



SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER
STATION PROJECT
SAWS Job No. 12-6006
SAWS Solicitation No. B-12-043-CM

ADDENDUM NO.3
October 26, 2012

To Bidder of Record:

This addendum, applicable to work referenced above, is an amendment to the bidding documents and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the addendum number and issue date in the space provided in submitted copies of the proposal.

Item 1: Mandatory Pre-Bid Meeting

Bids will not be accepted from any company not represented at the mandatory pre-bid meeting held on October 15, 2012 at 10:00AM. The following list is a record of the represented firms:

1. Cunningham Constructors & Associates
2. Pump Solutions, Inc.
3. Vapex
4. Archer Western Construction
5. Payton Construction, Inc.
6. Bryan Construction
7. Pesado Construction
8. Hierholzer Engineering, Inc.
9. Pronto Sandblasting
10. Shannon-Monk, Inc.
11. Keystone Construction
12. MGC Contractors
13. KST Electric
14. R&C Landscape LLC
15. Pepper-Lawson Construction
16. Municipal Valve
17. Surveillance Security
18. SEC-OPS, Inc.
19. Walker Engineering
20. Lambda Construction
21. 8A Electric, Inc.

Item 2: Mandatory Pre-Bid Meeting Notes

Meeting Notes are attached for information only. The pre-bid meeting sign-in sheet has been posted previously on the SAWS website.

Item 3: Table of Contents

REPLACE the Table of Contents in its entirety with the attached Table of Contents.

Item 4: Supplemental Conditions

ADD the attached Supplemental Conditions.

Item 5: Special Conditions

REPLACE the Special Conditions in entirety with the attached Special Conditions.

Item 6: Technical Specifications

1. Section 11395.1.08.C.

ADD the following:

“GENSET manufacturer shall determine GENSET settings not developed under Section 16140 that are needed for the proper operation and protection of GENSET. GENSET manufacturer shall review and coordinate settings developed under Section 16140 for proper operation and protection of GENSET.”

2. Section 11395.3.03.A.3.

REPLACE:

“Set, adjust, and test all protective relays based on the results of the coordination study, refer to sub-section 1.08, this Section of the Specifications”

WITH:

“Set, adjust, and test GENSET protective relays, controllers, etc. according to settings as determined under sub-section 1.08, this Section of the Specifications.”

3. Section 16140.1.04.C.

REPLACE:

“SWBDs shall be as manufactured by Square D Company, General Electric Company “G.E.”, Allen-Bradley, or Cutler Hammer Corporation.”

WITH:

“SWBDs shall be as manufactured by Square D Company, Siemens, General Electric Company “G.E.”, Cutler Hammer Corporation or Allen-Bradley.”

4. Section 16444.1.04.C.

REPLACE:

“Combination Motor Starters shall be as manufactured by Square D Company, General Electric Company “G.E.”, Allen-Bradley, or Cutler Hammer Corporation.”

WITH:

“Combination Motor Starters shall be as manufactured by Square D Company, Siemens, General Electric Company “G.E.”, Cutler Hammer Corporation or Allen-Bradley.”

5. Section 16483.1.08.C.

ADD the following:

“LVVFD manufacturer shall determine LVVFD settings not developed under Section 16140 that are needed for the proper operation and protection of LVVFD. The LVVFD manufacturer shall include extensive effort to coordinate the LVVFD settings with the 480V Switchboard Manufacturer as described in Section 16140. LVVFD manufacturer shall review and coordinate settings developed under Section 16140 for proper operation and protection of LVVFD.”

6. Section 16483.3.03.C.3.

REPLACE:

“Set, adjust, and test all protective relays based on the results of the coordination study, refer to sub-section 1.08, this Section of the Specifications”

WITH:

“Set, adjust, and test LVVFD protective relays, controllers, etc. according to settings as determined under sub-section 1.08, this Section of the Specifications.”

7. Section 16500.1.06.A.

REPLACE:

“208/120 volts “AC”, 3-phase, 4-wire Panelboards - Cutler-Hammer Corporation Type POW-R-Line 3a with specified accessories. Equal Panelboards manufactured by Square-D Company or General Electric are acceptable.”

WITH:

“208/120 volts “AC”, 3-phase, 4-wire Panelboards - Cutler-Hammer Corporation Type POW-R-Line 3a with specified accessories. Equal Panelboards manufactured by Square-D Company, Siemens or General Electric are acceptable.”

8. Section 16500.2.02.E.1.

REPLACE:

“208/120 Volts “AC” Lighting and Control Power Panelboards – U.L listed Current Interrupting 10,000 A.I.C. symmetrical @ 208 Volts. Cutler-Hammer Corporation, Type FD/HFD, or equal by General Electric Company “G.E.” or Square-D Company.”

WITH:

“208/120 Volts “AC” Lighting and Control Power Panelboards – U.L listed Current Interrupting 10,000 A.I.C. symmetrical @ 208 Volts. Cutler-Hammer Corporation, Type FD/HFD, or equal by General Electric Company “G.E.”, Siemens or Square-D Company.”

9. Section 16483.1.03.C.

REPLACE:

“LVVFDs shall be as manufactured by Square D Company, General Electric Company “G.E.”, Allen-Bradley, or Cutler Hammer Corporation.”

WITH:

“LVVFDs shall be as manufactured by Square D Company, Siemens, General Electric Company “G.E.”, Allen-Bradley, or Cutler Hammer Corporation.”

10. Section 16450.1.04 A.1.

REPLACE:

"General Use (Power & Lighting) Dry-Type Ventilated Isolation Transformers shall be Watchdog Premium Quality units manufactured by Sorgel (Square D) class 7430 or Type DT-3 energy-Efficient units manufactured by Eaton Cutler-Hammer."

WITH:

"General Use (Power & Lighting) Dry-Type Ventilated Isolation Transformers shall be Watchdog Premium Quality units manufactured by Sorgel (Square D)

class 7430, TP1 energy efficient transformers manufactured by Siemens, or Type DT-3 energy-Efficient units manufactured by Eaton Cutler-Hammer."

11. Section 16450.2.02.A.

REPLACE:

"The following requirements apply to transformers located inside the BLOWER ELECTRICAL ROOM, and HEADWORKS ELECTRICAL BUILDING NO. 1 only."

WITH:

"The following requirements apply to transformers located in all areas."

12. Section 16450.2.02.B.

REPLACE:

"Transformers shall be of the dry type suitable for indoor installation."

WITH:

"Transformers shall be of the dry type suitable for outdoor installation."

13. Section 16450.2.03.A.

REPLACE:

"The following requirements apply to transformers located inside the BLOWER ELECTRICAL ROOM, and HEADWORKS ELECTRICAL BUILDING NO. 1 only."

WITH:

"The following requirements apply to transformers located in all areas."

14. Section 16450.2.03.B.

REPLACE:

"Transformers shall be of the dry type suitable for indoor installation."

WITH:

"Transformers shall be of the dry type suitable for outdoor installation."

15. Section 16600.2.02.B.1.f.

REPLACE:

"Cabinets shall be as manufactured by Hoffman, Concept Series, or equal by Rittal."

WITH:

"Cabinets shall be as manufactured by Hoffman, Concept Series, or equal by Rittal or the Disconnect Switch and Enclosed Circuit Breaker Manufacturer."

16. Section 16600.2.02.B.2.e.

REPLACE:

"Cabinets shall be as manufactured by Hoffman, Concept Series, or equal by Rittal."

WITH:

"Cabinets shall be as manufactured by Hoffman, Concept Series, or equal by Rittal or the Disconnect Switch and Enclosed Circuit Breaker Manufacturer."

17. Section 16600.2.02.C.5.

REPLACE:

"Circuit breakers shall be Square D Company Type FCL, or equal by General Electric Company "G.E.", or Cutler-Hammer Corporation."

WITH:

"Circuit breakers shall be Square D Company Type FCL, or equal by Siemens, General Electric Company "G.E.", or Cutler-Hammer Corporation."

18. Section 17600.2.03.B.4.

ADD:

"c. For each Ethernet switch, furnish and install 120VAC Ethernet Switch power supply, model PWR-IE3000-AC= by Cisco, no equal. Furnish and install Expansion Module 8 10/100 TX ports, model IEM-3000-8TM= by Cisco, no equal, as required, to assure that Each Ethernet switch has minimum 35% spare/unused Ethernet ports of the total count of Ethernet ports on each Ethernet Switch."

19. REPLACE the following Technical Specification Sections in entirety with the attached Technical Specification sections:
 - Section 01010 - Summary of Work
 - Section 15500 - Hydropneumatic Tank System
 - Section 17100 – Process Instrumentation and Control System PICS
20. ADD the following attached Technical Specification Section:
 - Section 04300 - Unit Masonry System

Item 6: Modifications to Plans

1. REPLACE the following attached Sheets in entirety:
 - Sheet W1
 - Sheet W2
 - Sheet W3
 - Sheet W4
 - Sheet P2
 - Sheet P3
 - Sheet P4
 - Sheet P5
 - Sheet P6
 - Sheet P8
 - Sheet C1
 - Sheet S1
 - Sheet S3
 - Sheet E11
 - Sheet E12
 - Sheet E15
 - Sheet E17
2. ADD the following attached Sheets:
 - Sheet S7
 - Sheet S8

Item 7: Response to Bidder Questions

- Q1: Could you tell us what the wage rates for this project are? Prevailing, Davis Bacon, minimum wage?
- A1: *No Prevailing Wage or Davis Bacon requirements are applicable on this project.*
- Q2: Specification 11395 Article 1.08.A - Harmonic study is mentioned in this portion of the specification and also in Specification 16140 article 1.03.B and in Specification 16444 Article 1.07.A. Shall the Genset Manufacturer, the Switchboard Manufacturer or the VFD manufacturer provide the Harmonic Study?

- A2:** *The harmonic study shall be provided as per Section 16140 “Switchboards”. Equipment manufacturers (Section 11395, 16444, 16483, etc.) shall provide all necessary study input data and coordinate with the entity performing the study as required to facilitate the performance of the study.*
- Q3:** Specification 11395 Article 3.03.A.3 - This portion of the specification calls for the adjustment and setting of protective relays based on the coordination study. This is also called for under Specification 16140, Article 3.03.A.3. Will the Genset Manufacturer be solely responsible for the settings on the Genset Breaker and or Relays and the Switchboard Manufacturer for the others? Same question applies to the VFD Manufacturer.
- A3:** *For clarification, refer to the Specification 11395 revisions issued in Addendum 3.*
- Q4:** Specification 16483 Article 1.08.E.1 calls for IEEE 519 Compliance at "point of common coupling". Will compliance with IEEE 519 measurements be at the point of Common Coupling with CPS energy, or at the Line Side of the VFD breaker as shown on Drawing E7?
- A4:** *Specification 16483, Article 1.08.E.1 indicates that the location identified on the PLANS shall serve as the IEEE 519 “point of common coupling” for this project. The location is the line side of the VFD breaker as shown on Drawing E7, keynote 1.*
- Q5:** Specification 16483 Article 1.08.E.2 - Should a harmonic filter be required, only a filter that has been designed and UL Tested approved and or tested by the Manufacturer can be provided within the VFD enclosure. Having an Owner provided selection which may have not been designed and or tested cannot be provided unless the filter is outside of the VFD Enclosure?
- A5:** *The Owner’s selection shall be made from the family of filters available from the VFD manufacturer.*
- Q6:** Is the booster pump suction header to be included with the pump package? It is not mentioned in spec section 11215. If not, is this header steel pipe or ductile iron. Spec section 15052 calls for the buried suction pipe to be ductile iron but the drawings indicated steel pipe. What about the vertical pipe from the header up above grade – steel or ductile iron?
- A6:** *The suction header is separate from the pump skid. The suction header and below ground vertical piping will be ductile iron and will transition to steel piping above ground. See attached revised Sheet P4.*
- Q7:** Air line to HP tanks – where is the compressor, what size is the pipe and what kind of pipe? Site Information Item 11 on sheet P2 points to a pipeline.
- A7:** *Item 11 on Sheet P2 indicates the air compressor pad locations. The sheet has been revised to clarify further. See Sheet P5 and P6 also for location of the air compressor pads. Size and type of piping for the air lines shall be per hydropneumatic tank system manufacturer’s recommendations.*

