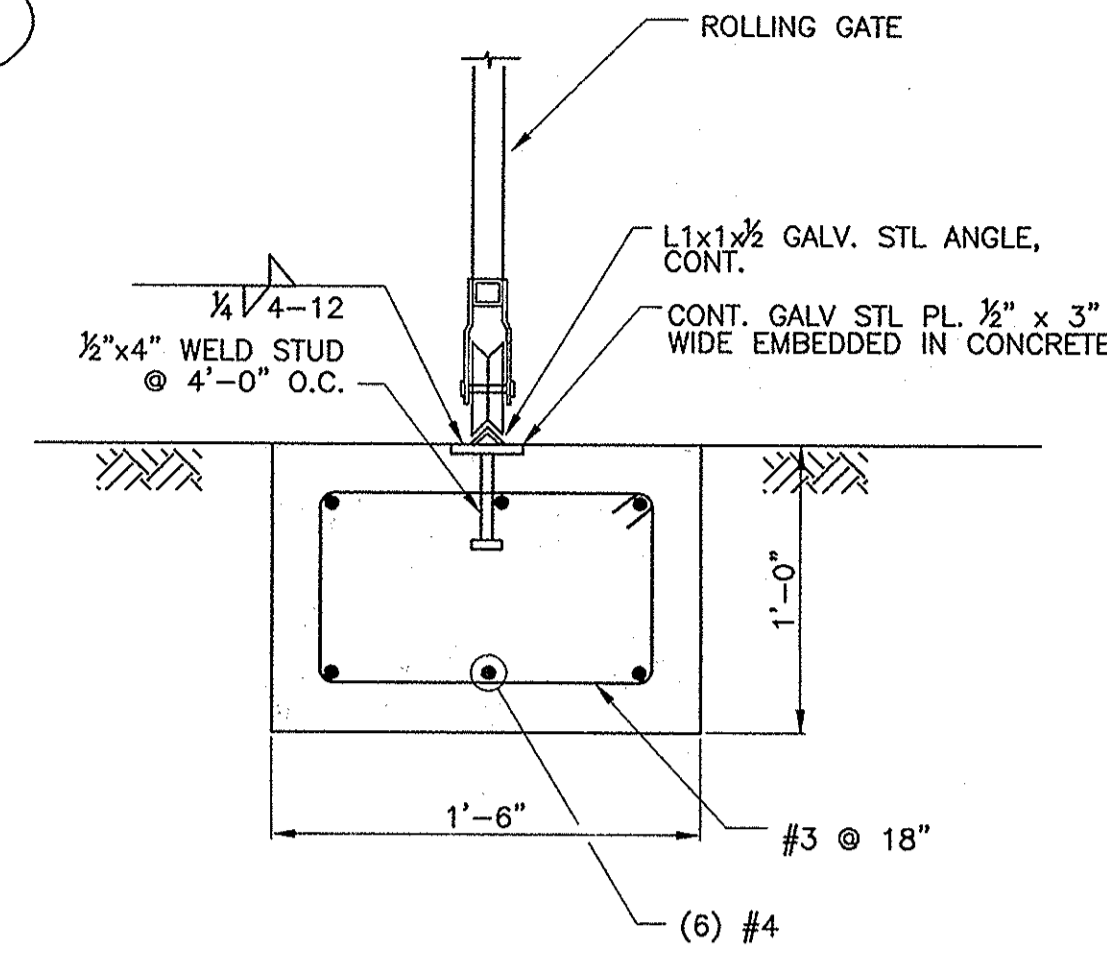


1 GATE EAST ELEVATION
SCALE: NONE

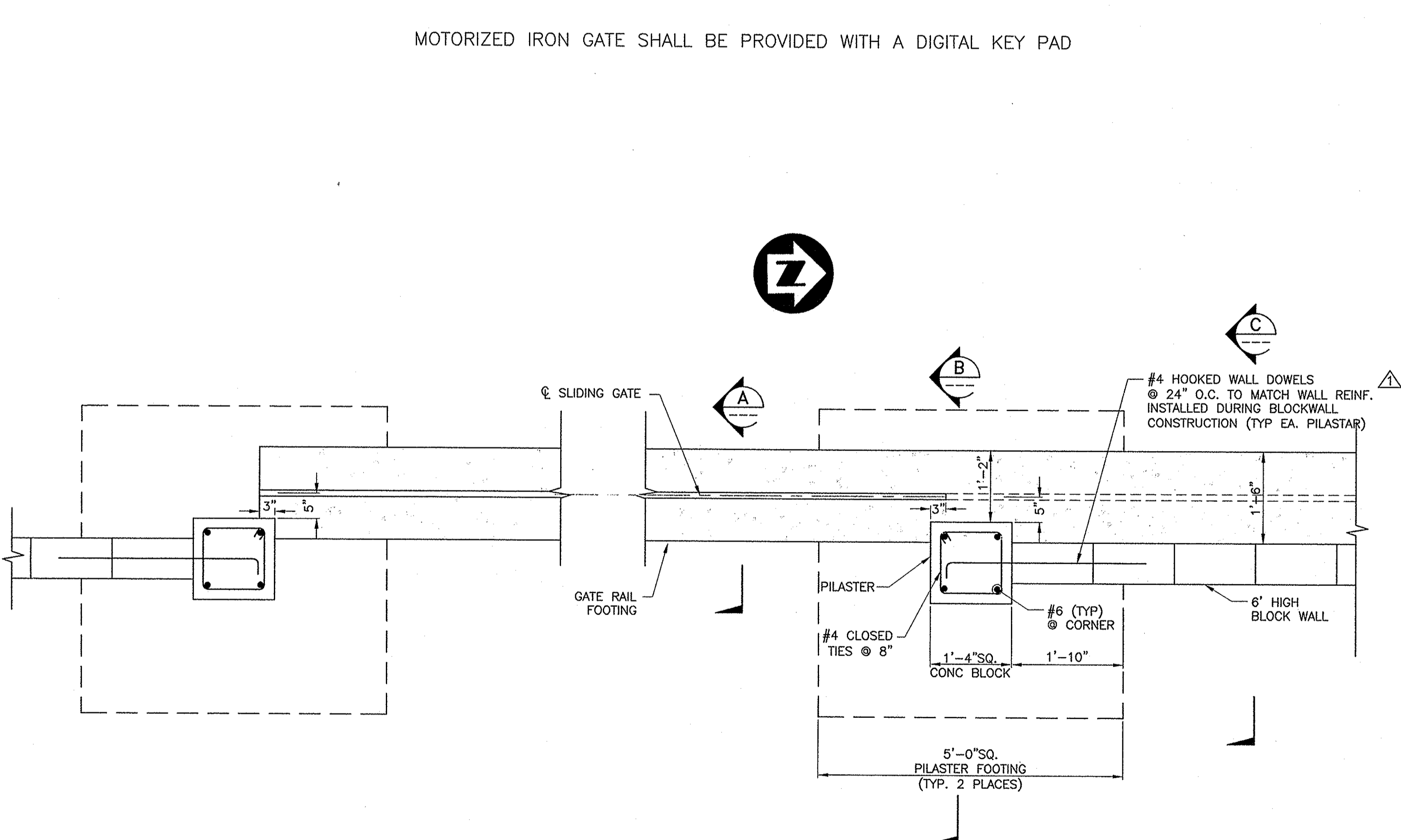
MOTORIZED IRON GATE SHALL BE PROVIDED WITH A DIGITAL KEY PAD



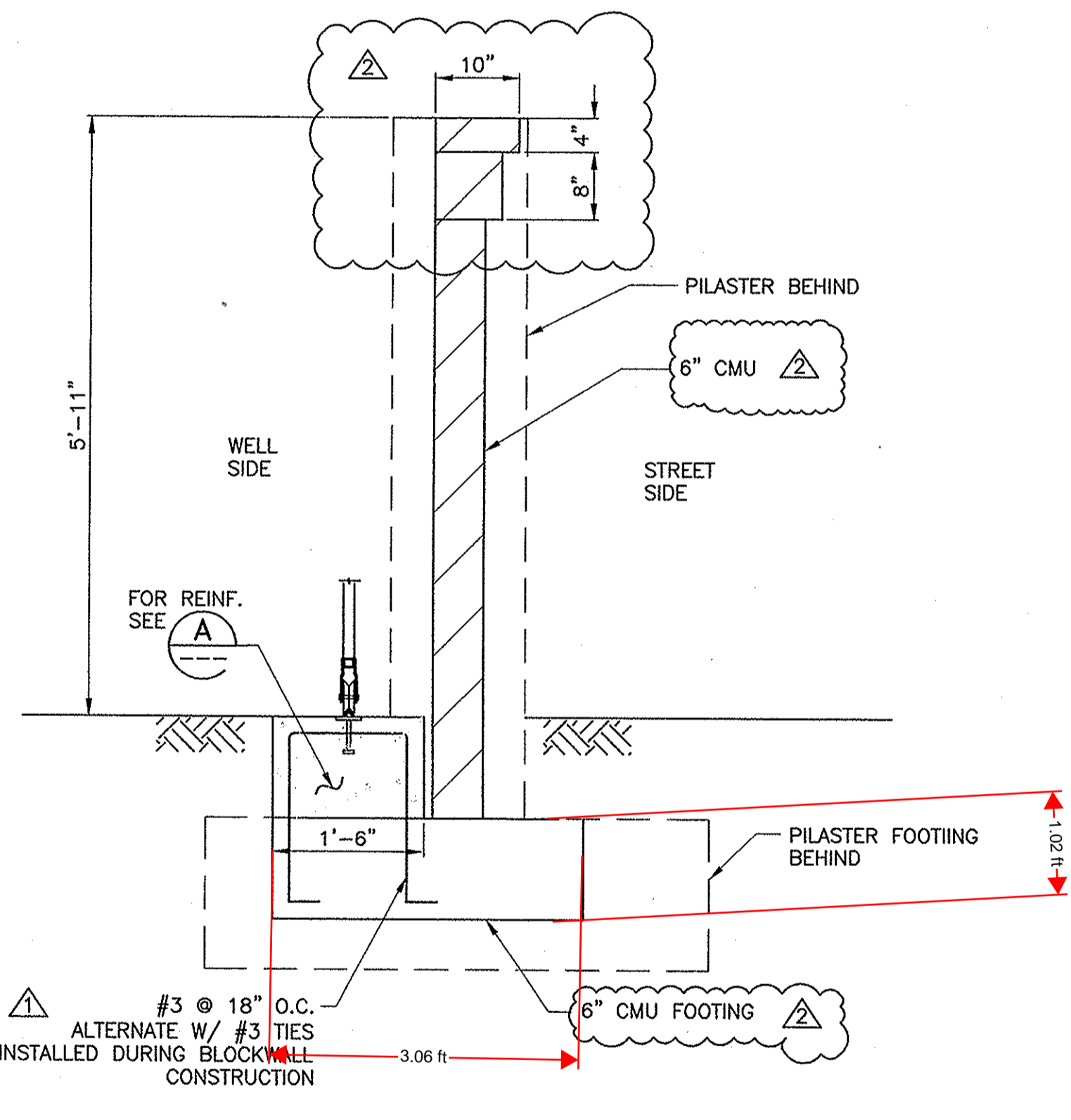
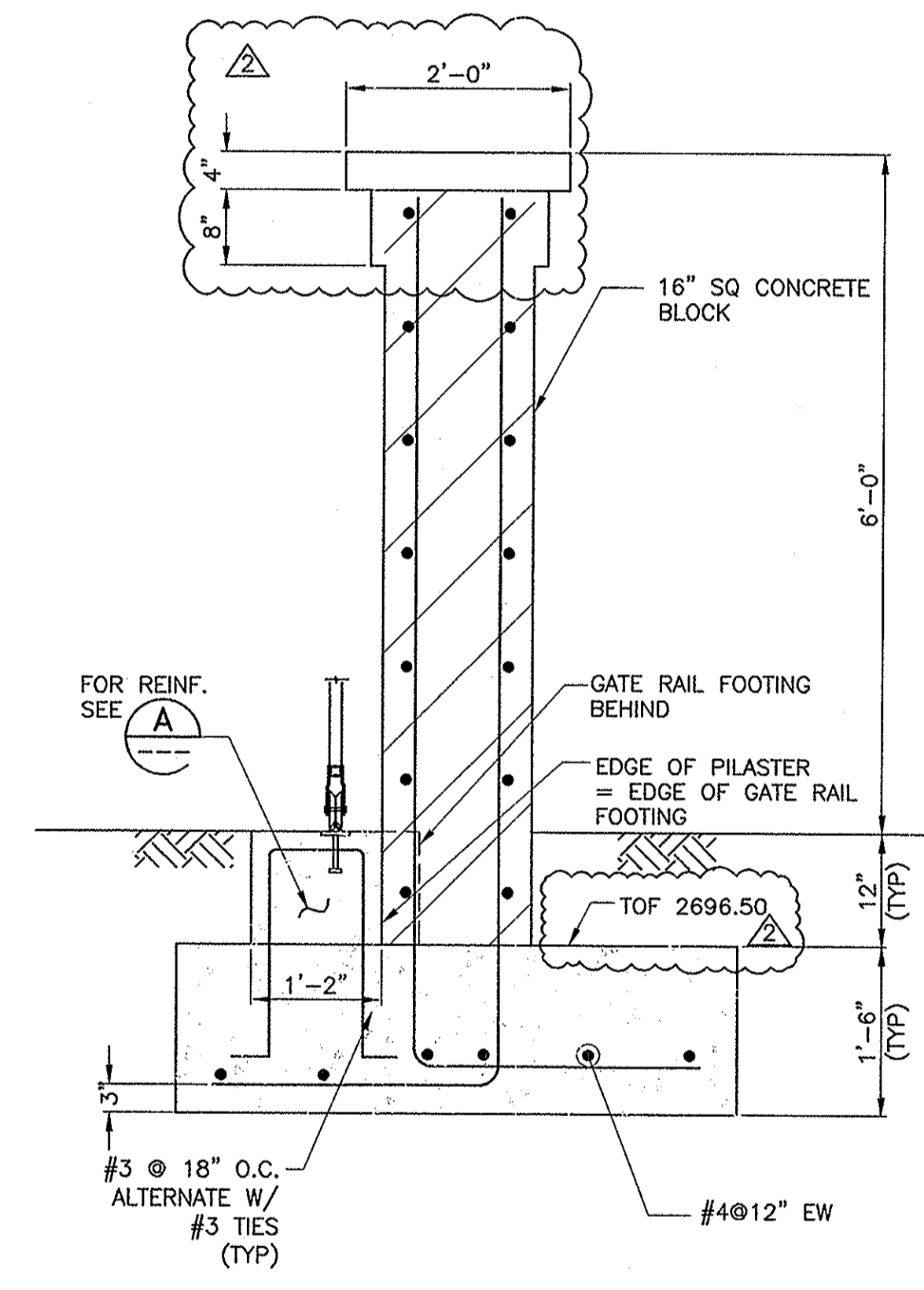
FENCE WALL DETAIL
SCALE: NONE