- Q8: We have noticed the plans we downloaded from the website are not scalable. Would it be possible to get a set of full size electronic drawings for the Crescent Park Booster Station?
- A8: *The plans are intended to be printed on 11 inch x17 inch paper. The plans were printed, sealed, signed and scanned to PDF as 11x17 size and do not exist as a full size 24x36 set. A CD can be picked up at any time through SAWS Contracting.*
- Q9: At the Booster Station, please provide the point of transition from the underground DIP to the above ground Steel piping. Is the piping in the PRV vault DIP or Steel?
- A9: *Sheets P4, P5, P6, and P8 have been revised to indicate the points of transition from ductile iron to steel. Piping inside the PRV vault will be Steel.*
- Q10: Is it possible to visit the site prior to the prebid?
- A10: *A non-mandatory site visit was conducted on October 17, 2012.*
- Q11: We see no information in regard to the 520 LF of 10' high security wall, please advise?
- A11: *The details for the wall have been included in this Addendum. See Attached Sheets S1, S7, and S8.*
- Q12: The bid form and the drawings call for a 10' security wall and a gate, but I can't find any other information or a specification on this wall. Can we get a specification and/or a detail drawing giving the contractors more information on this item?
- A12: *The details for the wall and gate have been included in this Addendum. See Attached Sheets S1, S7, and S8.*
- Q13: Who provides the Vibration Transmitters & Temperature Transmitters. Are they part of the VFD Equipment?
- A13: *The vibration transmitters are part of the packaged system provided by the pump and motor skid manufacturer. The temperature transmitters shall be provided by the manufacturer of the cabinet in which the temperature transmitter is installed. For control/security cabinets assembled by the Instrument and Control System Contractor (ICS), the ICS shall provide the temperature transmitters.*
- Q14: Who provides the Security Equipment & Control Panel?
- A14: *The Instrument and Control System Contractor (ICS) shall provide the security equipment and control panel. For clarification, refer to the revised 17100 specification issued in Addendum 3.*
- Q15: Do you have to be licensed to provide & install the Security Equipment?
- A15: *No, installation of the security system shall be a cooperative effort between the contractor and SAWS security group. Refer to Specification Section 17550 Part 3.*

- Q16: I need some clarification on the Main Control Panel NEMA rating. In spec section #17200-3, B. Freestanding Cabinets/Panels: 3. You call for a 316SS Enclosure. On drawing #I-23 you show the panel layout, if I'm not mistaken this looks like the Hoffman "Proline series"? If that is the case I don't think that the "Proline" series comes in a 316SS. I know it comes in a 304SS, but not 316SS. Please clarify.?
- A16:** *The main control panel shall be NEMA 4X type 316 stainless steel.*
- Q17: Is the asbestos abatement line item in regard to the AC pipe that will be or might be encountered on the project?
- A17:** *Yes, according to available records, the existing 16" water main on dominion drive may be asbestos cement (AC) pipe.*
- Q18: It appears that the 3rd permissive for the add air solenoid valve to open is incorrect...typically that permissive is "all pumps OFF".
- A18:** *The third condition in Section 15500.24(2)(C) is correct as written.*
- Q19: Please provide a detail for the security wall around the site.
- A19:** *The details for the wall have been included in this Addendum. See Attached Sheets S1, S7, and S8.*
- Q20: Will there be a HOA contact or will this be handled directly by SAWS?
- A20:** *There will be no direct HOA contact by Contractor. Contractor's point of contact will be SAWS Inspection. Any necessary communication to/from the HOA will be through SAWS.*
- Q21:** **Why skids for the pumps? Are they to be moved in the future?**
- A21: SAWS requires the pumps to be part of a pre-fabricated skid. There are no plans for the pumps to be moved.
- Q22: Will SAWS allow Aurora 410 Series Horizontal Split Case Pumps as an equal?
- A22:** **No, only manufacturers listed will be accepted.**
- Q23: The asbestos abatement plan listed in the bid proposal...is that in regard to the 16" AC water main pipe shown on sheet W3?
- A23:** *Yes, according to available records, the existing 16" water main on dominion drive shown on Sheets W3 and W4 may be asbestos cement (AC) pipe.*
- Q24: There are 2 water line bid items numbered '828'. One is for a 12" gate valve. One is for a 16" gate valve. I assume this is just a typo. Please clarify.
- A24:** *No, this is not a typo. The water line bid items correspond to SAWS Standard Specification numbers. All SAWS gate valves are specified in SAWS Standard Specification 828. This project will include both a 16" Gate Valve and a 12" Gate Valve.*
- Q25: Water line bid item 846 calls for a 1" air release valve assembly. Please clarify where this air release valve assembly is located.
- A25:** *This bid item has been removed from the Bid Proposal. A revised Bid Proposal will be issued in Addendum No. 4.*

Q26: Specification 16483-12 Article 2.04.B.4 calls for the following as a minimum, could the VFD's be provided with a Matrix Filter in lieu of a 18 Pulse Bridge Rectifier in order to meet the requirements of IEEE-519: "Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to variable voltage and frequency output. The manufacturer shall supply 18-Pulse bridge rectifier design, at minimum." Drawing E7 does show a filter as part of the schematics.

A26: *Please provide the VFD and filter design (18-Pulse Bridge Rectifier) as specified.*

Q27: Requesting clarifications on the following, and requesting permission to position each 8' tall Sight Glass Box, 6 inches above tank elevation.

SUCTION TANK:

Drawings

Two (2) 16"Ø inlet/outlets
One (1) 18"Ø Flanged/Hinged Manway?
Two (2) 6" high support saddles

Specifications

Two (2) 8"Ø inlet/outlets
Two (2) 14"x18" Elliptical Manways
Two (2) 18" high support saddles

DISCHARGE TANK(S):

Drawings

Two (2) 12"Ø inlet/outlets
One (1) 18"Ø Flanged/Hinged Manway?
Two (2) 6" high support saddles

Specifications

Two (2) 8"Ø inlet/outlets
Two (2) 14"x18" Elliptical Manways
Two (2) 18" high support saddles

A27: *Refer to attached revised drawings P5 and P6 and revised Hydropneumatic Tank System Specification Section 15500 for Saddles, Inlets/Outlets and Manway requirements. Sight Glass Enclosure shall be located as shown on drawings.*

Q28: Per specification section 17100, the contractor is responsible for programming the SAWS SCADA Office HMI, it is assumed that the SAWS SCADA Office HMI is the TRANSDYN System is this correct? If so, is SAWS going to allow the contractor to modify this system? Just asking because in the past SAWS has not allowed contractors to perform work on this system, all work on the TRANSDYN System was performed by SAWS.

A28: *For clarification, refer to the revised 17100 specification issued in Addendum 3.*

The remainder of the bid documents remains unchanged.

This Addendum, including this page, is twelve (12) pages in its entirety.

Each bidder is requested to acknowledge receipt of this Addendum No. 3 by his/her signature affixed hereto and to file same as an attachment to his/her bid.



10-26-12

Julian P. Bielawski

Julian P. Bielawski, P.E.
Project Manager
LNV
TBPE Firm No. F-366

The Undersigned acknowledges receipt of this Addendum No. 3 and the bid submitted herewith is in accordance with the information and stipulation set forth.

Date

Signature of Bidder

END OF ADDENDUM

**MANDATORY PRE-BID MEETING NOTES
SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION PROJECT
SAWS Job No. 12-6006
SAWS Solicitation No. B-12-043-CM**

I. MEETING TIME/PLACE

- Monday, October 15, 2012 10:00 a.m.
- SAWS, Tower II, Conf. Rm. 154

III. INTRODUCTION AND SIGN-IN

Patrick O'Connor, P.E.
San Antonio Water System

IV. PROJECT DISCUSSION

1. Overview of the project.
2. Contractor will need to be mindful of cleanliness of work.
3. Hours of work will be Monday through Friday, 8AM to 5PM. There will be no weekend work that would disturb the residents.
4. There will be no buildings in the booster station, cabinets are air conditioned.
5. Project is timed with Hidden Springs Water Project. If the Hidden Springs connection is not ready, contractor will cap the end of the waterline.
6. CPS cost will be on contractor and a CPS permitting allowance will be added to the bid proposal in Addendum.
7. Security Wall will be addressed in Addendum.
8. Non-mandatory Site Visit will be conducted October 17, 2012.
9. Duration of the contract will be 270 days. Estimate is \$3.57 million.
10. Eligible bidders will be noted and need to sign the sign-in sheet.
11. Contractors are to submit questions in writing.
12. Addendum No. 1 will be issued in the afternoon to confirm extended Question and Bid Opening dates.

V. QUESTIONS

- What is the projected Start Date?
The projected start date at the time of the Pre-Bid Meeting was March 15, 2013 but has since been moved to April 15, 2013. See Special Conditions SC-1.4 revised 10/26/12 in Addendum No. 3.
- What is the tentative extension date for Questions and Bid Opening?
Questions will be extended until October 23, 2012 and Bids will be received until November 7, 2012.

VI. CLOSING COMMENTS

- Submit questions in writing by 4:00 PM (CST) on October 23, 2012 to Cynthia Medina at cgmedina@saws.org. Questions regarding the content or interpretation of the Bid Documents must be submitted in writing to be considered valid and to elicit a response.
- Responses to the questions will be posted to the web site by 4:00 PM (CST) on October 26, 2012 as a separate document or included as part of an addendum.
- Bids are due prior to 10:00 AM, November 7, 2012 @ The Contract Administration Division, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212
- Bids will be publicly opened and read aloud by the SAWS Contract Administration Division in Conference Suite 169, SAWS Customer Center Building.
- These dates were tentative during the Pre-bid meeting but have since been confirmed with Addendum No. 1.

CONTRACT DOCUMENTS

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SUPPLEMENTAL CONDITIONS

- 1 CPS Energy Electrical Service Allowance – This item shall be for all CPS Energy fees and costs billed by CPS Energy for designing and providing new electrical service to the proposed booster site (including but not limited to CPS Energy engineered drawing development, medium voltage switchgear and service transformer installation, installation of foundations for switchgear and transformer, and installation of reinforced concrete duct banks, conduits and conductors from existing CPS Energy Manhole to switchgear and transformer). Measurement of this item shall be by the lump sum and shall not exceed \$234,000. Payment of the lump sum price shall be made based on the cost of the fees, labor, materials and actual work performed by CPS Energy. Contractor is to pay and be reimbursed actual amount of CPS Energy fees and costs upon submitting evidence in the form of receipts. Payment shall constitute full compensation to the Contractor for all CPS Energy fees and costs incurred for the Crescent Park Booster Station Project.

SPECIAL CONDITIONS

SC-1.0 GENERAL

SC-1.1 Scope of Work. The San Antonio Water System (hereinafter referred to as “SAWS” or “the System”) is soliciting Bids for the purpose of retaining an organization to provide construction services for the completion of a potable water booster pumping station and associated water mains and appurtenance.

Contractor shall anticipate a period of careful planning in close coordination with SAWS prior to beginning any work to fully develop procedures and standards for the work that will be performed. Employee safety, workmanship standards, and maintaining the integrity of SAWS operations with minimal disruption will be the key areas to be addressed prior to beginning work.

SC-1.2 Instructions to Bidders:

1. Item 23 on page IB-7 of the Instructions to Bidders shall be removed and replaced with the following:

“To assist the San Antonio Water System in performing the bidder evaluation and subsequent recommendation of award, each and every bidder **must submit the following with their bid**. Failure to provide the required information may result in determining a non-responsive bidder:

- (a) A complete financial statement for your organization that was prepared within the past 12 months, by an independent Certified Public Accountant, and a point of contact for your banking institution.
- (b) An information packet on company showing experience, organization and equipment.
- (c) A statement regarding ability to complete the project within the schedule taking into account existing commitments.
- (d) Record of performance on three (3) similar projects completed within the last 5 years including name of project, amount of project, project duration, name, address, and telephone number of contact person for each project.
- (e) A completed and signed W-9 Request for Taxpayer Identification Number and Certification.”

SC-1.3 Contract Requirements:

1. CONTRACTOR will name one individual as coordinator or primary contact to resolve all problems that may arise during the term of the Contract. This individual shall be highly experienced and knowledgeable of the functionality of their company's work, and shall be available two (2) weeks prior to the starting date of the Contract.
2. CONTRACTOR will provide adequate internal control procedures to protect SAWS from financial loss, resulting from any aspect of administering this Contract.
3. CONTRACTOR shall be available to attend meetings and make presentations as requested by SAWS.
4. At the pre-construction meeting, Contractor shall provide SAWS with an emergency 24 hour telephone number for evenings, weekends, and holidays.

SC-1.4 Contract Start Date: The contract start date for this project will be after April 15, 2013.

SC-2.0 PROJECT REQUIREMENTS

SC-2.1 Performance Time. It is the Contractor's responsibility to provide sufficient work force, materials, and equipment to complete the work in accordance with the contract duration.

SC-2.2 Specifications. The Contractor shall include in his Bid Proposal and shall furnish all labor, equipment, material, tools, supplies and incidentals necessary to complete all work required by this Contract in accordance with the latest revision of the following specifications:

- San Antonio Water System (SAWS) Specifications for Water and Sanitary Sewer Construction;
- San Antonio Water System Standard Material Specifications;
- Texas Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges;
- City of San Antonio Standard Specifications for Public Works Construction;
- and any Technical Specifications and Special Conditions specified herein.

- SC-2.3 Schedule of Operations. Contractor shall furnish to the Engineer a construction progress schedule setting forth the information required by the General Conditions of the Contract. Contractor shall send the construction progress schedule along with written notification to the Engineer and SAWS representative and obtain approval prior to starting work. In addition, Contractor shall submit an updated construction progress schedule weekly to the Engineer and to SAWS Inspector.
- SC-2.4 Cleanup. The Contractor shall maintain at all times during the course of work a neat and orderly area of construction operations. Contractor shall also comply with the requirements of Section 01010.16(I) for cleaning up. Unless otherwise specified herein, complete final cleanup following construction completion shall be as established in the field by the Construction Inspector. The final acceptance inspection shall not be conducted until the Contractor has completed final cleanup operations. The governing right-of-way entities Inspector or Representative shall accompany the San Antonio Water System Construction Inspector during the final acceptance inspection.
- SC-2.5 Permits. SAWS is responsible for obtaining all necessary City of San Antonio (CoSA) street cut, tree permits, CoSA right-of-way permits, and HOA permits. The Contractor is solely responsible for obtaining all other necessary permits and inspections, including but not limited to CPS Energy Application for Electrical Service, TPDES Stormwater NOI, and any required building permits. Cost of obtaining and fulfilling these permits are the responsibility of the Contractor and are subsidiary to various items in the project, unless a separate bid item for such is included in the bid proposal.
- SC-2.6 Barricades, Signs and Traffic Handling. Barricades, Signs, and Traffic Handling shall completed be in accordance with COSA Standard Specification No. 530. Payment for Barricades, Signs and Traffic Handling will be made by the contract lump sum price bid. Price shall include barricades, signs, and traffic handling for the duration of the project
- SC-2.7 Storm Water. The Contractor will be responsible for the development of the Storm Water Pollution Prevention Plan, preparation and submittal of TPDES Storm Water Permit, and for installation, maintenance, and removal of all storm water pollution prevention plan BMPs.
- SC-2.8 Construction Videos. The Contractor shall submit pre and post-construction videos in accordance to SAWS Standard Specification Item 1114.
- SC-2.9 Materials Testing. All Quality Assurance testing services (material proctor tests, density tests, concrete tests) required shall be preformed by a third party

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under the direction of SAWS. Such testing should be coordinated with SAWS, Contractor, and the SAWS Representative. Such testing does not relieve the Contractor from responsibility for quality control of the project work. Testing that the Contractor is required to perform shall be at Contractor's own expense.

- SC-2.10 Record Drawings. The Contractor shall submit all record drawings as required to SAWS inspections.
- SC-2.11 Payment. Except where bid items are specifically provided in the Proposal, payment to the Contractor to accommodate the requirements specified herein shall be included in the unit or lump sum price costs for the items bid and shall be considered to be subsidiary to the various items of work under this contract if so specified in the Standard or Special Specifications.
- SC-2.12 Existing Conditions. Existing subsurface conditions shall be confirmed by the CONTRACTOR. A Geotechnical Engineering Report for this project is provided by SAWS as Supplementary Information for informational purposes only. The accuracy and completeness of the information is not guaranteed. All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed, to include but not limited to rock, stone, sand, organic material, or whatever material is encountered.
- SC-2.13 Coordination with Others. The Contractor agrees to cooperate and coordinate its work with the existing property owners and/or work conducted by other contractor(s) within the project area so that this project can be completed in an orderly and coordinated manner, reasonably free of significant disruption to any party. All parties shall be solely required and obligated to coordinate and cooperate with each other to accomplish the scope of work required. SAWS shall have no duty to administer, perform or supervise the coordination for the use of the project site by all parties. The Contractor agrees that any delay or hindrance caused by or contributed to by failure to cooperate and/or coordinate among all parties will be governed by the Section and Section 6.7.1 of the General Conditions (commonly referred to as a "no damages for delay" clause).
- SC-2.14 Proposed CMU/Masonry Wall. The dry stack adhered stone used for the proposed CMU/Masonry wall shown on Sheet S7 of the Plans shall match the ranges of colors, shapes, textures and sizes of the stones of the existing wall located at the northwest corner of the Dominion Drive and Crescent Park Intersection. The overall finished appearance of the proposed wall also shall match the existing wall located at the northwest corner of the Dominion Drive

and Crescent Park Intersection. See Specification Section 04300 for photos of existing wall.

SC-3.0 ARTICLE V. CONTRACT RESPONSIBILITIES

SC-3.1 Construction Stakes, Page GC-24; Replace paragraph 5.16.1 with the following:

“The Contractor will be supplied with the appropriate benchmark information, but construction staking will be the responsibility of the Contractor. Detailed transfers of elevation, line and grades to structures and other features of the Work shall be the responsibility of the Contractor.”

SC-3.2 Construction Stakes, Page GC-24; Replace paragraph 5.16.2 with the following:

“WATER MAINS - The Contractor will be supplied with the appropriate benchmark information, but construction staking will be the responsibility of the Contractor. Detailed transfers of elevation, line and grades to structures and other features of the Work shall be the responsibility of the Contractor.”

SC-4.0 ARTICLE VIII. CONTRACT TIME COMPLETION

SC-4.1 Working Day, Page GC-34; Add the following paragraph at the end of 8.3.1:

“Manufacturer and subcontractor selection are within Contractor’s control. Extension of Contract Time due to delays in delivery of Contractor’s choice of pipe material, and warrant time extensions will not be allowed”

SC-5.0 ARTICLE IV – CONTRACT ADMINISTRATION

SC-5.1 Page GC-10; Section 4.6 of the general conditions shall be amended to add the following:

CONTRACTORS – The Contractor shall perform the Work with its own organization on at least 40% of the total original contract price.

The term to “perform the Work with its own organization” is defined herein as utilizing only:

- Workers employed and paid directly by the Contractor or a wholly owned subsidiary of the contractor.
- Equipment owned by the contractor or its wholly owned subsidiary.

- Rented or leased equipment operated by the Contractor's, or its wholly owned subsidiaries, employees.
- For purposes of determining the value of the Work self-performed, the amount shall include all materials incorporated into the Work where the majority of the value of the Work involved in incorporating the material is performed by the Contractor's own Organization, including wholly owned subsidiary; and
- Labor provided by staff leasing firms licensed under Chapter 91 of the Texas Labor code for non-supervisory personnel if the contractor or wholly owned subsidiary maintains direct control over the labor.

The remaining sections of Article IV shall remain the same.

SC-6.0 ARTICLE V – CONTRACT RESPONSIBILITIES

SC-6.1 Superintendent, Page GC-17; Section 5.4 of the general conditions shall be amended as follows:

SUPERINTENDENTS - The Contractor shall keep on-site pursuant to this Project during its progress a competent full time Superintendent who is a direct employee of the prime contractor and any necessary assistants, all satisfactory to the Owner.

The appointment of a designee in lieu of a full time superintendent shall not be allowed as part of this provision, therefore any reference to "designee" shall not be applicable.

The remaining section of this section shall remain the same.

**SECTION 01010
SUMMARY OF WORK**

01010.10 GENERAL

01010.11 PROJECT OVERVIEW

The work to be performed under this contract consists of providing all labor, equipment, and materials necessary for construction of the Crescent Park Booster Station Project, SAWS Job No. 12-6006.

01010.12 PROJECT LOCATION

The project is located near 1 Crescent Park, San Antonio, TX 78257.

01010.13 GENERAL DESCRIPTION OF PROJECT WORK

The following general descriptions of the major items of work are for information only. Contractor shall refer to plans for specific items of work to be performed under this contract.

A. General Description of Site/Civil/Mechanical Work

1. Construction of approximately 790 l.f. of new 12-inch PVC water main, 175 l.f. of new 16-inch PVC water main, 40 l.f. of jacking and boring a 24" steel casing and 8" carrier pipe, and all associated valves, fittings, restraints, pavement replacement, testing, etc. (Refer to sheets W1 thru W5).
2. Construction and installation of a pre-manufactured pump skid (1-1000 gpm pump, 2-500 gpm pumps, and 1-130 gpm pump), three 5,000 gal. hydropneumatic tanks, and all associated above-ground steel piping, fittings, valves, etc. within the proposed booster station site (Refer to sheets P1 thru P8).
3. Construction of approximately 340 l.f. of 12-inch ductile iron water line piping and 74 l.f. of 16-inch ductile iron water piping (below ground), a below ground PRV in a precast vault, and all associated valves, fittings, restraints, etc. within the proposed booster station site (Refer to sheets P1 thru P8).
4. Construction of site grading, drainage, concrete paving, gravel pavement, fencing/wall, bollards, SW3P item installation/removal, and tree removal and protection, etc. at the new booster station site (Refer to sheets P1 thru P8).

B. General Description of Structural Work (See sheets S0 thru S6)

1. Construction of foundations for 3-5000 gallon hydropneumatic tanks.
2. Construction of a foundation for a pre-manufactured pump skid.
3. Construction of a foundation for a new standby electric generator.
4. Construction of a foundation for a new CPS electric transformer (detailed drawings to be provided by CPS).
5. Construction of a foundation and canopy structure for the booster station electrical, controls, and SCADA cabinets.
6. Construction of a foundation for a new Antenna Tower for SCADA and Security.
7. Construction of foundations for site lighting and security camera poles.

C. General Description of Electrical, Instrumentation and Control Work (See sheets E-1 thru E-43, I1 thru I25)

1. Construction of CPS Energy duct banks and switchgear and transformer equipment pads (Coordinate with CPS Energy for engineered drawings.)
2. Construction of Booster Station underground electrical, instrumentation, control, and security system duct banks.
3. Construction of Booster Station grounding network.
4. Construction of electrical, instrumentation and control equipment concrete housekeeping pads.
5. Installation of electrical, instrumentation, control, and security system equipment and support racks.
6. Construction of exposed above ground electrical, instrumentation, control, and security system raceways.
7. Installation of electrical, instrumentation, control, and security system cable and wire.
8. Installation of electrical, instrumentation, control, and security system wiring devices.
9. Programming of local PLC and associated control system components as well as programming of SAWS SCADA Office HMI.
10. Setting and calibration of electrical, instrumentation, control, and security system components and certification of electrical, instrumentation, control, and security system equipment installation by manufacturers.
11. Conduct on-site demonstration of operational readiness and performance acceptance testing.
12. Provide owner/operator training.

01010.14 EXISTING CONDITIONS

- A. San Antonio Water System (SAWS) will continue to operate and maintain all facilities during construction. Coordination with SAWS will be required for any shutdown necessary to connect to existing systems.
- B. Existing utility locations shown in the drawings are approximate, based on available information. Contractor shall field verify location and elevation of all existing utilities prior to construction. Notify Engineer and SAWS of any conflicts.
- C. Existing subsurface conditions shall be confirmed by the CONTRACTOR. A Geotechnical Engineering Report for this project is provided by SAWS as Supplementary Information for informational purposes only. The accuracy and completeness of the information is not guaranteed. All excavation shall be unclassified and shall include all materials encountered regardless of their nature or the manner in which they are removed, to include but not limited to rock, stone, sand, organic material, or whatever material is encountered.