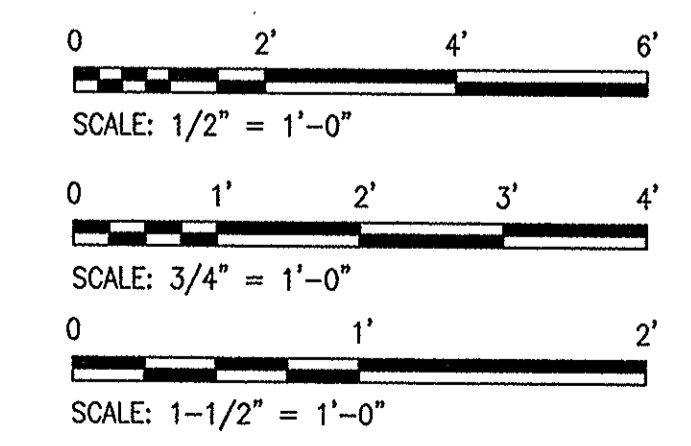
A SECTION
SCALE: 1-1/2" = 1'-0"



2 GATE PLAN VIEW
SCALE: 3/4" = 1'-0"



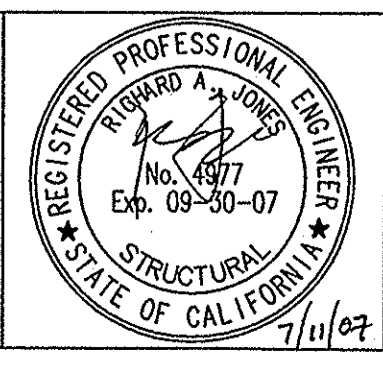
C SECTION
SCALE: 3/4" = 1'-0"



ISSUED FOR CONSTRUCTION

W:\Pasadena Sector\Projects\BCVWD\Well No. 25\CAD\DWG\S-07rev.2.dwg Jul 11, 2007 - 8:28am

PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000



Job No.	723185				
Designed	JV				
Drawn	JV				
Checked	SG				
Approved	JCR				
Reg. No.		7/7	FENCE WALL DETAIL & FOOTING GRADES	SG	
Date		6/7	ADDENDUM NO. 2	SG	

Benchmark	SEE SHEET 1
Scale	AS SHOWN

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. Jones
District Engineer

J. Jones
R.C.E. No. 18034

BCVWD - WELL NO. 25

SLIDING GATE DETAILS

Drawing No. S-7

SHEET 18 OF 39

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER AND CATALOG NO.	ALTERNATE MANUFACTURERS	LAMPS (VA LOAD)	REMARKS	
A 80	4 FOOT PENDANT MOUNTED INDUSTRIAL FLUORESCENT WITH BAKED ENAMEL REFLECTOR	LITHONIA AF10-232-120-GEB10	HUBBELL LIGHTING CROWN SERIES	DAY BRITE	2-F32T8 (70VA)	CHAIN HUNG
B 100	WALL MOUNTED HIGH PRESSURE SODIUM, INTEGRAL PHOTO-CELL	RUUD E8507-1-P-BS	HOLOPHANE	LITHONIA	1-70 WATT HPS (100VA)	
C 80	4 FOOT ENCLOSED FLUORESCENT FIXTURE, FIBERGLASS HOUSING, WET LOCATION.	LITHONIA DMW-2-32-120	HOLOPHANE	DAY BRITE	2-F32T8	CHAIN HUNG
D 2-18	WALL MOUNTED EMERGENCY LIGHT FIXTURE	HOLOPHANE C112N50WHT18-1-A1	LITHONIA	DAY BRITE	2-18W TUNGSTEN	
E 40	2 FOOT FLUORESCENT FIXTURE	LITHONIA WC-2-20-A-120-PRM	HOLOPHANE	DAY BRITE	2-20W	WALL MOUNTED (NOT USED)

LOCATION: ELECTRICAL ROOM

MOUNTING		SURFACE		PANEL		"LP1"		MAIN		125A		
208/120V		VOLTS		3		PHASE		4		WIRE		
A.I.C. RATING		A		B		C		BUS		225A		
LOCATION	VOLT-AMPERES			LTG	REC	MISC	BKR	CIRC	VOLT-AMPERES			LOCATION
ELECT./CHEM. RM LIGHTS		1092		14			20/1	1				CHEMICAL PUMP P-251
ELECT./CHEM. RM RECEPT			1440			8	20/1	3				
PUMP BLDG LIGHTS		516		7			20/1	5				
PUMP BLDG RECEPTACLES	720					4	20/1	7				ELECT. RM. EXHAUST FAN EF-2
DIESEL ENGINE BATTERY CHARGER		500					20/1	9				CHEM. RM. EXHAUST FAN EF-3
WELL PUMP MTR SPACE HTR			400			1	20/1	11				MOTOR & PUMP
CONTROL PNL. UPS	250						20/1	13				BLOWER MOTOR
IRRIGATION CONTROL PNL.		300					20/1	15				FIT-253
SUMP PUMP CP			2000				40/1	17				GATE OPENER
VT-25							20/1	19				CHEMICAL PUMP P-252
SPARE							20/1	21				SPACE
WELL PUMP CONT. PNL			500				20/1	23				SPACE
SPARE							20/1	25				SPACE
SPACE								27				SPACE
SPACE								29				SPACE
								31				
								33				
								35				
								37				
								39				
								41				
								42				
WATTS	PHASE A =	2160		PHASE B =	3350		PHASE C =	5580				
TOTAL VA =	11090		AMPS =	30.78								

ELECTRICAL SYMBOLS

SINGLE LINE DIAGRAMS	ELEMENTARY & CONTROL WIRING DIAGRAMS	PLANS																																																																					
KILOWATT HOUR METER CURRENT TRANSFORMER 3 - INDICATES NO. OF CIRCUITS UNDERVOLTAGE RELAY POWER TRANSFORMER SEE NOTE 1. FUSE PLUG-IN TYPE EQUIPMENT CIRCUIT BREAKER, 3 POLE UNLESS OTHERWISE INDICATED AF = AMPERE FRAME RATING AT = AMPERE TRIP SETTING MCP = MOTOR CIRCUIT PROTECTOR CONTACTOR OVERLOAD RELAY COMBINATION MOTOR STARTER, CIRCUIT BREAKER AND 2 SPEED MAGNETIC MOTOR STARTER S INDICATES SLOW F INDICATES FAST DISCONNECT SWITCH, 600 VOLT, 3 POLE, UNLESS OTHERWISE INDICATED. MOTOR, 10 HORSEPOWER CONDUIT NUMBER 12. SEE CONDUIT AND WIRING SCHEDULE FOR SIZES AND QUANTITIES OF CONDUIT AND WIRES. GROUND INDICATES TO REFER TO NOTE (1) ON DRAWING ELECTRONIC SOFT START WITH BYPASS CONTACTOR	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NORMALLY OPEN</th> <th>NORMALLY CLOSED</th> <th>DEVICE</th> </tr> <tr> <td></td> <td></td> <td>CONTACT</td> </tr> <tr> <td></td> <td></td> <td>TEMPERATURE ACTUATED SWITCH</td> </tr> <tr> <td></td> <td></td> <td>PUSH BUTTON SINGLE CIRCUIT MOMENTARY CONTACT. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>PUSH BUTTON SINGLE CIRCUIT LOCK-OUT</td> </tr> <tr> <td></td> <td></td> <td>TIMED CONTACT - CONTACT ACTION RETARDED ON ENERGIZATION.</td> </tr> <tr> <td></td> <td></td> <td>TIMED CONTACT - CONTACT ACTION RETARDED ON DE-ENERGIZATION.</td> </tr> <tr> <td></td> <td></td> <td>PILOT LIGHT, Y=YELLOW, R=RED, A=AMBER, B=BROWN, W=WHITE, G=GREEN. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>GROUND</td> </tr> <tr> <td></td> <td></td> <td>FUSE. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>TWO POSITION SELECTOR SWITCH. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>THREE POSITION SELECTOR SWITCH. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>RELAY. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>STARTER COIL. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>SOLID STATE RELAY. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>TIME DELAY RELAY. SEE NOTE 2.</td> </tr> <tr> <td></td> <td></td> <td>MOTOR STARTER OVERLOAD RELAY CONTACTS</td> </tr> <tr> <td></td> <td></td> <td>ON-OFF SWITCH, SPACE HEATERS. (LOCATED AT MOTOR UNLESS OTHERWISE NOTED.)</td> </tr> <tr> <td></td> <td></td> <td>TERMINAL AT WELL PUMP CONTROL PANEL</td> </tr> <tr> <td></td> <td></td> <td>TERMINAL AT MOTOR CONTROL CENTER</td> </tr> <tr> <td></td> <td></td> <td>TERMINAL AT A FIELD MOUNTED DEVICE</td> </tr> <tr> <td></td> <td></td> <td>FIELD WIRING</td> </tr> <tr> <td></td> <td></td> <td>INDICATES TO REFER TO NOTE (1) ON DRAWING</td> </tr> </table> <p>NOTES: (ELECTRICAL SYMBOLS)</p> <ol style="list-style-type: none"> POWER TRANSFORMERS SHALL BE DRY TYPE 480-208/120 VOLTS, 3 PHASE, 4 WIRE UNLESS OTHERWISE INDICATED. LOCATED IN OR ON MOTOR CONTROL CENTER UNLESS OTHERWISE INDICATED. ELECTRICAL SYMBOLS SHOWN ARE TYPICAL AND MAY OR MAY NOT BE USED ON THIS PROJECT. 	NORMALLY OPEN	NORMALLY CLOSED	DEVICE			CONTACT			TEMPERATURE ACTUATED SWITCH			PUSH BUTTON SINGLE CIRCUIT MOMENTARY CONTACT. SEE NOTE 2.			PUSH BUTTON SINGLE CIRCUIT LOCK-OUT			TIMED CONTACT - CONTACT ACTION RETARDED ON ENERGIZATION.			TIMED CONTACT - CONTACT ACTION RETARDED ON DE-ENERGIZATION.			PILOT LIGHT, Y=YELLOW, R=RED, A=AMBER, B=BROWN, W=WHITE, G=GREEN. SEE NOTE 2.			GROUND			FUSE. SEE NOTE 2.			TWO POSITION SELECTOR SWITCH. SEE NOTE 2.			THREE POSITION SELECTOR SWITCH. SEE NOTE 2.			RELAY. SEE NOTE 2.			STARTER COIL. SEE NOTE 2.			SOLID STATE RELAY. SEE NOTE 2.			TIME DELAY RELAY. SEE NOTE 2.			MOTOR STARTER OVERLOAD RELAY CONTACTS			ON-OFF SWITCH, SPACE HEATERS. (LOCATED AT MOTOR UNLESS OTHERWISE NOTED.)			TERMINAL AT WELL PUMP CONTROL PANEL			TERMINAL AT MOTOR CONTROL CENTER			TERMINAL AT A FIELD MOUNTED DEVICE			FIELD WIRING			INDICATES TO REFER TO NOTE (1) ON DRAWING	<p>--- CONDUIT RUN CONCEALED UNDER SLAB OR BELOW GRADE. (CONCEALED IN SLAB WHERE SO NOTED OR WHERE ALLOWED PER SPECIFICATIONS).</p> <p>--- CONDUIT RUN EXPOSED UNLESS OTHERWISE NOTED</p> <p>--- HASH MARKS INDICATE QUANTITY OF #12 WIRES IN CONDUIT (PLUS 1#12 GROUND WIRE) EXCEPT NO HASH MARKS = 3/4"C, 2#12 (PLUS 1#12 GROUND WIRE) UNLESS OTHERWISE NOTED.</p> <p>--- 3/4"C, 3#12 --- 1"C, 6#12 --- 3/4"C, 4#12 --- 1"C, 7#12 --- 3/4"C, 5#12 --- 1"C, 8#12</p> <p>--- LPI-1,3 --- HOMERUN TO PANEL LPI, CIRCUITS 1 AND 3</p> <p>--- GROUND WIRE</p> <p>--- CONDUIT UP (OUT TOP OF EQUIPMENT)</p> <p>--- CONDUIT DOWN (OUT BOTTOM OF EQUIPMENT)</p> <p>--- CONDUIT STUBBED OUT AND CAPPED</p> <p>--- BRACKET MOUNTED LIGHTING FIXTURE</p> <p>--- FLUORESCENT LIGHTING FIXTURE</p> <p>--- LIGHTING FIXTURE TYPE A, 80 VA LOAD. SEE LIGHTING FIXTURE SCHEDULE FOR QUANTITY AND TYPE OF LAMPS.</p> <p>S SINGLE POLE, SINGLE THROW TOGGLE SWITCH S₃ THREE WAY TOGGLE SWITCH } AT +48" OR AS NOTED S_M MANUAL MOTOR STARTER S₀ OUTLETS SHOWN WITH SUBSCRIPT "0" ADJACENT TO THEM SHALL BE CONTROLLED BY S₀ Ⓧ DUPLEX CONVENIENCE RECEPTACLE AT +18" OR AS NOTED</p> <p>Ⓧ THERMOSTAT OUTLET AT +54"</p> <p>Ⓧ JUNCTION BOX, MOUNTED ON WALL</p> <p>Ⓧ JUNCTION BOX, SIZE AS REQUIRED BY CODE</p> <p>Ⓧ CONTROL DEVICE P = PRESSURE SWITCH ZS = LIMIT SWITCH L = LEVEL SWITCH V = CONTROL VALVE</p> <p>Ⓧ CONTROL STATION: PUSHBUTTON STATION OR SELECTOR SWITCH. SEE ELEMENTARY WIRING DIAGRAMS FOR REQUIREMENTS.</p> <p>Ⓧ MOTOR</p> <p>Ⓧ GROUND WELL</p> <p>Ⓧ DISCONNECT SWITCH. REFER TO SINGLE LINE DIAGRAM FOR SIZE</p> <p>Ⓧ CONDUIT NUMBER 12. SEE CONDUIT AND WIRING SCHEDULE FOR SIZES AND QUANTITIES OF CONDUIT AND WIRES.</p> <p>+12" INDICATES HEIGHT FROM FINISHED FLOOR OR GRADE TO CENTERLINE OF DEVICE.</p> <p>W.P. WEATHERPROOF. PROVIDE GASKETS AS REQUIRED</p> <p>C.O. CONDUIT ONLY</p> <p>Ⓧ SV PROCESS OR INSTRUMENTATION DEVICE. SEE PROCESS AND INSTRUMENTATION DRAWINGS FOR DESCRIPTIONS.</p> <p>Ⓧ INDICATES TO REFER TO NOTE (1) ON DRAWING</p> <p>--- CONDUIT SEAL</p>
NORMALLY OPEN	NORMALLY CLOSED	DEVICE																																																																					
		CONTACT																																																																					
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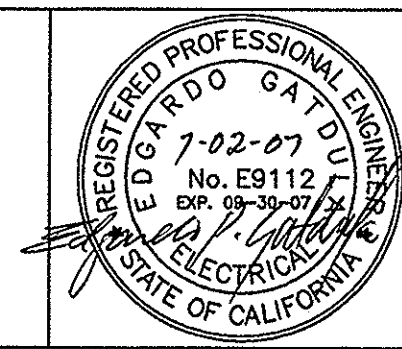
ABBREVIATIONS

A AMPERE	HPS HIGH PRESSURE SODIUM	N.C. NORMALLY CLOSED
AT AMP TRIP	IC INTERRUPTING CAPACITY	N.O. NORMALLY OPEN
AF AMP FRAME	KV KILOVOLTS	NO. NUMBER
BC BYPASS CONTACTOR	kcml THOUSAND CIRCULAR MIL	REC RECEPTACLE
BKR BREAKER	LCL LONG CONTINUOUS LOAD	RVAT REDUCED VOLTAGE AUTOTRANSFORMER
C.O. CONDUIT ONLY	LOS LOCK OUT STOP	V VOLTS
CKT CIRCUIT	LTG LIGHTING	WP WEATHERPROOF
HP HORSEPOWER	MCC MOTOR CONTROL CENTER	S/D SHUT DOWN
	MS MOTOR STARTER	

ISSUED FOR CONSTRUCTION

W:\Pasadena Sector\Projects\BCVWD\Well No. 25 CAD\DWG\E-01rev.1.dwg Jun 29, 2007 - 1:48pm

PARSONS
 100 WEST WALNUT STREET
 PASADENA, CALIFORNIA 91124
 (626) 440-4000



Job No. 723185
 Designed EG
 Drawn JV
 Checked EG
 Approved JCR
 Reg. No. _____
 Date _____

Rev	Date	Description
1	06/19/07	REVISED AS NOTED

Benchmark
 SEE SHEET 1
 Scale
 NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
 RIVERSIDE COUNTY, CALIFORNIA