01010.15 CONSTRUCTION SEQUENCE

- A. Contractor shall follow the general construction sequence outlined below.
 - 1. Install temporary erosion, sediment and water pollution control measures.
 - 2. Clear and grub site, and install tree protection measures per plans.
 - 3. Construct Suction Main (S1).
 - a. Install Suction Main S1 from Station 200+00 to Station 201+68.79. Provide traffic control for work within Dominion Drive per plans.
 - b. Provide temporary cap on suction main at Station 200+00 until tie in to booster station can be made.
 - c. Test and disinfect Suction Main S1.
 - d. Perform tie in to exist 16" water main on Dominion Drive.
 - e. Restore pavement in Dominion Drive per plans.
 - 4. Construct Discharge Main to Hidden Springs (D1)
 - a. Install Discharge Main (D1) from Station 100+00 to Station 103+28.22.
 - b. Install temporary caps at Station 103+28 and Station 100+00.
 - 5. Construct Booster Pumping Station

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- a. Complete site grading per plans.
 - b. Install underground conduits and water piping per plans.
 - c. Construct foundations.
 - d. Install above ground improvements (mechanical equipment, tanks, generator, piping, electrical, sight lighting, canopy, security, etc.)
 - e. Install PRV vault, piping, and valves.
6. Construct Discharge Main to Crescent Park (D2)
- a. Provide traffic control on Dominion Drive per plans.
 - b. Perform bore from Station 14+51 to Station 14+91.
 - c. Install remaining water main from Booster Station to Crescent Park Tie in.
7. Testing, Disinfection and Tie Ins.
- a. Complete testing and disinfection of booster station piping, discharge main D1, and discharge main D2.
 - b. Perform tie in of booster station piping to suction main S1, to discharge main D1, and to discharge main D2.
 - c. Perform tie in of discharge main D2 at Crescent Park per plans.
 - d. Perform tie in of discharge main D1 at Hidden Springs boundary, if Hidden Springs Water Project is completed. Otherwise cap discharge main D1 at Hidden Springs boundary point.
8. Perform Booster Station Testing and Startup.
- a. Contractor shall coordinate with SAWS Operations to open Division Valve on Crescent Ledge.
- B. Contractor may submit an alternative sequence of construction in writing to the SAWS Inspector and Engineer for approval.

01010.16 PROJECT REQUIREMENTS

- A. All work done under this Contract shall conform to all governing local, state, or federal ordinances and laws.
- B. The CONTRACTOR shall take care to protect existing trees that are to remain, in accordance with the most current City of San Antonio Tree Ordinance No. 85262. Unless specified on plans for removal, CONTRACTOR shall avoid damage to trees, brush and any landscaping. Any trees and vegetation damaged or removed that are not specified to be removed on plans shall be replaced with equivalent or better vegetation, at CONTRACTOR'S own expense.
- C. Portions of this project may be subject to review and acceptance by various

agencies. The CONTRACTOR will be required to coordinate with these agencies for such items as issuance of permits or work orders, inspections during construction, and final acceptance. The agencies for this project that may require coordination include but are not limited to the following:

1. City of San Antonio
2. Texas Commission on Environmental Quality
3. San Antonio Water System
4. CPS Energy
5. The Dominion Home Owners Association

- D. Substitutes and "Or-Equal" Items. Whenever a material or article is specified or described by using the name of a product or the name of a particular manufacturer or vendor or model number, the specified item shall be understood as establishing the type, function, and quality desired. Requests for review of equivalency items will not be accepted.
- E. Preparation for Shipment. All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces, which are damaged prior to acceptance of equipment, shall be repainted to the satisfaction of OWNER.
- F. Lines and Grades. All Work shall be done to the lines, grades, and elevations indicated on the Drawings. CONTRACTOR shall provide an experienced instrument person, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, CONTRACTOR shall furnish, without charge, competent persons and such tools, stakes, and other materials as OWNER may require in establishing or designating control points or in checking survey, layout, and measurement work performed by CONTRACTOR.

CONTRACTOR shall keep OWNER informed, a reasonable time in advance, of the times and places at which the CONTRACTOR wishes to do Work, so that horizontal and vertical control points may be established and any checking deemed necessary by OWNER. So it may be done with minimum inconvenience to OWNER and minimum delay to CONTRACTOR. CONTRACTOR shall remove and reconstruct work, which is improperly located.

- G. Connections to Existing Facilities. Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas,

telephone, and electric. In each case, CONTRACTOR shall receive permission from OWNER or the owning utility prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage. CONTRACTOR shall provide a minimum of 72 hours notice prior to making interconnection.

Connections to existing facilities, which are in service, shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

- H. Unfavorable Construction Conditions. During unfavorable weather, wet ground, or other unsuitable construction conditions, CONTRACTOR shall confine its operations to work that will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions that would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the Work in a proper and satisfactory manner.
- I. Cleaning Up. CONTRACTOR shall keep the premises free at all times from accumulations of waste materials and rubbish. CONTRACTOR shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled.

Construction materials generated from demolition activities, such as concrete forms and scaffolding, shall be removed from the site by CONTRACTOR at the end of the workday. CONTRACTOR shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage. Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.

Adequate cleanup will be a condition for recommendation of progress payment applications.

- J. Applicable Codes. References in the Contract Documents to local codes

mean the following:

- Currently adopted International Building Code with City of San Antonio amendments
- Currently adopted International Fire Codes with City of San Antonio amendments
- Current National Fire Protection Association Codes
- Other standard codes, which apply to the Work, are designated in the Specifications and include, but are not limited to, NEC, OSHA, ASHRAE, TCEQ, and EPA.

- K. Reference Standards. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or laws or regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated. However, no provision of any referenced standard, specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR, CONSULTANT, or ENGINEER, or any of their Consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to ENGINEER, or any of ENGINEER's Consultants, agents, or employees, any duty or authority to supervise or direct the furnishing or performance of the Work.
- L. Site Administration. CONTRACTOR shall be responsible for all areas of the site used by it and by all Subcontractors in the performance of the Work. CONTRACTOR will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to OWNER or others. CONTRACTOR has the right to exclude from the site all persons who have no purpose related to the Work or its inspection and may require all persons on the site (except OWNER'S employees) to observe the same regulations, as CONTRACTOR requires of its employees.
- M. Layout of Work and Elevations. The CONTRACTOR shall verify dimensions and elevations indicated in the drawings. Discrepancies between the drawings, specifications and/or existing conditions shall be referred to the OWNER in writing, for review, before the affected work is performed. Failure to make notification shall place the responsibility upon the CONTRACTOR to carry out the work in a satisfactory and workmanlike

manner.

01010.17 ACTIVITIES BY OTHERS

- A. OWNER, utilities, and others may perform activities within Project area while the Work is in progress. Schedule the Work with OWNER, utilities, and others to minimize mutual interference.

- B. The Contractor agrees to cooperate and coordinate its work with the existing property owners and/or work conducted by other contractor(s) within the project area so that this project can be completed in an orderly and coordinated manner, reasonably free of significant disruption to any party. All parties shall be solely required and obligated to coordinate and cooperate with each other to accomplish the scope of work required. SAWS shall have no duty to administer, perform or supervise the coordination for the use of the project site by all parties. The Contractor agrees that any delay or hindrance caused by or contributed to by failure to cooperate and/or coordinate among all parties will be governed by the Section and Section 6.7.1 of the General Conditions (commonly referred to as a “no damages for delay” clause.

END OF SECTION

**SECTION 04300
UNIT MASONRY SYSTEM**

04300.10 GENERAL

04300.11 SECTION INCLUDES

- A. Concrete masonry units.
- B. Reinforcement, anchorage, and accessories.

04300.12 RELATED SECTIONS

- A. Section 03200 – Reinforcing Steel

04300.13 REFERENCES

- A. ACI 530 - Building Code Requirements for Masonry Structures.
- B. ACI 530.1 - Specifications for Masonry Structures.
- C. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- D. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- F. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- G. ASTM A580 - Stainless and Heat-Resisting Steel Wire.
- H. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- I. ASTM A641 - Zinc-Coated (Galvanized) Carbon Steel Wire.

- J. ASTM C90 - Load-Bearing Concrete Masonry Units.
- K. IMIAC – International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.
- L. IMIAC – International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.
- M. UL – Fire Resistance Directory.

04300.14 SUBMITTALS

- A. Product Data: Provide data for masonry units and fabricated wire reinforcement, wall ties and accessories.
- B. Samples: Submit four samples of adhered stone veneer and masonry units to illustrate color, texture and extremes of color range.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

04300.15 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.
- B. Provide one copy of each document if requested.
- C. Installers:
Company specializing in performing the work of this Section with minimum 5 years documented experience.

04300.16 MOCKUP

- A. Provide mockup of adhered stone veneer and masonry units.
- B. Construct a masonry wall into a panel sized 4 feet long by 5 feet high, which includes mortar and accessories, colors, jointing and veneer.

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- C. Locate where directed.
- D. Mockup may not remain as part of the work. The approved mockup will be the standard for all work.
- E. Convene a Pre-Installation meeting to observe Mockup prior to any further masonry work.

04300.17 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work. (IMIAC - Cold Weather Practices).
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during and 48 hours after completion of masonry work. (IMIAC – Hot Weather Requirements).

04300.18 MANUFACTURERS - CMU

- A. Feather-Lite
- B. Texas Industries
- C. E. Dillon and Co.

04300.19 CONCRETE MASONRY UNITS

- A. Hollow Loading Bearing Block Units (CMU): ASTM C90, normal weight, nominal 12” thick.
- B. Size and Shape: Nominal modular sizes as indicated on plans. Provide special units for bond beams, 90 degree corners, and skewed corners.
- C. Water Repellents.
 - 1. Concrete Masonry Water Repellent Protection (Field Applied): WRP-700 as distributed by Feather-Lite Building Products Corp.
 - 2. Concrete Masonry Acrylic Sealer (Field Applied): FBP-707 as

distributed by Feather-Lite Building Product Corp.

04300.20 BRICK UNITS (NOT APPLICABLE)

- A. Face Brick: ASTM C216, Type FBS, Grade MV.
- B. Size and Shape: Modular Size nominal 2 1/4"x3 5/8"x7 5/8" (Nominal Face Size: 2 2/3"x8").

04300.21 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Ladder type; steel wire, hot dip galvanized to ASTM A641 Class 1 after fabrication, 9 gage side rods with 9 gage cross ties.
 - 1. Manufacturer's:
 - a) AA Wire Products
 - b) Dur-O-Wall
 - c) Hohmann & Barnard
- B. Reinforcing Steel: Deformed type, specified in Section 03200.
- C. Wall Ties: Formed steel wire, 3/16 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A123 B2 steel finish.
- D. Strap Anchors: Bent steel shape, 2x8 inch x 16 gage hot dip galvanized to ASTM A123 B2 steel finish. Mfg's: same as A.1. above.
- E. Expansion Joint Stabilizers: Dur-O-Wall D/A 2200.
- F. Miscellaneous Masonry Accessories: As appropriate to the required function and as approved by SAWS/Engineer, all hot dip galvanized to ASTM A153.

04300.22 MORTAR AND GROUT

- A. Mortar and Grout: As specified on drawings. Mortar in exterior face brick and cmu walls shall have water repellent admixture.

04300.23 ACCESSORIES

- A. Preformed Control Joints: Polyvinyl chloride material. Provide w/ corner and tee accessories, heat fused. Mfg. Dur-O-Wall: Hohman & Barnard, Mod VS Standard.
- B. Compressible Joint filler: Closed cell polyethylene; oversized 50 percent to joint width; self-expanding.
- C. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials
- D. Centering Clips: Provide clips that prevent displacement of reinforcement bars during course of construction.
- E. Control Joint Bond Breaker: 3/8" neoprene filler strip.
- F. Fill Stop: Monofilament screen to prevent mortar drop through at selected areas in cavity wall or cmu.

04300.24 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

04300.25 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

04300.26 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.

- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: concave.
- D. Brick Units: (NOT APPLICABLE)
 - 1. 1/2 Running Bond.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

04300.27 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corner.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. Prevent broken masonry unit corners or edges.

- H. Cut mortar joints flush where wall tile is scheduled; resilient base is scheduled; synthetic plaster or polymer based cementitious coating is scheduled; inner liner G.B. wall is scheduled; or bitumen damp proofing is applied or where other finish surface other than paint is scheduled.

04300.28 WEEPS (NOT APPLICABLE)

- A. Install weeps in brick veneer at 24 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls and at other places where indicated or otherwise required to allow moisture to drain from cavity.

04300.29 CAVITY WALL (NOT APPLICABLE)

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.
- B. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor barrier adhesive.
- C. Pea Gravel. Install 6 inches of pea gravel at bottom of cavity walls to help prevent sealing off of weep holes and/or utilize/install other accessory product (submit & approve) designed for same purpose at weeps.

04300.30 REINFORCEMENT AND ANCHORAGES – CAVITY WALL MASONRY AND SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches o.c.. in bed joints of CMU.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Expansion Joints. Install preformed PVC control joints where indicated. Install as per manufacturer's instructions. CMU control joints shall be spaced as shown.

- F. Joint Stabilizing Anchors. At expansion joints in masonry walls, install joint stabilizing anchors at 24 inches on center vertically for both face brick and CMU.
- G. At all single wythe CMU partitions, provide one #5 reinf. bar full height at minimum 6 feet o.c. unless shown otherwise on structural drawings.

04300.31 LAYING CONCRETE MASONRY UNITS

- A. Lay masonry units only when lighting is adequately illuminated.
- B. Cut all masonry units with a motor-driven saw, using diamond or abrasive blades.
- C. Take masonry units from multiple pallets for blending.
- D. Align masonry units level, plumb and true with uniform concave tooled 3/8 inch wide joints. Scored units shall be tuck-pointed and tooled with a concave jointer to match head and bed joints.
- E. All masonry units shall be laid using mortar with integral water repellent admixture "Dry-Block Admixture" at the rate recommended by W.R. Grace & Company.
- F. Flashing, Weep Holes and Control Joints: Install flashing, weep holes and control joints as specified herein and indicated on the drawings.
- G. Cover walls each day after installation to keep open wall protected and dry.
- H. During installation, keep masonry units clean daily using brushes, burlap, etc.
 - 1. No high pressure spray (power wash) cleaning methods shall be used. Please note: The initial factory-applied coating is a part of the coating system. During the cleaning process, some or all of the initial coating will be stripped from aggressive scrubbing and/or misuse of acidic cleaners. The result will be an uneven appearance in color and sheen. Adhering to the following field coat products and specifications will ensure the desired results.

04300.32 MASONRY FLASHINGS (NOT APPLICABLE)

- A. Extend flashings horizontally at foundation walls, above ledge or shelf angles and lintels, at bottom of walls, and as shown. Extend flashing membrane fully to exterior face plane.
- B. Turn sheet membrane waterproofing up minimum 16 inches and turn 1" into CMU bed joint.
- C. Lap end joints minimum 6 inches and seal watertight.
- D. Turn flashing, fold, and seal at corners, bends, and interruptions.

04300.33 LINTELS (NOT APPLICABLE)

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
- C. Openings Up to 42 inches wide: Place one, No. 4 reinforcing bar 1 inch from bottom web or as per structural, whichever is greater.
- D. Openings From 42 inches Up to 78 inches Wide: Place two, No. 5 reinforcing bars 1 inch from bottom web or as per structural, whichever is greater.
- E. Openings Over 78 inches: Reinforce openings as detailed.
- F. Do not splice reinforcing bars.
- G. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- H. Place and consolidate grout fill without displacing reinforcing.
- I. Allow masonry lintels to attain specified strength before removing temporary supports.
- J. Maintain minimum 8 inch bearing on each side of opening or as noted

otherwise.

04300.34 GROUTED COMPONENTS

- A. Reinforce bond beam with 2, No. 6 bars, 1 inch from bottom web or as per structural, whichever is greater.
- B. Lap splices minimum 48 bars diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

04300.35 REINFORCING MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between withes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back upward. Permit mortar to cure 7 day before placing grout.
- C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200.
- E. Do not wet masonry unit surfaces in contact with grout prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout unless noted otherwise on structural drawings/notes.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

H. Grouting:

1. Provide cleanout opening no less than 4 inches at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
2. Clean out masonry cells with compressed air, remove debris.
3. Request inspection of the cells. Allow 3 days advance notice of inspection.
4. After cleaning and cell inspection, seal openings with masonry units.
5. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
6. Limit grout lift to 60 inches unless otherwise allowed by Structural drawings/notes and rod for grout consolidation or mechanically vibrate. Wait 30 to 60 minutes before placing next lift.

04300.36 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Form control joint with 3/8" neoprene bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant; or install preformed control joint device in continuous lengths; seal butt and corner joints in accordance w/ mfg's instructions.
- C. Form brick expansion joint as detailed. (backer rod and sealant unless otherwise shown)

04300.37 BUILT-IN WORK

- A. As work progresses, install built-in metal gate.
- B. Install built-in items plumb and level.

04300.38 TOLERANCES

- A. Maximum Variation From Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft. and 1/2 inch in 20 ft. or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft. and 1/4 inch in 10 ft.; 1/2 inch in 30 ft.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

04300.39 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other work. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

04300.40 FIELD QUALITY CONTROL

- A. Inspect and test all masonry work.

04300.41 CLEANING

- A. Clean masonry work.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.

- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

04300.42 PROTECTION OF FINISHED WORK

- A. Protect finished work.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

04300.43 FIELD COAT APPLICATION OF WATER REPELLENT PROTECTION OF MASONRY UNITS

- A. After the final clean down when the walls are dry, apply ground face concrete masonry water repellent protection, WRP-700, or as recommended by W.R. Grace Co. as specified herein to all walls laid with ground face concrete masonry units with one flood coat using an industrial pump sprayer.
- B. After water repellent protection has cured as recommended by manufacturer, apply one coat of FBP-707 Ground Face Concrete Masonry Acrylic Sealer or as recommended by W.R. Grace Co. evenly as specified herein without runs or drips, using airless spray equipment.

04300.44 DRY STACK ADHERED STONE VENEER

- A. The dry stack adhered stone used for the proposed CMU/Masonry wall shown on Sheet S7 of the Plans shall match the ranges of colors, shapes, textures and sizes of the stones of the existing wall located at the northwest corner of the Dominion Drive and Crescent Park Intersection. The overall finished appearance of the proposed wall also shall match the existing wall located at the northwest corner of the Dominion Drive and Crescent Park Intersection. See below for photos of existing wall.

**Crescent Park Booster Station Project
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Existing Wall Photo No. 1



Existing Wall Photo No. 2

END OF SECTION

SECTION 15500
HYDROPNEUMATIC TANK SYSTEM

15500.10 GENERAL

15500.11 GENERAL DESCRIPTION

1. The hydropneumatic tank system includes one (1) 5,000-gallon hydropneumatic tank suction side and two (2) 5,000-gallon hydropneumatic tanks discharge side, tanks accessories, air supply, and air supply control.

15500.12 SCOPE OF WORK

1. The hydropneumatic tank manufacturer shall furnish materials, equipment, and incidentals necessary for the hydropneumatic tank system specified herein and shown on the drawings.
2. The hydropneumatic tank manufacturer shall be responsible for overall supply and quality of all the items specified herein and shown on the drawings.
3. The hydropneumatic tank manufacturer shall be responsible for testing, start-up, troubleshoot, and personnel training of the hydropneumatic tank system specified herein and shown on the drawings.
4. The Contractor shall install the hydropneumatic tank system specified herein and shown on the drawings.

15500.13 REFERENCE STANDARDS

1. American Water Works Association (AWWA).
2. American National Standards (ANSI).
3. American Standards for Testing Materials (ASTM).
4. American Society of Mechanical Engineers (ASME).
 - A. Boiler and Pressure Vessel Code, Section VIII, Unfired Pressure Vessels
 - B. Section IX, Welding and Brazing Qualifications
5. Underwriters Laboratory (UL).
6. National Electrical Code (NEC).
7. NEMA (National Electrical Manufacturer's Association).

15500.14 INTENDED FUNCTIONALITY

1. The intended functionality of the hydropneumatic tank system is expressed by the description and requirements presented throughout the Drawings and Specifications.
2. The Contractor and the hydropneumatic tank system Manufacturer shall acknowledge that a requirement for final acceptance of the hydropneumatic tank system shall be the fitness of the system and each of its parts to perform the intended functions as set forth in the Contract Documents. The Drawings and Specifications do not purport to provide a “total” description of every component or miscellaneous function of the hydropneumatic tank system. The Drawings and Specifications include that information necessary to identify the requirements of the system as it compares to systems of its type so that a knowledgeable person may determine system requirements. The lack of specific inclusion in the Drawings and Specifications of any component necessary for completeness or for proper functioning/operation of the system shall not be construed as license or justifiable cause for its exclusion. All determinations of the fitness of the system in performing the intended functions shall be made by the Engineer.

15500.15 QUALIFICATIONS

1. The equipment specified in this item shall be supplied by only those manufacturers who are fully experienced, reputable, qualified and regularly engaged in the manufacture of the components to be furnished. The contractor shall not utilize individually purchased components and controls. The complete hydropneumatic tank system including all components, controls and services shall be furnished by a single supplier who shall be responsible for the operation of the complete system.
2. Manufacturers: One of the following:
 - A. Hydro-Air Systems, Inc. Winter Garden, Florida.
 - B. PULSCO, Irvine, California.

15500.16 SUBMITTALS

1. See Item 01330, Submittals, for submittal requirements.

2. Provide product Information and descriptive literatures for the following components:
 - A. Hydro-pneumatic tank.
 - B. Safety relief valve.
 - C. Solenoid valves.
 - D. Vacuum relief valve.
 - E. Air compressor unit.
 - F. Air supply control panel.
 - G. Magnetic level gauge and transmitter.
 - H. Full enclosure for magnetic level gauge and transmitter.

3. Submit following shop drawings:
 - A. Tank design notes and calculations.
 - B. Certified drawings.
 - C. Performance curves.
 - D. Foundation and installation plans.
 - E. Wiring and piping schematics.

15500.20 MATERIALS

15500.21 HYDROPNEUMATIC TANK

1. The hydropneumatic tank #1 (suction) shall have a nominal capacity of 5,000 gallons and design working pressure of 100 psig at 150 degrees Fahrenheit with a 1/8-inch corrosion allowance. It shall be designed, fabricated, tested, inspected and stamped in accordance with ASME Code. Hydropneumatic tanks #2 & #3 (discharge) shall have a nominal capacity of 5,000 gallons each and design working pressure of 175 psig at 150 degrees Fahrenheit with a 1/8-inch corrosion allowance. It shall be designed, fabricated, tested, inspected and stamped in accordance with ASME Code.

2. The following components shall be an integral part of Hydropneumatic Tanks:
 - A. Standard dished heads;
 - B. Lifting lugs;
 - C. Two support saddles welded to the tank shell as shown on the drawings;

- D. One 24-inch diameter manway as shown on the drawings;
 - E. Inlet/Outlet Connections:
 - a. Hydropneumatic Tank No. 1 (Suction): Two (2) 16-inch flanged inlet/outlets as shown on the drawings;
 - b. Hydropneumatic Tanks No. 2 and 3 (Discharge): Two (2) 12-inch flanged inlet/outlets as shown on the drawings;
 - F. One site gauge box with hinged door and pad-lockable hasp as shown on the drawings.
 - G. One (1) 2-inch threaded drain outlet as shown on the drawings;
 - H. Standard threaded connections (NPT) as shown on the drawings.
 - I. Full enclosure for magnetic level gauge and transmitter with horizontal opening front as shown on the drawings.
 - J. All other components as shown on the drawings.
- 3. All flanges shall be 150-pound ANSI standard type, faced and drilled 125-pound ANSI standard.
 - 4. Paint the hydropneumatic in accordance with the following:
 - 5. Tank Interior: Factory prepare surfaces with abrasive blast or centrifugal wheel blast (SP 10), factory prime with polyamide anticorrosive, epoxy primer (one coat, 3MDFT), factory finish with NSF 61 approved high build polyamide epoxy meeting AWWA-D102-78 (two coats, 12 MDFT), Tnemec Series N140.
 - 6. Tank Exterior: Factory prepared and prime, and field finished with System specified in Item 09960, High Performance Coatings. Tank exterior color shall be Pantone 284C.

15500.22 TANK ACCESSORIES

- 1. An ASME nameplate shall be permanently attached to the tank.
- 2. Safety Relief Valve
 - A. Provide heavy duty, high capacity air/gas release valve.
 - B. Pressure rating: 300 psig working pressure.
 - C. Single piece construction with top guided disc, wave spring retained disc guide, and manual open lift lever.
 - D. Provide 2-inch male threaded NPT inlet and 2-inch threaded NPT female outlet.