J. V. JCR
 District Engineer

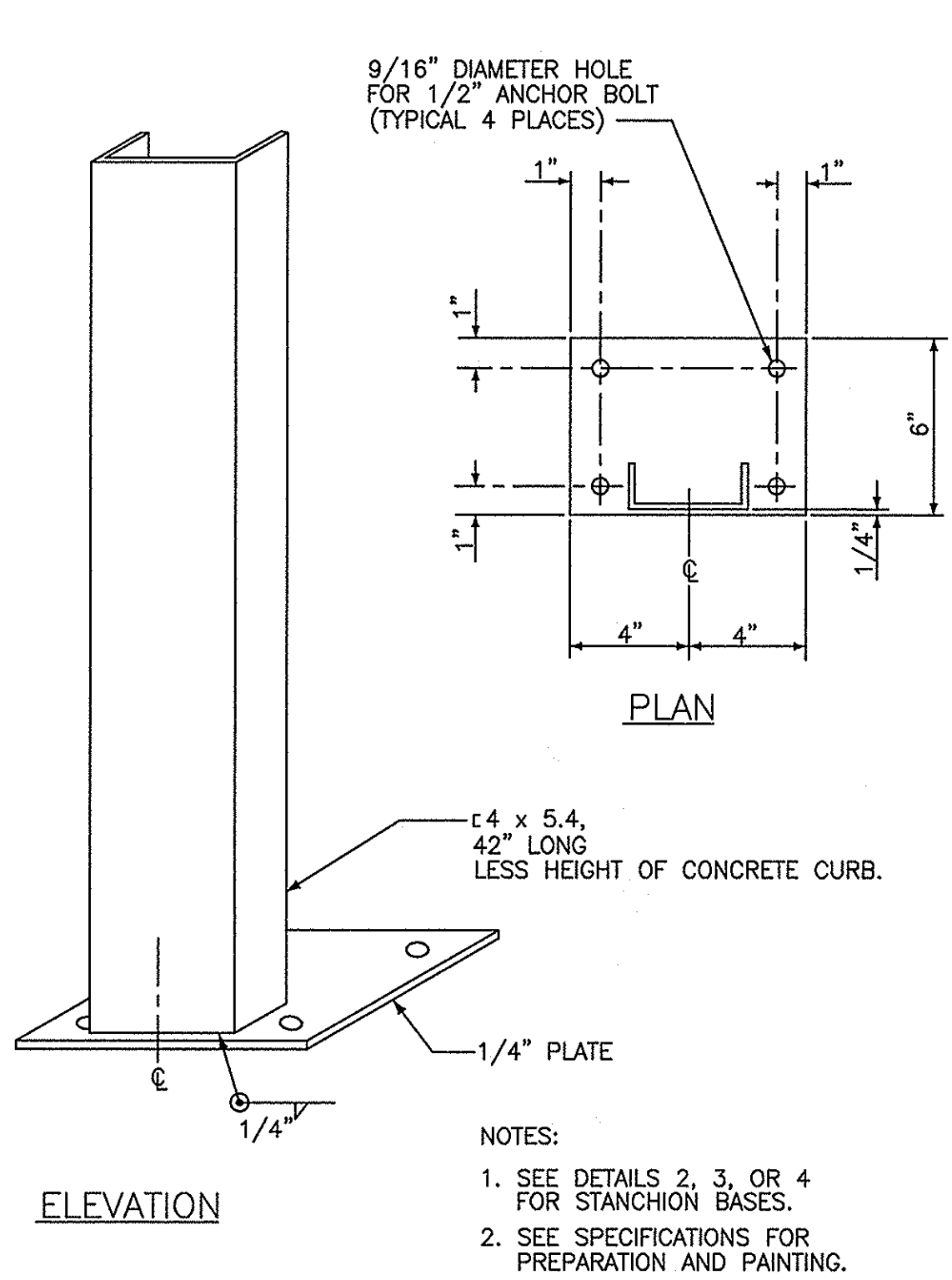
R.C.E. No. 18034

J. V. JCR
 Date

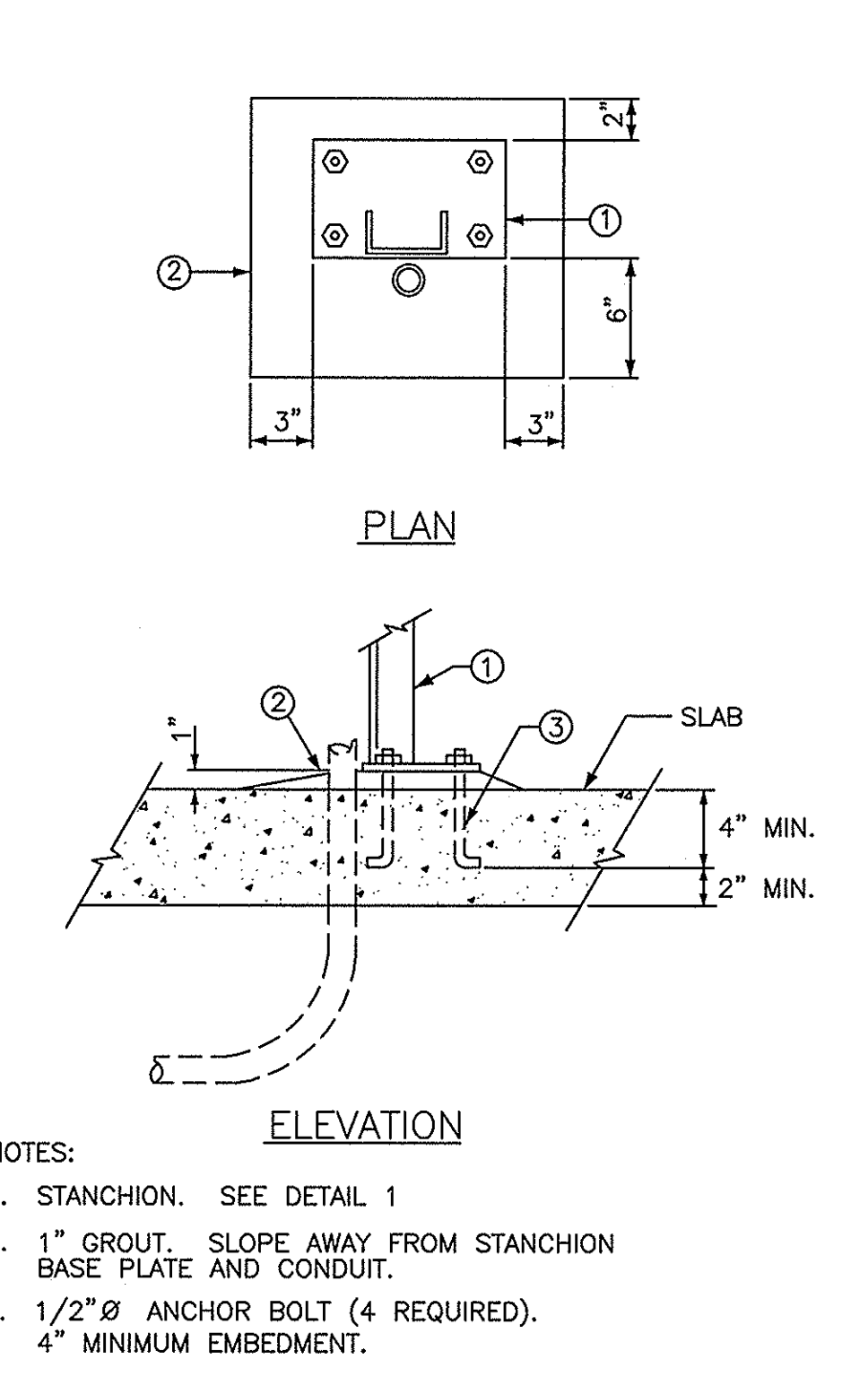
ELECTRICAL SYMBOLS AND SCHEDULES

Drawing No. E-1A

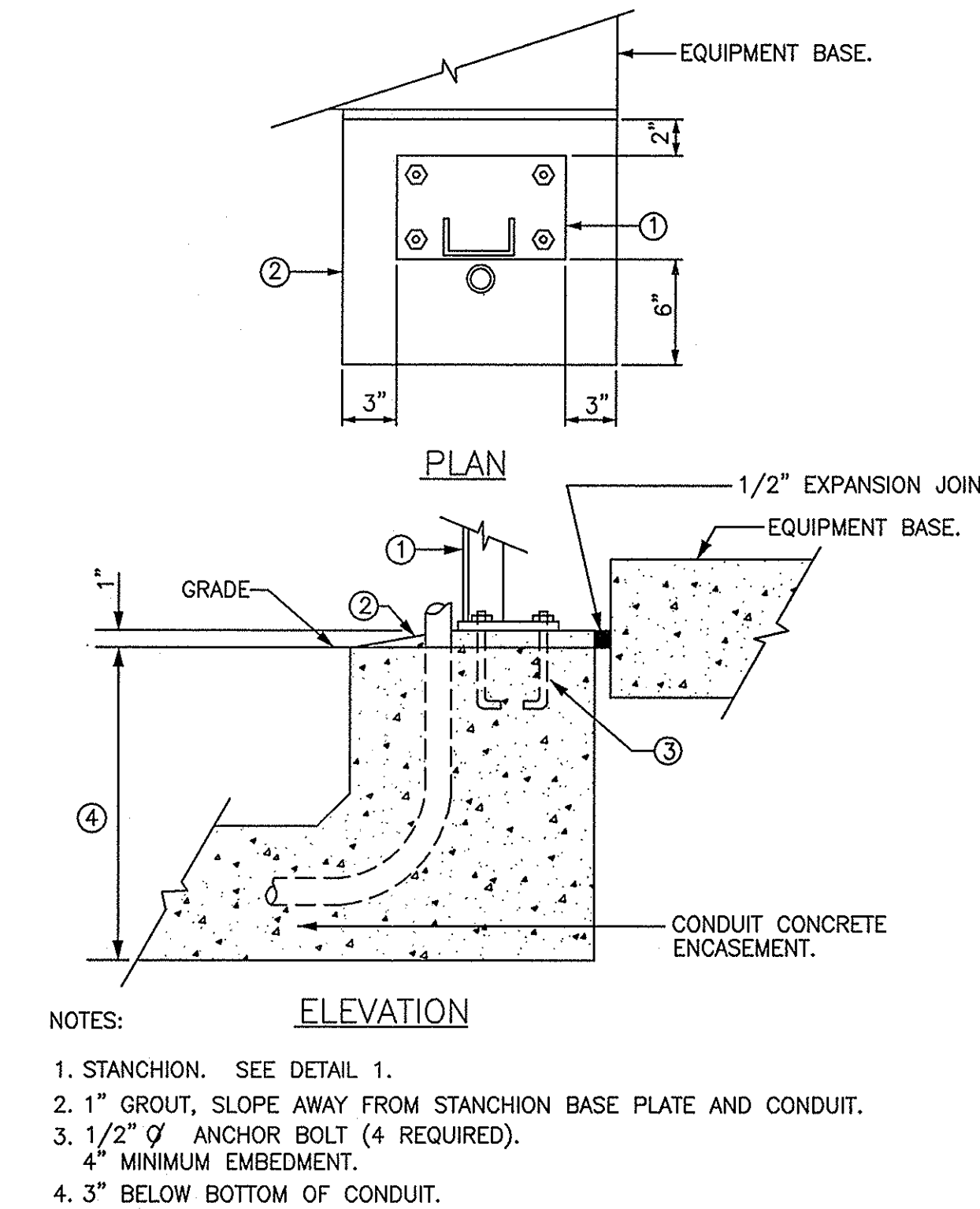
SHEET 30 of 39



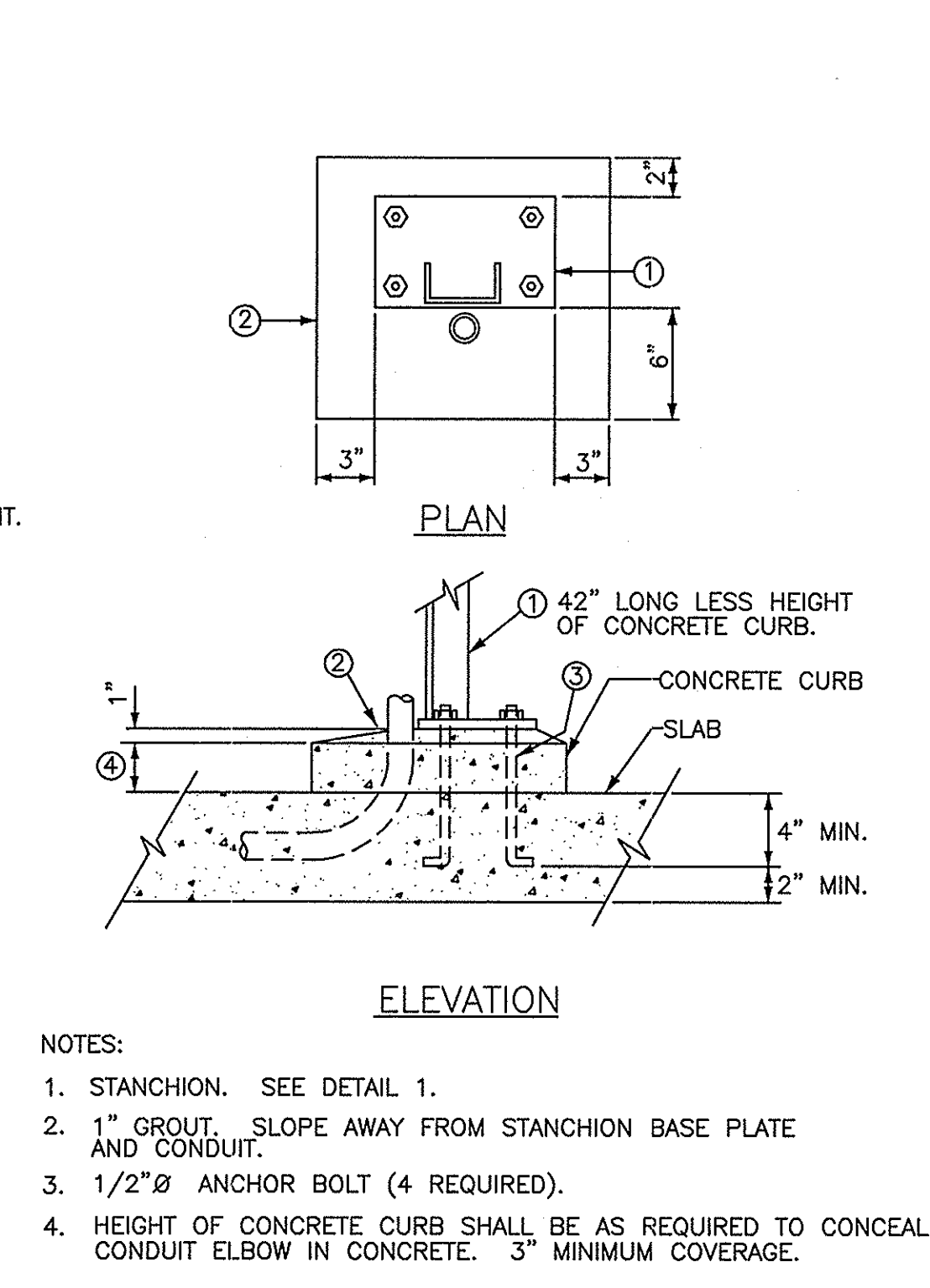
1 STANCHION DETAIL
N.T.S.