- E. Built in accordance with ASME Boiler and Pressure Vessel Code, Item VIII.
 - F. Certified capacity by National Board of Boiler and Pressure Vessel Inspectors.
 - G. Manufacturers:
 - 1) Conbraco one (1) Model Number 19KHHK0100 and (2) two model number 19KHHK0200.
 - 2) Equivalent model as manufactured by APCO.
 - H. Safety relief valve shall be factory adjusted to release 1,736 scfm minimum at 100 psig and 3,267 scfm minimum at 200 psig.
3. Magnetic Level Gauge with Transmitter for each tank:
- A. Jogler MGT-6000,
 - B. Equivalent model as manufactured by Magnetrol,
 - C. Or equivalent model as manufactured by Kenco.
4. Vacuum Relief Valve:
- One piece bronze body construction, 2-inch MNPT inlet, 2-inch FNPT outlet for each of three tanks:
- A. Conbraco Number 14-605V10,
 - B. Or equivalent model as manufactured by APCO.
5. Heat Trace
- Heat trace shall be installed on all water piping that is less than or equal to (2) inches in diameter, on level gauge, and on pressure transmitters in accordance with Section 16533.

15500.23 AIR SUPPLY

- 1. Air supply includes air compressor unit and air discharge line piping.
- 2. Air compressor unit
 - A. The air compressor unit shall include air compressor, air tank, and motor.

- B. The unit for both discharge tanks shall be one (1), Quincy QR-25 duplex, Model QR25 FF325-120 (5 HP) or equivalent model as manufactured by Ingersoll-Rand.
 - C. The unit the suction tank shall be one (1), Quincy QR-25, Model QR25 F325-80 (5 HP) or equivalent model as manufactured by Ingersoll-Rand.
 - D. The air compressor shall be pressure lubricated, 2-stage, 2-piston, V-belt driven, air cooled with cast iron cylinders.
 - E. The compressor lubricant is to be “Food Grade”
 - F. The air compressor shall be powered by 5.0 HP 460/3/60 TEFC electric motors with a 1.15 service factor.
 - G. The suction tank compressor and motor shall be mounted on an 80-gallon ASME 200 psi tank with an automatic electric timed tank drain.
 - H. The discharge tanks compressor and motor shall be mounted on a 120-gallon ASME 200 psi tank with an automatic electric timed tank drain.
3. Air discharge line piping
- A. Air discharge line piping shall include a 0.9 micron oil removal filter, air add solenoid valve, air vent solenoid valve, inline check valve, and isolation valves. The piping shall be connected as shown on the drawings.
4. Solenoid Valves
- A. Solenoid valve shall be 2-way type for normally closed operation designed for not less than 150 psi water working pressure. Valves shall have forged brass bodies; NPT threaded ends; stainless steel wetted parts; Buna N seals/disks; and NEMA 4X solenoid enclosures. The valves shall operate on 120 VAC power, shall have threaded conduit hubs and shall not require a minimum operating pressure differential for steady operation. The valves shall be manufactured by Automatic Switch Company (ASCO Red Hat).

15500.24 AIR SUPPLY CONTROL

- 1. The correct compressed air to water ratio shall be maintained at all times for the hydro-pneumatic tank systems. The correct ratio is accomplished

by a Jogler MGT-6000 level control unit or equivalent model as manufactured by Kenco or Magnetrol consisting of a magnetic level gauge and transmitter for continuous level monitoring with a Hart protocol 4-20 mA output. The control panel will include the following conditions:

- A. High water level alarm
- B. Add air water level
- C. Low water level alarm.

The Jogler MGT-6000 level control unit or equivalent model as manufactured by Kenco or Magnetrol with Hart 4-20 mA output shall be provided for continuous level monitoring of each hydropneumatic tank.

2. The air add solenoid valve shall open to supply air into the tank only when the following three conditions are present:
 - A. The hydro-pneumatic tank pressure is below normal pump shut-off pressure.
 - B. The water level in the tank is above the add air water level.
 - C. And the pump or pumps are running.
3. The pressure in the tanks will be read by a Coplanar pressure gage transmitter, with a pressure range of -330 to 300 psi, a 4-20 mA output with digital signal based on HART protocol, stainless steel flange and drain vent, 316L SST isolating diaphragm, glass-filled PTFE o-ring, silicone fluid fill, aluminum housing with LCD display, analog zero and span configuration buttons. The pressure transmitter shall be a Rosemount model 2051 or equivalent model as manufactured by Foxboro.
4. The Air Supply Control Panel meeting the following requirements:
 - A. See Specification Items for Process Instrumentation And Controls, and Low-Voltage Electrical Work—General Requirements, for the requirements for motor starters, pushbutton and selector switches, indicator lamps, disconnects, circuit breakers, transient voltage surge suppressors, identification of devices, and other applicable requirements specified therein.
 - B. Furnish a control panel to operate the air compressors, and the hydropneumatic tank air volume control system. This single control panel shall be provided and shall include air compressor motor starters, main and control breakers, transformer, solenoid

valve relays, terminal strip, dry remote contacts enclosed in a NEMA 4X stainless steel enclosure suitable for wall or free standing mounting.

- C. The control panel shall be designed for 480-Volt, 3-phase operation with internal supply of 120 VAC, 60 Hz, single phase control power via a fused Control Power Transformer (CPT).
- D. The compressor motor starters shall be appropriately sized combination type Full-Voltage Non-Reversing (FVNR).
- E. The control panel shall be installed adjacent to the compressors.
- F. The control panel shall be of the annunciating type and shall include air compressor elapsed time meters (99,999 hours, non-resetting), control power on light (white), compressor run light (red), compressor high air temperature and low oil pressure light (amber), High water level alarm (amber), Low water level alarm (amber), Low system pressure (amber) and High system pressure (amber).
- G. The control panel shall have visible and audible failure alarm with silence button, to indicate any system fault.
- H. The control panel shall be equipped with sufficient sets of dry contacts to transmit the following alarms to the High Service Pump Station Controller:
 - I. High water level alarm
 - J. Low water level alarm
 - K. Low hydropneumatic tank air pressure
 - L. High hydropneumatic tank air pressure
 - M. General compressor failure alarm (combined fail to start, and low oil pressure)

15500.25 TOOLS AND SPARE PARTS

- 1. The air compressor shall be supplied with the following spare parts and special tools if required for the normal operation and maintenance of the unit.
 - A. Special tools if required.
 - B. Two complete set of gaskets.
 - C. Four inlet filter elements.
 - D. Four oil filters.
 - E. Two set v-belts.
 - F. Two gallons "Food Grade" Reciprocating Oil.

- G. All spare parts shall be packed in containers clearly marked as to its contents, duplicate parts shall be interchangeable.
- H. An itemized list of all spare parts shall be included in parts list and instructions as specified in 15500.14.

15500.30 EXECUTION

Install as shown and in compliance with manufacturer's instructions. Provide anchor bolt template and stainless steel fusion-bonded coated cast-in-place anchor bolts. Provide support for attached piping and accessories. Contractor shall provide initial charge of compressed air with portable compressor for testing and startup, unless directed by the Engineer or Owner otherwise.

END OF SECTION

SECTION 17100

PROCESS INSTRUMENTATION AND CONTROL SYSTEM PICS

PART 1 GENERAL

1.01 SCOPE

- A. Provide all labor, materials, and equipment to design, furnish, install, calibrate, test, adjust, and place in operation the facility monitoring and control system as specified herein and as shown on the PLANS.
- B. The PLANS and Specifications show and specify those features required to illustrate and describe functional requirements of the monitoring and control system.
- C. A single Instrument and Control System Contractor (ICS) shall furnish all services and equipment defined herein and in other Specification sections as listed below under Related Work. These services include but not limited to furnishing the design, equipment, installation, calibration, programming, checkout, required documentation, maintenance, etc. for the entire instrumentation and control system as specified herein and in Division 17 of the Specifications and also in Section 17101 "Control System Strategies" of the Contract Specifications. These services also include but not limited to furnishing the design, equipment, installation, calibration, programming, checkout, required documentation, maintenance, etc. for the security system as identified in section 17550 of the Specifications. The Instrument and Control System Contractor is referred to herein and after (in Division 17 of the Specifications and in Section 17101) as the ICS, ICS supplier/firm, or Contractor.
- D. The subsequent document entitled "Appendix A – Sample SAWS I&C Test Procedure" is hereto made part of this section and it exemplifies the minimum level of formatting, content, and detail for a SAWS I&C test procedure that is expected by the Owner. The test procedure shown in "Appendix A" is not inclusive of all equipment required by this Contract. Additionally, this Section of the Specifications requires additional tests and test procedures which are not described in Appendix A. The test procedure requirements shown in Appendix A shall be considered over and above the other requirements described in this Section of the Specifications. Refer to other subsections of this Specification Section for additional requirements in addition to those listed in "Appendix A".

- E. The **ICS** shall also:
1. Terminate and tag all field wiring associated with the process instrumentation and control system shown on the PLANS and specified herein and in other Specification sections listed below under Related Work. This includes termination and tagging of instrumentation and control system wiring within, inside and at:
 - a. Proposed Main Instrument Control Panel MCP named as “PROD440RTU901” on the PLANS.
 - b. Proposed Lighting Contactor Panels named as “PROD440LC901” on the PLANS
 - c. Proposed 480V generator “PROD440GEN901”, 480V Low Voltage Motor Control Centers, variable frequency drives, reduced voltage starters, and other power distribution/control equipment as shown on the PLANS
 - d. Proposed air compressors PROD440ACOMP901, PROD440ACOMP902, hydro-pneumatics tanks, and other process/mechanical equipment with packaged control systems
 - e. MAS radio system antenna, radio, and other communication components
 - f. The Heating and Ventilating and Air-conditioning (HVAC) Units
 - g. All the mechanical equipment
 - h. I&C wiring Field termination junction boxes.
 - i. Field mounted Control Stations
 - j. Field mounted instruments and control/sensing devices such as pressure switches, vibration switches, level transmitters, temperature transmitter, pressure transmitters, limit/position sensing switches, process variable indicators and sensors, machine monitoring sensing devices, etc.

- k. All Supervisory Control and Data Acquisition (SCADA) System wiring and cables. Including extension and termination of the Modbus Plus network, fiber optic network, remote I/O wiring, etc.
- 2. Tag Instrumentation and control wiring/cable and Fiber-Optic cables per the requirements and methodology/scheme outlined in specifications *Section 16200 "Wiring (600 volt and Below) paragraph 3.03 "Wire Tagging Methodology"*.
- 3. Calibrate, set and test the PICS equipment, components, cables, hardware, and software.
- 4. Provide special additional services during installation, including:
 - a. Verifying that the following are furnished and installed:
 - 1) Correct type size, and number of signal wires with their raceways.
 - 2) Correct electrical power circuits and raceways.
 - b. Required submittals.
 - c. Equipment and ancillaries.
 - d. Instructions, details, and recommendations to, and coordination with, all other installation entities for Certificate of Proper Installation.
 - e. Certifying readiness for operation.
 - f. Starting up.
 - g. Testing.
 - h. Training
 - i. Use of testing/calibration equipment to facilitate calibration/testing of field sensors and instruments. Equipment shall include, but not be limited to:
 - 1) Test pressure pump for field calibration/testing of pressure transmitters

- 2) Signal generator/multi-function meter for field calibration/testing of resistance temperature detector (RTD) monitoring devices
 - 3) Shaker table for vibration transmitters, etc.
 - j. Configure communication devices such as Ethernet switches, MAS radio, radio antenna, etc.
 - k. Install instruments associated with process/mechanical equipment that ship un-installed such as vibration transmitters, RTDs, etc.. Install in the locations as determined by the process/mechanical equipment manufacturer and in accordance with the instrument manufacturer's recommendations. Coordinate and assist the process/mechanical equipment manufacturer with their testing of the vibration transmitters/RTDs, diagnose discrepancies in system operation as well as assist the process/mechanical equipment manufacturer in diagnosing discrepancies in system operation. Include time to correct and adjust any discrepancies and retest.
5. Heat Tracing and Tubing Insulation: Size, furnish and install heat tracing for instrument tubing per the PLANS and in accordance with the requirements of Section 16533. Coordinate electrical service to the heat tracing with the electrical contractor and make all final connections for a complete and functional heat tracing system
- F. The ICS shall procure the services of a Top-End Computer Programmer (TECP) for application software programming for the SAWS SACADA office Transdyn SCADA system, including its associated Human Machine Interface (HMI) graphics. The TECP shall perform all work necessary to configure, customize, debug, install, connect, and place into operation all SCADA software specified within this Division and other related divisions. The ICS shall coordinate with the TECP all scheduling, installation, and startup services. The TECP shall be one of the following:
1. Transdyn
 - a. David C. Gumpel
 - b. Senior Project Manager
 - c. 4256 Hacienda Dr, Suite 100
 - d. Pleasanton, CA 94588
 - e. Tel: 925-460-5533
 2. CH2M Hill
 - a. Dhumal N. Aturaliye
 - b. SCADA / I&C Engineer

- c. 12301 Research Blvd, Suite 250
 - d. Austin, TX 78759
 - e. Tel: 512-249-3310
- G. The ICS shall procure the services of an Industrial Automation Programmer (IAP) for application software programming. With exception to the SAWS SCADA Office HMI system, all configuration, programming, and integration, including but not limited to, PLC configuration and/or programming, OIU, loading of software for process devices, Ethernet configuration and communications verification shall be performed by the IAP. With exception to the SAWS SCADA Office HMI system, the IAP shall perform Applications Software Development, Installation, and Testing services as specified hereinafter. The IAP shall be one of the following:
- 1. Prime Controls
 - a. 815 Office Park Circle
 - b. Lewisville, Texas 75057
 - c. Attn: Gary McNeil
 - d. Phone: 972.221.4849
 - 2. Richardson Logic Control
 - a. 8115 Hicks Hollow
 - b. McKinney, Texas 75071
 - c. Attn: Michel Cunningham
 - d. Phone: 972.542.7375
 - 3. Wunderlich - Malec
 - a. 2855 Trinity Square Drive, Suite 100
 - b. Carrollton, Texas 75006
 - c. Att.: Adrian Beaty
 - d. Phone: 469.574.2500
 - 4. BL Technology, Inc.
 - a. 1730 S. Cherry St. Tomball, TX 77375
 - b. Phone: 832.698.8000
 - c. Fax: 832.698.8001
- H. The ICS shall be responsible for all work performed by the TECP and IAP. The ICS shall be responsible for and coordinate with the TECP and IAP to perform Applications Software Development, Installation, and Testing services as specified hereinafter for the entire project.
- I. All Applications Software Development shall be performed in accordance with the Owner's pre-established programming conventions for the facility and for the SAWS SCADA Office HMI system. The SAWS SCADA Office HMI system is a Transdyn system. Design, furnish, and install application software algorithms and associated graphic screens for the Programmable Logic Controller (PLC) and Operator Interface Unit (OIU), inclusive of the software and licenses that are required to facilitate the application software

development. Design, furnish, and install application software algorithms and associated graphic screens for the SAWS SCADA Office HMI system, inclusive of the software and licenses that are required to facilitate the application software development. OIU development and SAWS SCADA Office HMI development shall at minimum include system tag database development, device communication configuration and settings, monitoring, control, menus and navigation, alarming, historical data collection, historical trending, alarm logging, and event logging, per the SAWS requirements and standards. SAWS SCADA office HMI configuration shall also at minimum include reporting configuration and report generation per the requirements of SAWS. ICS is entirely responsible for furnishing and installing all hardware and software (inclusive of any licenses) required to establish communication and configure all the required database points between the SAWS SCADA Office HMI system with the Crescent Park Booster Station PLC system. Place the system into complete operation meeting the objectives and requirements of this project, in accordance to SAWS standards and requirements, and all that is required to accomplish what is shown on the PLANS. Refer to and comply with the requirements of Section 17101 "Control System Strategies". Coordinate all ranges, units, setpoints, timer settings, etc., with the Owner. The ICS shall perform Applications Software Development, Installation, and Testing for the following:

1. The proposed PLCs furnished and installed under this Contract.
 2. The proposed OIU furnished and installed under this Contract.
 3. The SAWS SCADA Office HMI system. The SAWS SCADA Office HMI system is located remotely from the Crescent Park Booster Station site. Please coordinate with SAWS personnel for SAWS SCADA Office HMI system information.
 4. The proposed communication cards, converters, switches, and other communication devices furnished and installed under this Contract.
 5. The ICS shall be the sole point of responsibility for the coordination of IP addresses and settings of all communication devices on this project, inclusive of devices furnished by the switchboard and the VFD manufacturers. The ICS shall coordinate all IP settings with SAWS and in accordance to SAWS IP settings standards.
- J. The proposed radio system located the Crescent Park Pump Station site, as shown on the PLANS and described in the SPECIFICATIONS, will communicate with the Owner's existing radio system located off of the Crescent Park Pump Station site. The Owner will perform a radio propagation

survey to determine the optimal location, elevation, and orientation of the proposed radio system antenna. After Bid Award, the Owner will inform the ICS of the desired location, elevation, and orientation of the radio system antenna. The ICS shall furnish and install the radio system antenna and orient the antenna and extend the antenna feed cable as required in accordance with the Owner's requests at No Additional Cost To The Owner. The ICS shall also perform testing with the Owner and diagnose system operation to facilitate the proper operation of the radio system communication link as well as make adjustments to the proposed radio configuration, radio antenna orientation/ elevation/location, data communication cabling between the radio and other equipment, and PLC application software as required for proper system operation at No Additional Cost To The Owner.

1.02 RELATED WORK AND EQUIPMENT SPECIFIED ELSEWHERE

- A. Division-16 ELECTRICAL SPECIFICATIONS.
- B. Division-17: INSTRUMENTATION AND CONTROL SPECIFICATIONS.
- C. Section 17101 "Control System Strategies" of the Contract Specifications.
- D. All other division of the Specifications related to the installation of the process mechanical equipment, Heating Ventilating and Air-conditioning equipment, etc. that are related to the operation of the instrumentation and control system.

1.03 ACCEPTABLE INSTRUMENT AND CONTROL SYSTEM SUPPLIERS AND INSTALLERS (ICS)

As minimum the ICS firm to have the following:

- A. The ICS firms shall have in-house capability to prepare all necessary component drawings, system drawings (loop diagrams) and installation, operations and maintenance manuals.
- B. The ICS shall have the capability to develop and test all necessary HMI screens, point database, graphics, control sheets, historian database, configurations, and associated attributes at the ICS's facility. This includes development capability for the OIU system as well as the SAWS SCADA Office HMI system. Please note that the SAWS SCADA Office HMI system is located at a remote site from the Crescent Park Booster Station Site.
- C. The ICS firm shall have in-house capability to coordinate design and selection of all components in the instrument and control system. It is understood that the ICS firm shall understand and review the design of the entire process instrumentation and control system PICS and not just trace the PLANS. It is

also understood that the ICS firm shall review all the components, equipment, and software/hardware specifications and prepare detailed purchase orders that will assure the proper features are furnished on each component that will comply with the intent of the Specifications and function as required in the individual system as designed and specified by the Engineer.

- D. The key personnel of the ICS firm that shall be directly engaged in the day-to-day activity of this project shall have a minimum of five (5) years experience in manufacturing and installing complete instrument and control systems for water and wastewater facilities that are similar in scope and value as that proposed for this project. At minimum, the experience of the key personnel of the ICS firm assigned to this project shall encompass specific expertise in instrumentation and control systems of water and wastewater facilities in various facets of the project including administration, management, equipment selection, equipment submittal preparation, proper procurement of equipment, instrument and control panel layout and integrated component/equipment arrangement and wiring, equipment installation and procurement, coordination with Owner/Engineer and equipment suppliers, production of detailed installation/loop/ wiring/etc. drawings,etc. i.e., the ICS firm inclusive of its key personnel shall have the proper resources for the preparation and installation of all efforts and elements of work required to insure proper system setup, proper system operation, and successful completion of this project.
- E. The ICS firm shall own and maintain in its headquarter facility a minimum of 4000 square-ft. of manufacturing space dedicated for layout and manufacturing of control panels and associated wiring and integrated systems. The required square footage of 4000 is manufacturing space only and is exclusive of any office spaces of the ICS firm.
- F. The ICS shall maintain a fully equipped office/production facility with full-time employees capable of fabricating, configuring, installing, calibrating, troubleshooting, and testing the system specified herein. Qualified repair personnel shall be available and capable of reaching the facility within a 24 hour period.
- G. The ICS firm, or each firm whose services are used by the ICS, shall have programming capability that includes the programming of PLCs, the SAWS SCADA Office HMI system, and Operator Interface Units and shall have previously performed similar work for the Owner. The ICS firm, or each firm whose services are used by the ICS, shall have experience with systems including, at minimum, logic algorithm development and graphic screens applications. The key programming personnel that shall be directly engaged in the day-to-day programming activity of this project of the ICS firm, or each

firm whose services are used by the ICS, shall have a minimum of five (5) years experience in programming, installing, and testing complete software applications for water and wastewater facilities that are similar in scope and value as that proposed for this project. At minimum, the experience of the key personnel assigned to this project of the ICS firm, or each firm whose services are used by the ICS, shall encompass specific expertise in software application development for water and wastewater facilities in various facets of the project including conceptual algorithm design, pseudo-code, software flow charts, database management, report generation, graphic screen layout/development, function block programming, coordination with the Owner/Engineer, production of detailed operations manuals, etc. i.e., the ICS firm inclusive of its key personnel and firms whose services are used shall have the proper resources for the preparation and installation of all programming efforts and elements of work required to insure proper system setup, proper system operation, and successful completion of this project. Additionally, the ICS firm, or each firm whose services are used by the ICS, shall have experience in the software applications being employed for this project and be certified by the software manufacturer to develop software for the software applications required for this project. At minimum, these applications are as follows:

1. Square D Schneider Modicon M340 Unity Pro XL Series (6.1 or greater) and the programming language in which the program is to be created in is "FUNCTION BLOCK" software application.
2. Square D Schneider Magelis Vijeo Designer 6.0 or greater.
3. SAWS SCADA Office HMI system Transdyn software

H. The ICS shall in addition meet the following requirements:

1. The ICS firm shall employ personnel on this Project who have successfully completed ISA or manufacturer's training courses on general process instrumentation and configuration and implementation of the specific programmable controllers, computers, and software proposed for this Project.
2. The ICS firm key personnel shall hold ISA CCST Level 1 certification or have a minimum of 10 years of verifiable plant startup experience. Key personnel shall include, as a minimum, the lead field technician.
3. The ICS firm must have successfully completed Work of similar or greater complexity on at least three (3) previous Projects within the last five (5) years. Successful completion shall be defined as a finished Project completed on time and without any outstanding claims or

litigation involving the ICS. Potential references shall be for projects where the ICS's contract was of similar size to this Project.

- I. ICS firms that wish to provide these services on this project shall prepare a qualifications package that shall be submitted to the Owner/Engineer for approval. This qualification package must demonstrate ICS's experience in Paragraphs and satisfy 1.03A through 1.03H herein, which shall be subject to review and approval by Owner. The Owner will make the final determination of whether or not the ICS meets the minimum capabilities, experience criteria, and staff and facility requirements as specified herein. All decisions will be final.

1.04 SPECIAL CONDITIONS

- A. All components shall be used in the instrument and control systems shall be new (not used) and the current model produced by the manufacturer.
- B. All equipment of a common type shall be the product of a single manufacturer and if possible shall be purchased simultaneously to ensure consistency between like equipment for this project.