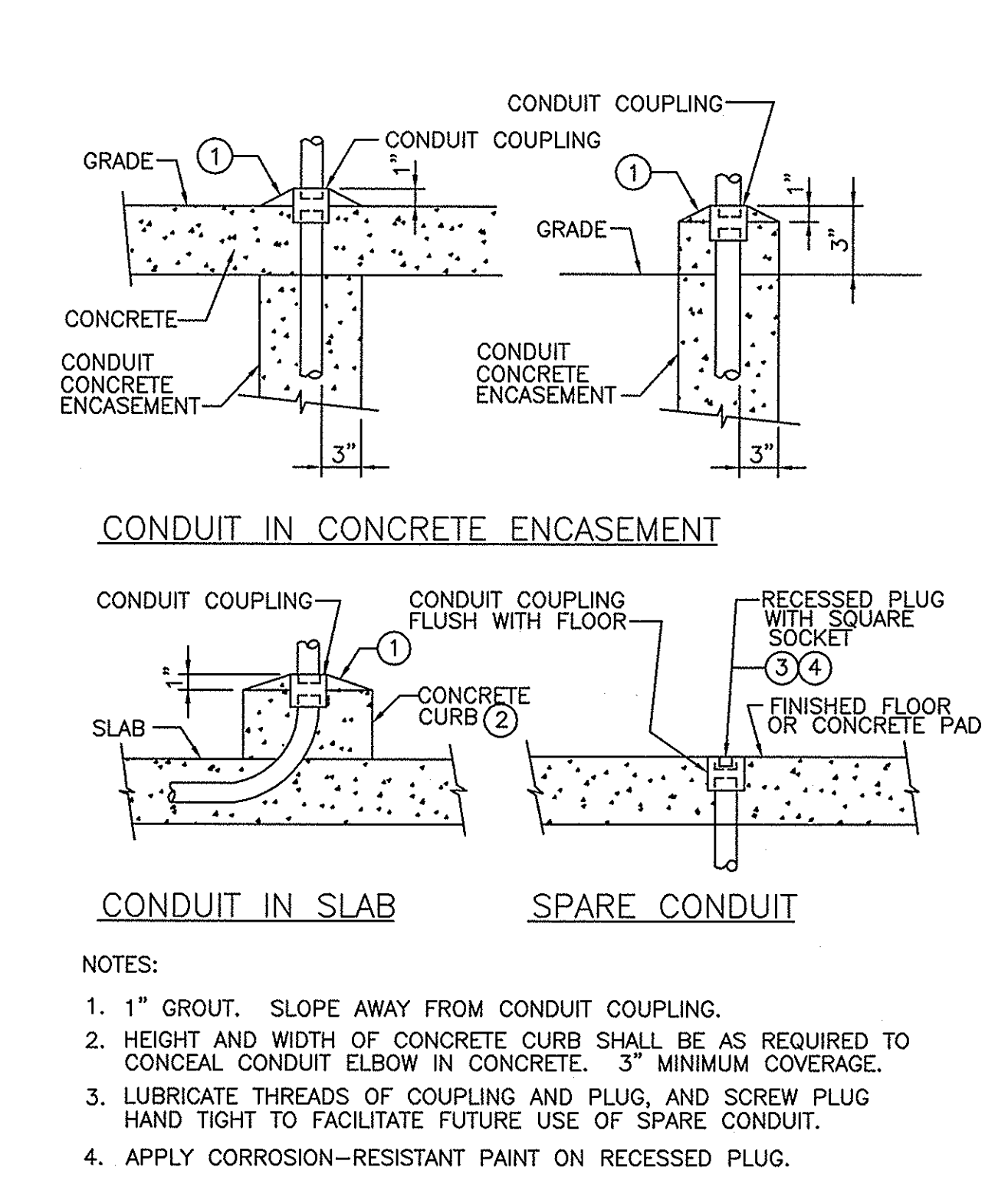
2 STANCHION BASE DETAIL
STANCHION MOUNTED ON SLAB
INDEPENDENT OF SLAB
N.T.S.



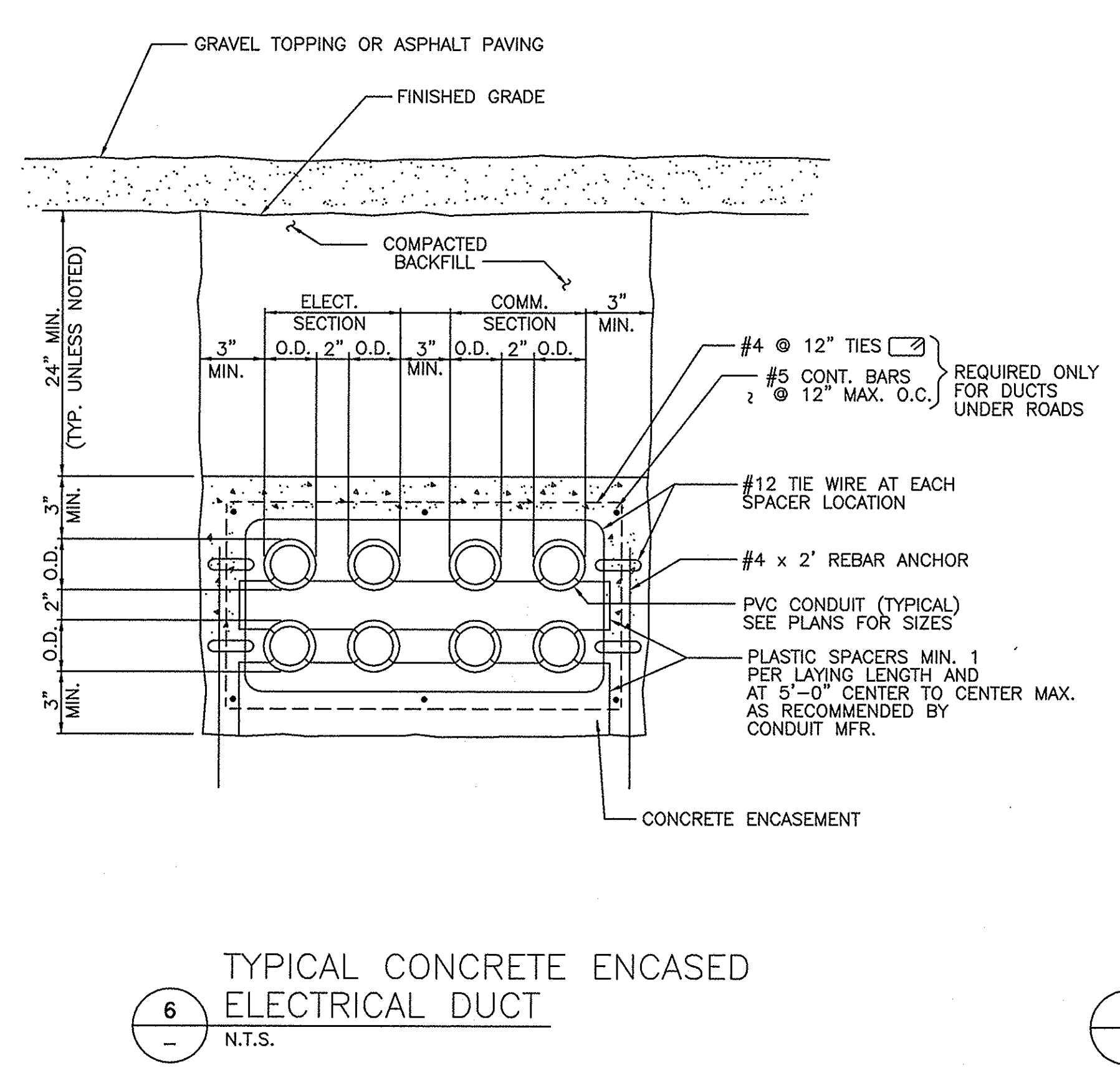
3 STANCHION BASE DETAIL
STANCHION MOUNTED
CONDUIT ENCASED IN CONCRETE
INDEPENDENT OF SLAB
N.T.S.



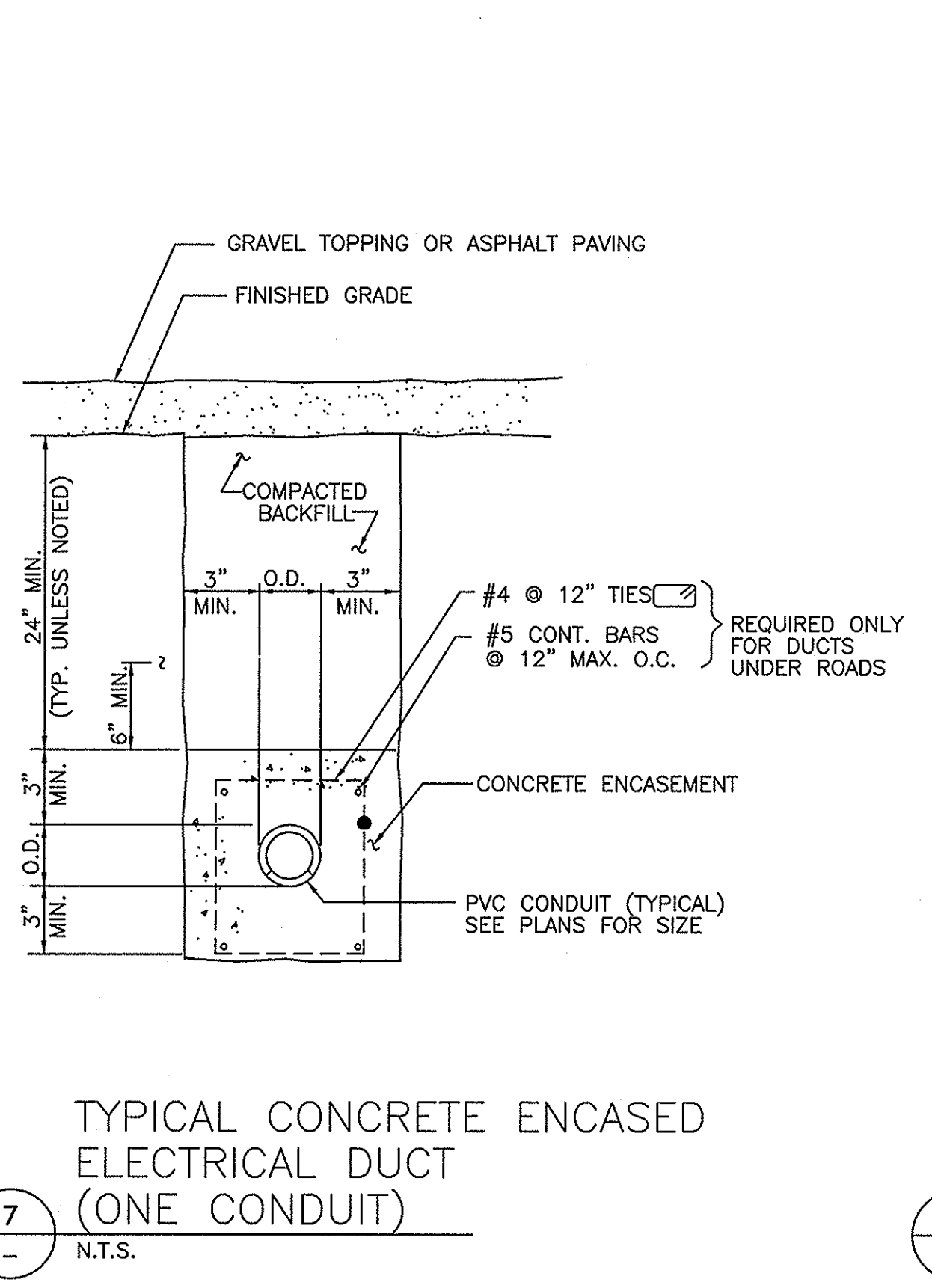
4 STANCHION BASE DETAIL
STANCHION MOUNTED ON SLAB
CONDUITS RUN IN SLAB
N.T.S.



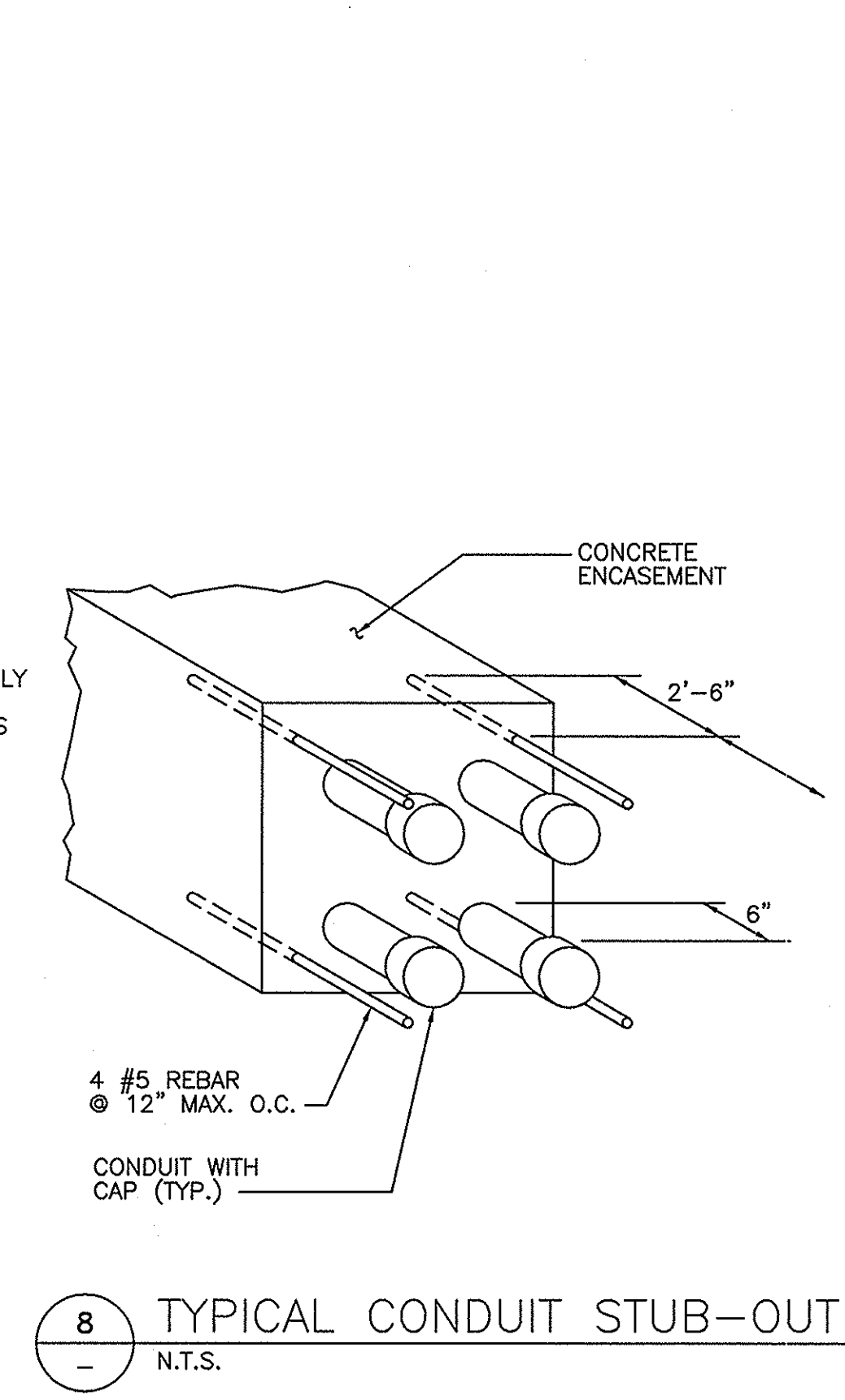
5 CONDUIT STUB-UP DETAIL
N.T.S.



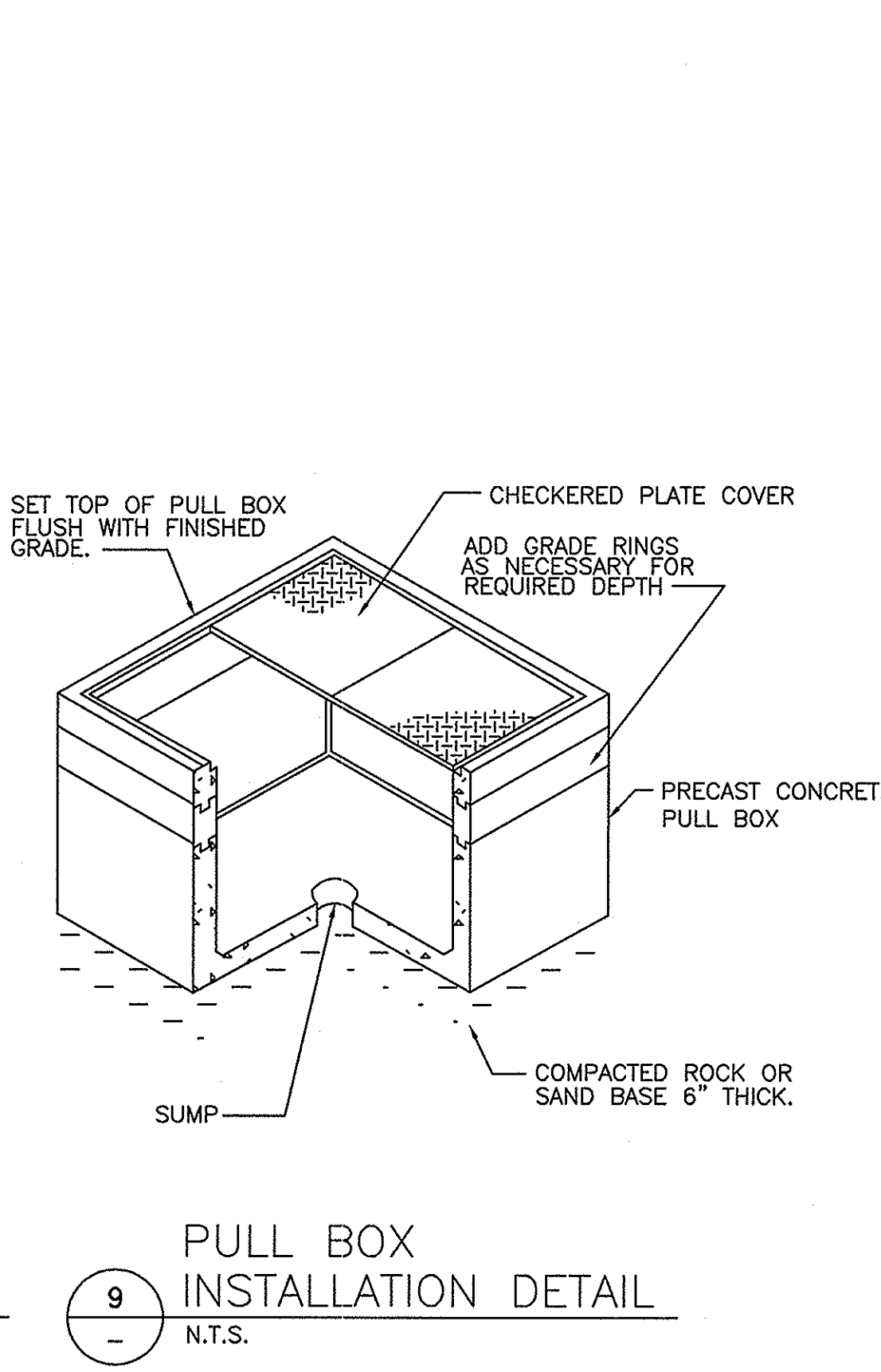
6 TYPICAL CONCRETE ENCASED
ELECTRICAL DUCT
N.T.S.



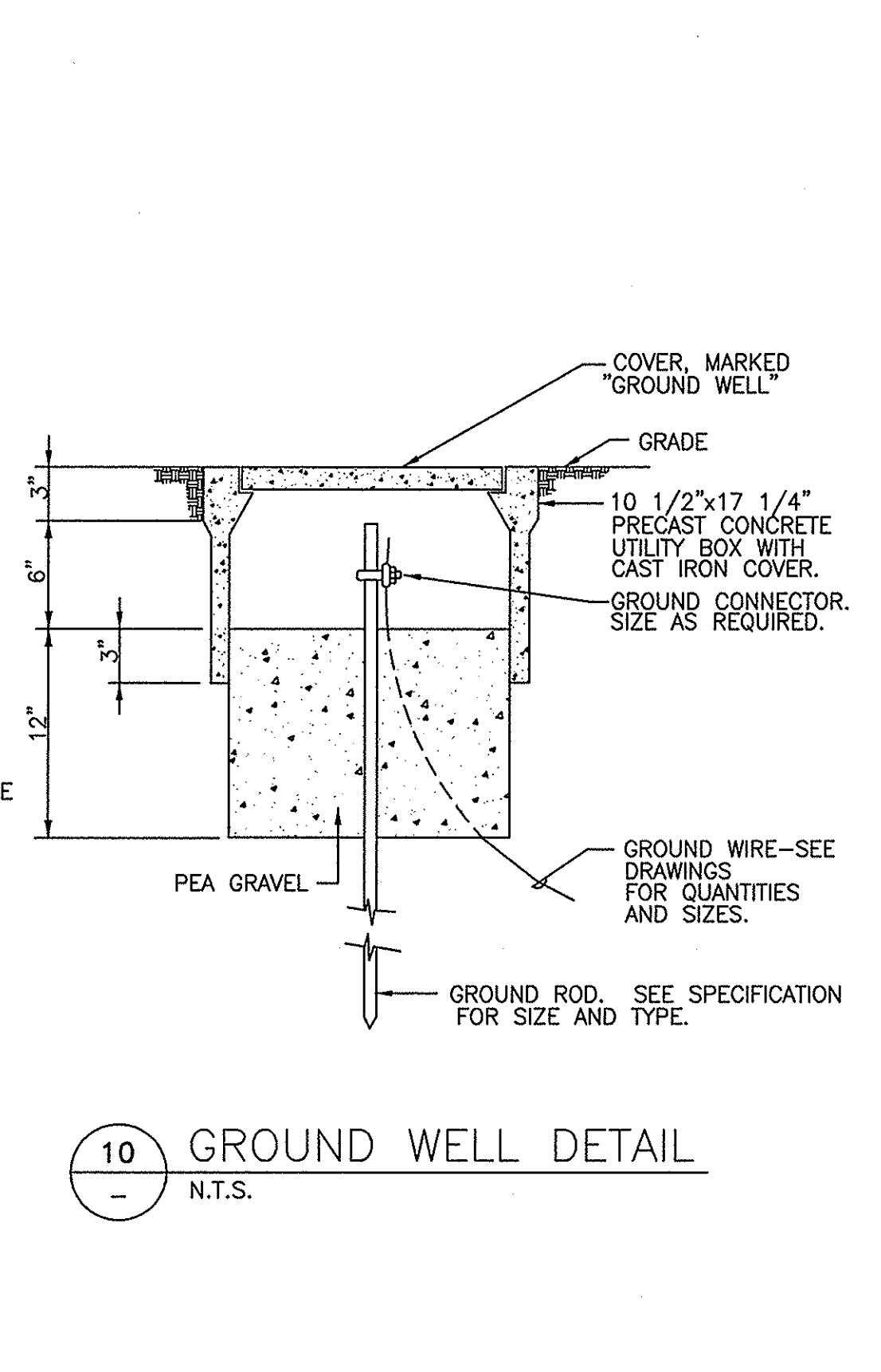
7 TYPICAL CONCRETE ENCASED
ELECTRICAL DUCT
(ONE CONDUIT)
N.T.S.



8 TYPICAL CONDUIT STUB-OUT
N.T.S.



9 PULL BOX
INSTALLATION DETAIL
N.T.S.



10 GROUND WELL DETAIL
N.T.S.

W:\Pasadena_Sector\Projects\BCVWD\Well No. 25\CAD\DWG\Conformed\E-03.dwg Apr 30, 2007 - 2:39pm

PARSONS
100 WEST WALNUT STREET
PASADENA, CALIFORNIA 91124
(626) 440-4000

Job No.	723185				
Designed	EG				
Drawn	JV				
Checked	EG				
Approved	JCR				
Reg. No.					
Date					
Rev	Date	Description	By		

Benchmark	SEE SHEET 1
Scale	NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

J. R. [Signature]
District Engineer

R.C.E. No. 18034

5/16/07
Date

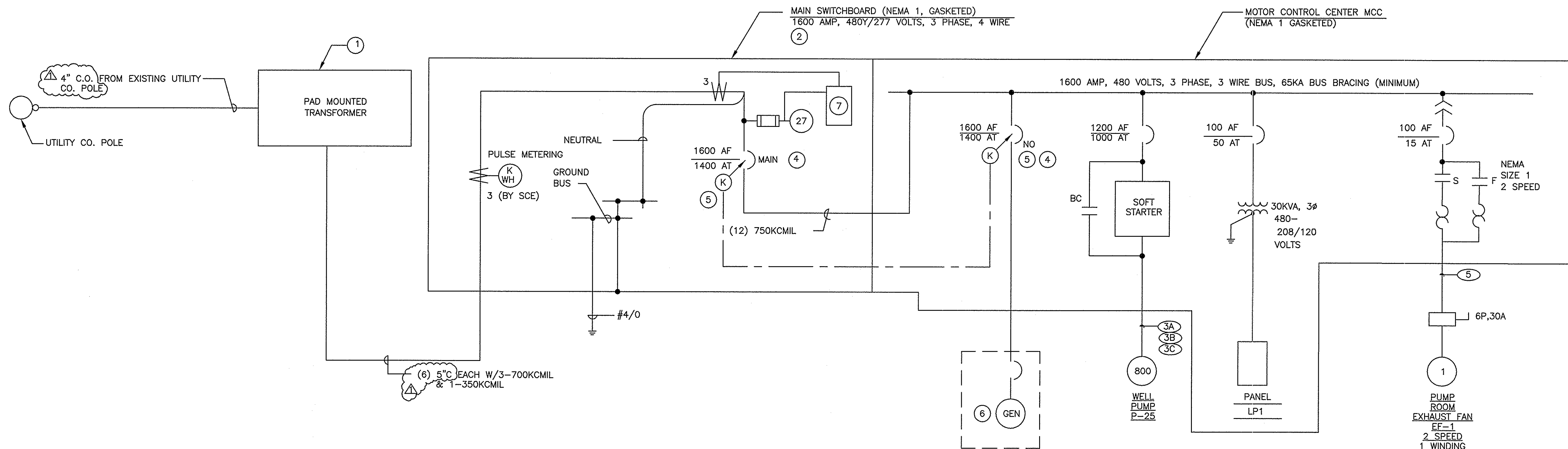
ISSUED FOR CONSTRUCTION

BCVWD - WELL NO. 25

ELECTRICAL DETAILS 1

Drawing No. E-3

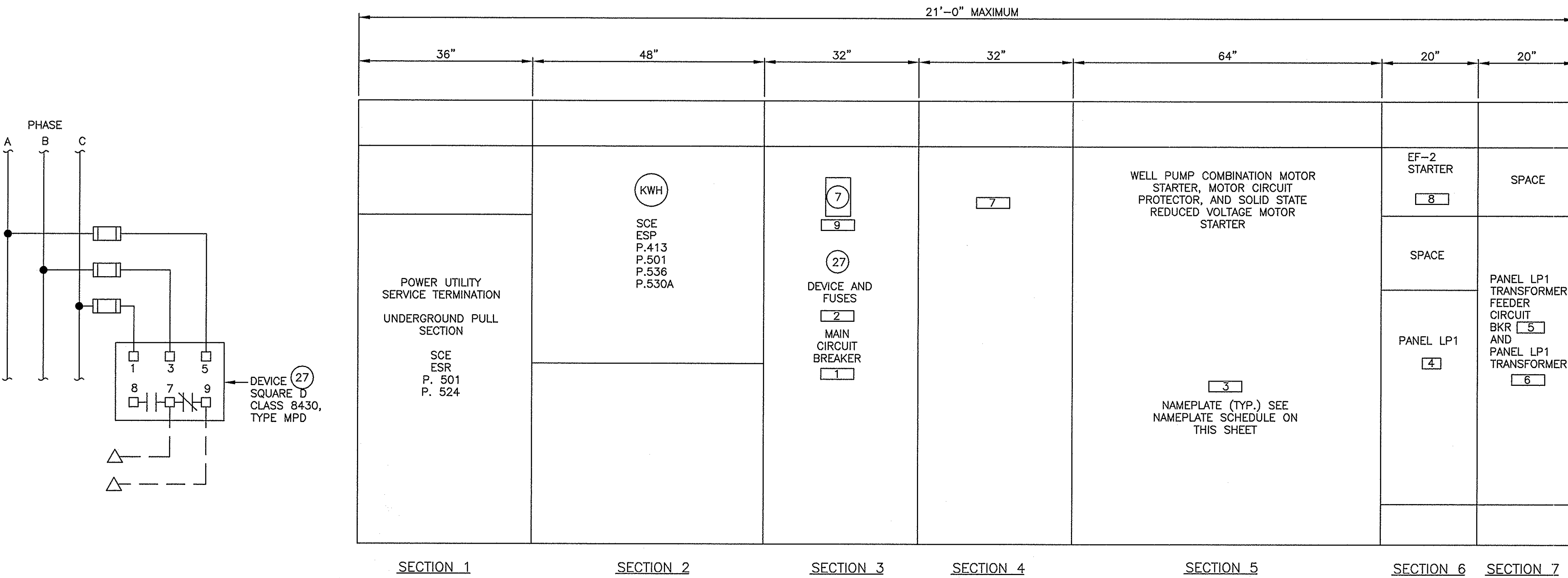
SHEET 32 OF 39



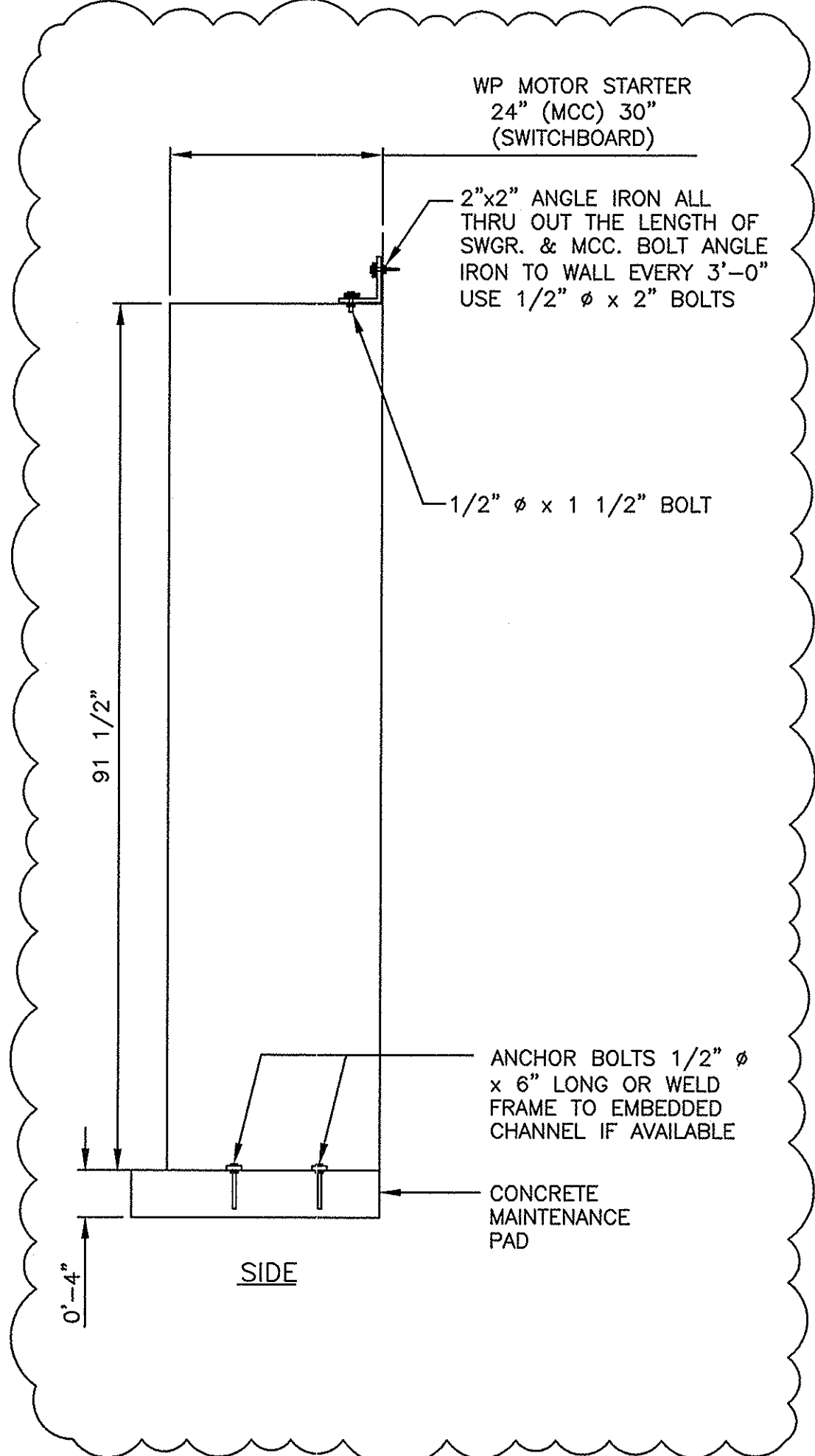
SINGLE LINE DIAGRAM

NOTES:

- PAD MOUNTED TRANSFORMER WILL BE PROVIDED BY THE SOUTHERN CALIFORNIA EDISON. CONTRACTOR TO PROVIDE A 10'-0" x 12'-0" TRANSFORMER PAD WITH 8"x12" SLAB BOX AND GROUNDING PER SOUTHERN CALIFORNIA EDISON CONSTRUCTION STANDARDS.
- ELECTRICAL UTILITY INTERFACE REQUIREMENTS: MAIN SWITCHBOARD SHALL MEET THE SOUTHERN CALIFORNIA EDISON REQUIREMENTS. SUBMIT MANUFACTURER'S SHOP DRAWINGS FOR APPROVAL.
- EQUIPMENT LAYOUT AND DIMENSIONS SHOWN ARE APPROXIMATE. ACTUAL LAYOUT AND DIMENSIONS WILL BE DETERMINED BY THE MAIN SWITCHBOARD SUPPLIER.
- SQUARE D MODEL ME (LSG) WITH INTEGRAL GROUND FAULT PROTECTION OR EQUAL.
- KIRK KEY INTERLOCK WILL ALLOW ONE CIRCUIT BREAKER TO BE CLOSED AND THE OTHER TO STAY OPEN.
- CLIENT WILL ADD STANDBY GENERATOR AT A LATER DATE. SEE DWG. E-7 FOR THE CONDUIT INSTALLATION REQUIREMENTS.
- METERING DEVICE FOR CLIENT'S KWH REQUIREMENT, CUTLER-HAMMER #1Q-320 OR EQUAL.



MAIN SWITCHBOARD/MCC ELEVATION ③
SCALE: NOT TO SCALE



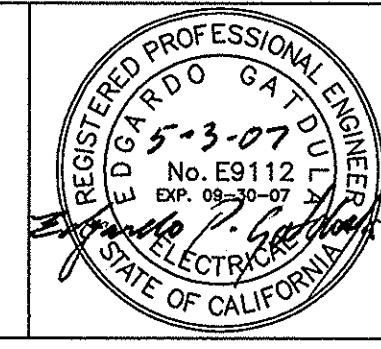
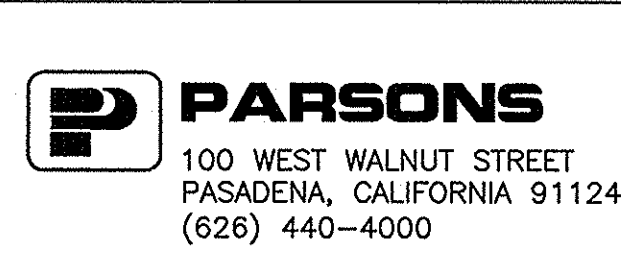
MAIN SWITCHBOARD/MCC ELECTRICAL LOAD CALCULATIONS		
		AMPS AT 460 VOLTS, 3 PHASE
WELL PUMP P-25	800 HP	914
PANEL LP1 TRANSFORMER	30 KVA	36
EF-1	1 HP	2.1
TOTAL CONNECTED LOAD / MCC		952.10A

MAIN SWITCHBOARD NAMEPLATE SCHEDULE	
NAMEPLATE NUMBER	NAMEPLATE INSCRIPTION
1	MAIN CIRCUIT BREAKER
2	UNDERVOLTAGE RELAY
3	WELL PUMP P-25
4	PANEL LP1
5	PANEL LP1 TRANSFORMER FEEDER
6	PANEL LP1 TRANSFORMER
7	STANDBY GEN. CIRCUIT BREAKER
8	EF-1 PUMP ROOM EXHAUST FAN
9	PULSE METER (KWH)

UNDERVOLTAGE RELAY CONNECTION DIAGRAM

ISSUED FOR CONSTRUCTION

WA Pasadena Sector Projects BCWMD Well No. 25 (CAD) DWG (Conformed) E-05rev2.dwg Apr 30, 2007 - 2:40pm



Job No.	723185	Benchmark	SEE SHEET 1
Designed	EG	Scale	NONE
Drawn	JV		
Checked	EG		
Approved	JCR		
Reg. No.			
Date			
Rev	Date	Description	By
	4/07	CONTROL PANEL WIDTH CHANGED	SG
	02/22/07	ADDED SCE'S INFORMATION	EPG

Job No.	723185
Designed	EG
Drawn	JV
Checked	EG
Approved	JCR
Reg. No.	
Date	

BEAUMONT CHERRY VALLEY WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

[Signature]
District Engineer

R.C.E. No. 18034

[Signature]
Date

BCWWD - WELL NO. 25

SINGLE LINE DIAGRAM & MAIN SWBD / MCC ELEVATION

Drawing No. E-5

SHEET 34 OF 39

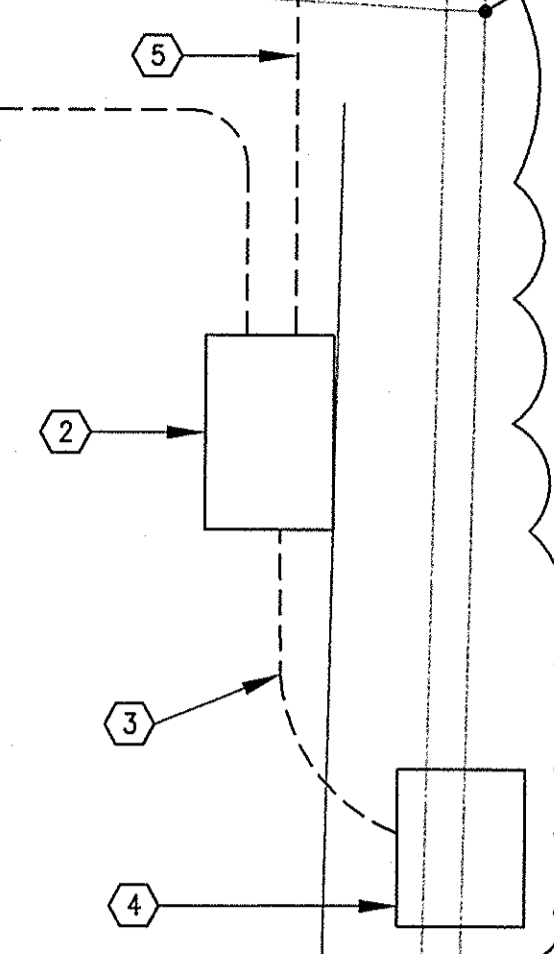
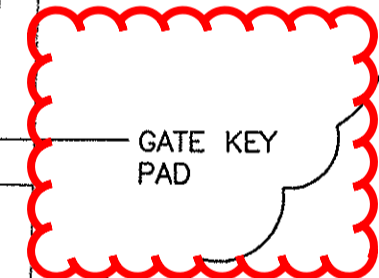
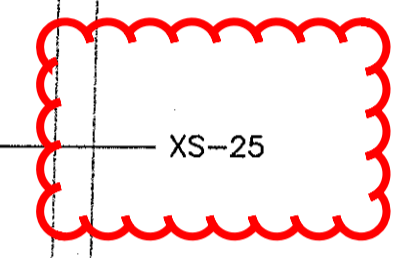
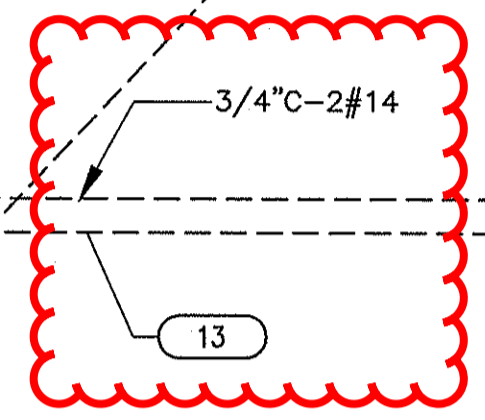
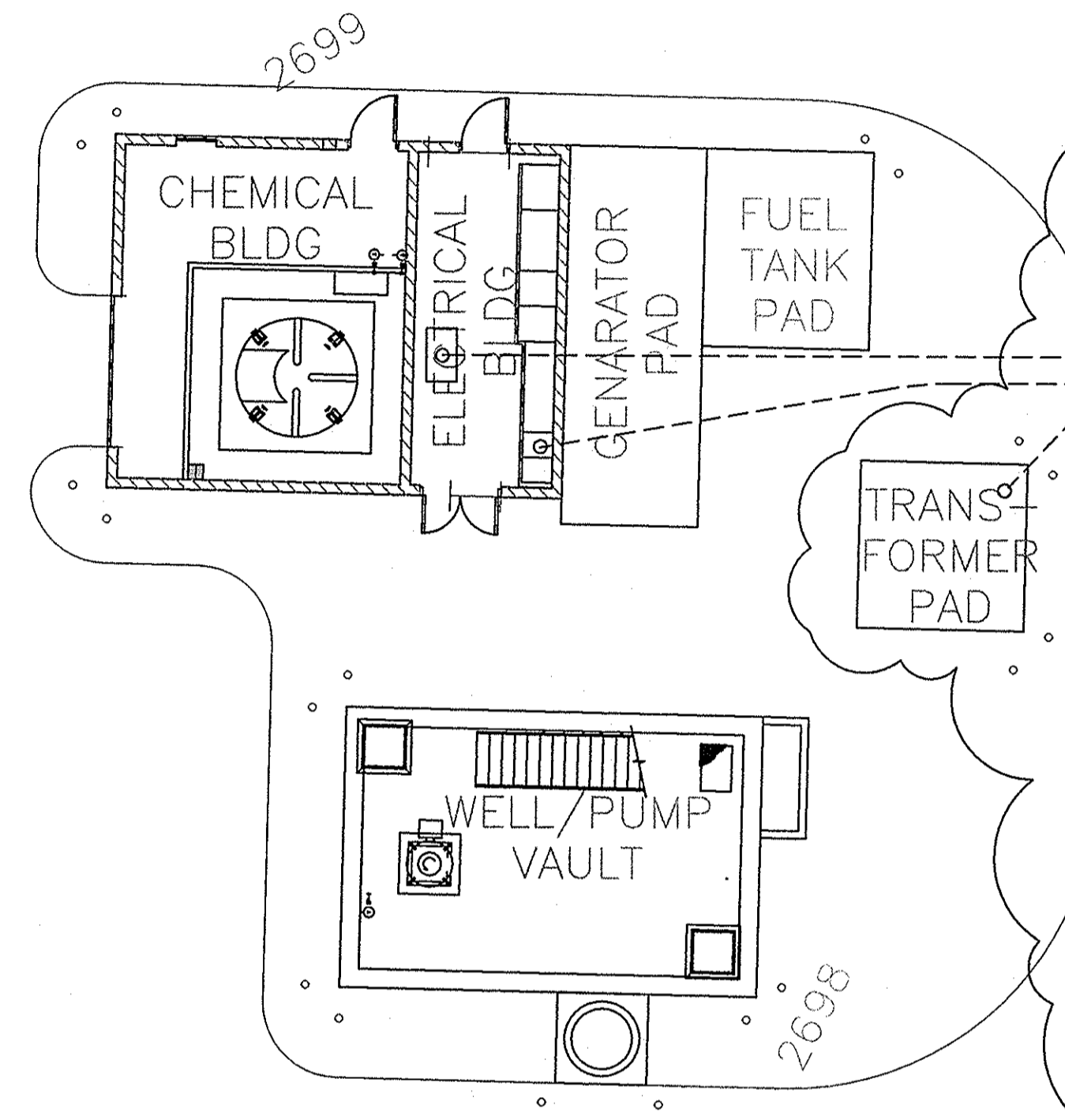
(700.0) FG



698

10

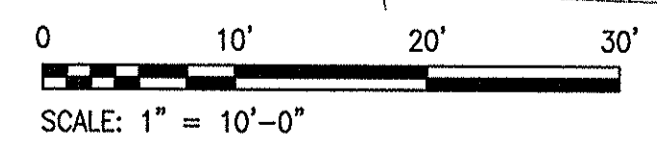
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STARLIGHT AVE.

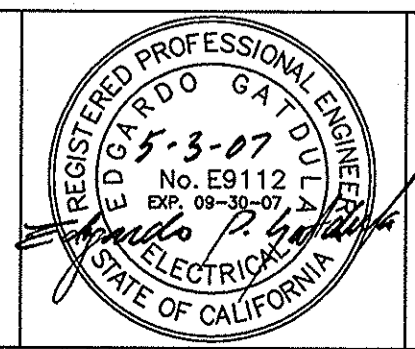
NOTES:

1. CONDUIT IS 4" # PVC SCHEDULE 40 (C.O.) TO CONTRACTOR SUPPLIED 5'x8 1/2'x7' CONCRETE PULL BOX. CONDUIT LENGTH IS 190 FEET.
2. CONTRACTOR SUPPLIED CONCRETE PULL BOX, 5'x8 1/2'x7'.
3. CONTRACTOR SUPPLIED 4" PVC TO CONNECT EXISTING SCE TRANSFORMER AND PULL BOX. ENERGIZED STRUCTURES MUST BE ENTERED ONLY BY SCE APPROVED CONTRACTOR.
4. EXISTING SCE PAD MOUNTED TRANSFORMER (ENERGIZED).
5. CONTRACTOR TO INTERCEPT EXISTING 4-5" EMPTY CONDUIT AND ROUTE IT TO PULL BOX.
6. CONTRACTOR TO PROVIDE CONTROL WIRES REQUIRED IN ACCORDANCE WITH GATE OPENER VENDOR REQUIREMENTS.



ISSUED FOR CONSTRUCTION

PARSONS
 100 WEST WALNUT STREET
 PASADENA, CALIFORNIA 91124
 (626) 440-4000



Job No.	723185				
Designed	EG				
Drawn	JV				
Checked	EG				
Approved	JCR				
Reg. No.					
Date					
Rev	Date	Description	EPG	By	
	02/22/07	ADDED SCE'S INFORMATION			

Benchmark
SEE SHEET 1

Scale
NONE

BEAUMONT CHERRY VALLEY WATER DISTRICT
 RIVERSIDE COUNTY, CALIFORNIA

JCR
 District Engineer

R.C.E. No. 18034

Adelo
 Date

BCVWD - WELL NO. 25

ELECTRICAL SERVICE CONDUIT LAYOUT

Drawing No. E-10

SHEET 39 OF 39

W:\Pasadena Sector\Projects\BCVWD\Well No. 25\CAD\DWG\Conform\E-10.dwg Apr 30, 2007 - 2:41pm

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, BEAUMONT-CHERRY VALLEY WATER DISTRICT (also herein "Obligee") has awarded to (Contractor's Name Here _____) (hereinafter designated "Contractor" and "Principal"), a contract for the Work described as follows: WELL 25 WALL AND GATE CONSTRUCTION PROJECT, 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 _____, 2019, (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 California, and duly authorized to transact business under the laws of the State of California, as Surety, are held and firmly bound unto the BEAUMONT-CHERRY VALLEY WATER DISTRICT in the sum of (_____ Dollar amount written out and No/100 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.

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.

NOTARY FOR PRINCIPAL

NOTARY FOR SURETY

STATE OF _____)
COUNTY OF _____)

STATE OF _____)
COUNTY OF _____)

On _____, 20____, before me,
_____, personally
appeared _____

On _____, 20____, before me,
_____, personally
appeared _____

() personally known to me or () 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.

() personally known to me or () 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.

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 _____ Secretary 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)