1.05 SUBMITTALS

- A. General: Do not design, manufacture, or ship any PICS equipment until all related submittals have been reviewed by Engineer. Submit shop drawings and product data in complete functional packages; i.e., submit all shop drawings and product data for a given loop or subsystem together as a functional package. Piecemeal submittals not organized by systems or incomplete submittals for a given loop or subsystem will not be accepted. Drawings shall be neat, legible, and on 2 feet x 3 feet sheets.
- B. Comply with the requirements outlined in *Subsection 1.07* (below) "*Special Submittal Requirements*. Additionally, Submit shop drawings in accordance with *Sections 01330 and 01782* of the Contract Specifications and as specified below:
 1. Prior to the first shop drawing submittal, provide certification that ICS firm has completed the design and taken into account all interrelationships of the specific instruments proposed; and that the design accomplishes the functions described herein and shown on the PLANS.
 2. Detailed product data, catalog cut sheets, cabinet exterior and interior front elevations, bill of materials, and spare parts list

3. Point-to-Point Wiring Diagrams: Prepare Point-to-Point Instrument Loop Wiring Diagrams, ladder diagrams (control schematics), cabinet wiring, and other field wiring diagrams in accordance to the format shown on the PLANS. Drawings to include all relevant information for equipment connected to the PICS, regardless if the equipment is provided by the ICS or not, i.e., include motor control centers, valve actuators, etc. Contractor shall also submit for approval a complete schedule of all wire tag numbers sorted by area and equipment/instrument/field device.
4. Although typical control schematics/instrument loops are presented on the PLANS for some equipment, the Contractor shall generate specific equipment control schematic drawings/instrument loops (i.e., individual control schematic/instrument loop drawings dedicated for each specific equipment) based upon the typical control schematic/instrument loop drawings, the device identification/tag replacement schedules shown on the PLANS, and the additional requirements described herein. The Contractor generated specific equipment control schematics/instrument loops shall follow the same overall presentation format as the typical equipment control schematics/instrument loops presented on the PLANS. The specific equipment control schematics/instrument loop drawings, complete with all specific equipment/device tags (as a minimum, also refer to the additional requirements described herein) shall be generated by the Contractor and included with the project submittals (i.e., prior to equipment purchase) and the “As-Built” drawings. Any Contractor generated control schematic/instrument loop shown as applicable to multiple equipment shall not be accepted.
5. All loop diagrams, ladder diagrams, control schematics, etc., shall be generated with terminal block numbers and wire numbers and be complete in all respects. It is anticipated that all wire numbers cannot be accommodated on the loop diagrams, ladder diagrams, control schematics, etc. format shown on the PLANS. As a minimum, to facilitate the depiction of the wire numbers on the loop diagrams, ladder diagrams, control schematics, etc., the Contractor shall generate and include uniquely identified alpha-numeric wire codes on the loop diagrams, ladder diagrams, control schematics, etc. The wire codes shall cross-reference tables of wire numbers shown on additional drawings that shall be generated by the Contractor. At minimum, the Contractor shall generate the wire codes and the cross-reference tables which depict the wire numbers associated with each wire code and shall group the cross-reference tables by specific equipment (Process Water Pump No. 1, Air Compressor No. 1, etc.). As a minimum, the Contractor shall generate drawings to depict the wire code and wire tag

cross-reference tables and these drawings shall also be grouped by specific equipment (Process Water Pump No. 1, Air Compressor No. 1, etc.). Additional requirements concerning the cross-reference table headings, table organization, wire code generation, formatting, etc., shall be provided by the Owner during the Pre-Submittal Conference specified hereinafter (refer to subsection 1.08, this Section of the Specifications) and the Contractor shall incorporate these requirements at no additional cost to the Owner.

C. Testing Related Submittals:

1. Submit factory and field calibration reports
2. Submit the following for each of type of test (ORT and PAT) required under Division 17 of the Specifications:
 - a. Preliminary Test Procedures: Outlines of proposed tests, forms, and checklists.
 - b. Final Test Procedures: Proposed test procedures, forms, and checklists.
 - c. Test Documentation: Copy of signed off test procedures when tests are completed.
 - d. For each item 17100.1.05.C.2.a through 17100.1.05.C.2.c inclusive, supplement the procedure and documentation provided over and above that specified herein with additional documentation in accordance with the Owner's sample provided in "Appendix A – Sample SAWS I&C Test Procedure".

1.06 OPERATION AND MAINTENANCE MANUALS

Furnish and submit Operation and Maintenance manuals in accordance with Section 01330 and 01782 of the Contract Specifications. Additionally, provide Operation and Maintenance manuals in electronic format per the requirements of Section 01782 of the Contract Specifications. Include approved shop drawing data in the Operation and Maintenance manuals and including the following contents:

- A. Information as specified in Paragraph 1.05 with the following modifications to the shop drawing exhibits:
 1. Reflect "As-Built" conditions.

2. Prints of exhibits, wiring diagrams, etc. shall be half size (11 x 17-inch).
 3. Full size reproducible mylars (2 x 3-foot) of all exhibits, loop diagrams, ladder control wiring diagrams, point to point wiring diagrams, etc. The same must also be submitted on CD-ROM produced in Microstation (latest release).
- B. Operating procedures.
 - C. Shut-down procedures.
 - D. Safety instructions.
 - E. Calibration instructions and factory test results of each instrument.
 - F. Maintenance and repair instructions.
 - G. Recommended spare parts list.
 - H. Name, address and phone number of instrumentation control system supplier's local representative.
 - I. Additionally, comply with the requirements of the Contract Documents.

1.07 SYSTEM OPERATOR'S OPERATION AND MAINTENANCE MANUALS

- A. Furnish and submit System Operator's Operation and Maintenance manuals in accordance with Section 01330 and 01782 of the Specifications. Manuals are to be provided for the PLCs, the OIUs, SAWS SCADA Office HMI system, and the communication devices.
- B. Develop and furnish separate/individual manuals each for the OIU and the SAWS SCADA Office HMI system. Each of the manuals shall, at a minimum, include the following specifically for the respective system (OIU or SAWS SCADA Office HMI System):
 1. A complete copy of each approved graphics screen developed for the respective system in hardcopy color printed format as well as Adobe Acrobat electronic color format,
 2. flow charts,
 3. variable listing with variable descriptions and ranges,

4. mathematical formulas used,
 5. input/output point listing,
 6. operational descriptions and narratives for the operation of each process equipment/instrumentation and associated interlocks, operational description and narrative associated with each input/output shown on the approved graphic screens. Operational descriptions and narratives shall, at a minimum, address startup/shut down procedures of all equipment, all possible alarm conditions, and interlocks associated with all equipment, and
 7. Complete backup of entire configuration of the OIU configuration software, including graphics, network settings, security settings, IO point settings, historical settings, etc. on CD or DVD so as to be able to completely restore the configuration for the OIU from this CD or DVD.
 8. Complete backup of entire configuration of the SAWS SCADA Office HMI system configuration software, including graphics, network settings, security settings, IO point settings, historical settings, etc. on CD or DVD so as to be able to completely restore the configuration for the SAWS SCADA Office HMI system from this CD or DVD.
- C. For each PLC (both proposed and modified existing) manuals shall, at a minimum, include:
1. program logic listing,
 2. memory map,
 3. input/output point listing,
 4. flow charts,
 5. variable listing with variable descriptions and ranges,
 6. mathematical formulas used,
 7. descriptive comments for each logical variable/constant used in the program coding, and
 8. a complete copy of each PLC program for each PLC programmed in this project in hardcopy (printed) format as well as electronic editable

soft copy in the native PLC programming utility data file format provided on CD.

- D. For each proposed communication device, manuals shall, at a minimum, include a listing of all communication device configuration settings. The programming language in which the program is to be created in is "FUNCTION BLOCK."

1.08 PRESUBMITTAL CONFERENCE

- A. Schedule, arrange and conduct a presubmittal conference for the entire PICS within 90 days after receipt of written notice to proceed work is given by the Owner.
- B. The presubmittal conference shall be attended by representatives of the Contractor, the Engineer and the ICS firm. Each attendee to allot time required for the conference.
- C. The purpose of the presubmittal conference shall review the manner in which the Contract requirements will be met before any submittals are prepared.
- D. The following items shall be presented at the presubmittal conference:
 - 1. A list of equipment and materials required for the PICS and the brand shall be used for each item.
 - 2. A sample of each type of submittal specified later herein.
 - 3. Sample submittal drawings from similar projects previously performed by the ICS firm. Submittal drawings shall include sample wiring diagrams, cabinet elevations, bill of materials, etc.

1.09 APPLICATION SOFTWARE DEVELOPMENT WORKSHOPS

- A. Schedule, arrange and conduct a series of workshops to facilitate the development and review of the application software and graphic screens developed for the PLCs, OIU, and SAWS SCADA office HMI system. Allow two weeks notice, at minimum, prior to the scheduled date of the workshop. Submit workshop agenda for review and comment by the Owner with workshop scheduling request.
- B. Each workshop shall be attended by representatives of the Contractor, process engineer, and the Owner. Each attendee to allot time required for the

workshop. For bidding purposes, the Contractor shall assume that each workshop will be attended by a total of twenty (20) Owner representatives.

- C. The purpose of the workshops is to obtain Owner/Process Mechanical Engineer input and review of logic algorithm and graphic screens being developed by the ICS prior to their final implementation. It is imperative that the ICS be prepared for each workshop and bring all algorithms, graphic screens, materials, etc., developed for review by the Owner/Engineer. If a workshop must be repeated due to lack of complete readiness by the ICS, the ICS shall reimburse the Owner for the additional workshop time expended at the rate of \$150.00 per hour. Additional workshop time expended is defined as the total number of workshop hours based on normal business working hours, for these costs the Engineer will document work hours and other expenses required during the additional time.
- D. The ICS shall furnish all materials/equipment to facilitate each workshop. These materials shall include, but not be limited to:
1. Agenda for the workshop. Agenda shall identify applicable process areas of the treatment plant.
 2. Large screen color projector and screen suitable for graphic screen/logic presentation in a conference room/meeting room setting of twenty (20) personnel, at minimum. Minimum screen size shall be 72" high by 72" wide.
 3. Laptop/desktop algorithm/graphic screen development personal computer complete with keyboard, mouse, monitor, software, and necessary adapters and cables to connect to the aforementioned large screen projector and display/modify/store all application software being developed for this project.
 4. Twenty (20) color photocopies of any graphics screens, flow charts, worksheets, spreadsheets, graphs, etc., distributed at the meeting by the Contractor.
- E. At minimum, the workshops shall be topically organized as follows:
1. Workshop No. 1:
 - a. Review of PLC program algorithm development for all process/equipment. All PLC programming shall be developed as Function Block Diagram (FBD).

- b. Review all process/mechanical variable alarms, interlocks, lockouts, ranges, timers, start-up, and shut downs associated with all process/mechanical equipment.
 - c. Review all remote, local, and corresponding manual/automatic algorithm functionality as applicable.
 - d. Review all field process analog and discreet I/O generated at the PLC to be totalized, displayed, and historically collected at the OIU and the SAWS SCADA Office HMI system.
 - e. Review of all alarms generated at the PLC to be indicated and logged at the OIU and the SAWS SCADA office HMI system.
 - f. Review all PLC system diagnostic status, alarming, communications status/failure, hardware primary or standby status, and hardware status/failure to be displayed and alarmed at the OIU and SAWS SCADA office HMI system.
 - g. Review all commands issued at the OIU and SAWS SCADA office HMI system (equipment start/stop, reset, set point entry, etc.) to be security protected.
 - h. Review all communications watchdogs to monitor communication between the PLC, the OIU, SAWS SCADA office HMI system, and communication failure alarms generated to notify the operator of the communication failure.
 - i. Allocate a minimum duration of eight (8) hours for this workshop. Prior to scheduling this workshop, the ICS shall have developed all PLC logic algorithms based upon the requirements of this project.
2. Workshop No. 2: Review of all PLC program algorithm developed for each PLC. Additionally, another intent of this workshop is to review the implementation results of Workshop No. 1 review comments. Allocate a minimum duration of eight (8) hours for this workshop.
 3. Workshop No. 3: Review of all graphic screens developed for the OIU. Allocate a minimum duration of four (4) hours for this workshop.
 4. Workshop No. 4: Review of all graphic screens developed for the SAWS SCADA office HMI system. Allocate a minimum duration of

four (4) hours for this workshop. Additionally, another intent of this workshop is to review the implementation results of Workshop No. 3 review comments.

5. Workshop No. 5: Review of all graphic screens developed for all OIU and SAWS SCADA office HMI system. Additionally, another intent of this workshop is to review the implementation results of Workshop No. 4 review comments. Allocate a minimum duration of four (4) hours for this workshop.

PART 2 QUALITY ASSURANCE

2.01 ACCEPTABLE PROCESS INSTRUMENTATION AND CONTROL SYSTEM PICS

- A. Provide a complete, workable, and installed-in-place Instrument and Control System, hereinafter referred to as the PICS, as specified herein. The PICS shall be designed, installed, and started up by the single ICS firm.
- B. Acceptable ICS firm shall be as required by *Subsection 1.03, above*.

2.02 SYSTEM COORDINATION AND QUALITY

- A. Coordinate installation of instrumentation with mechanical and electrical systems and the owner's Instrumentation shop.
- B. Coordinate subsystems to provide a complete operational and functional instrumentation system to the satisfaction of the Owner and Engineer.
- C. Equipment, instruments, components, and materials for PICS components shall be new (not used) and of the current model.
- D. Instrument and Control Components Furnished By Others: Certain items of instrumentation and controls shall be furnished by various equipment manufacturers. Coordinate the purchase orders of the items such that the resulting system will function properly.

2.03 DESIGN CRITERIA

Design, construct, and install all PICS components in compliance with the applicable provisions of the following standards, codes, and regulations:

- A. American National Standards Institute (ANSI) Standards.
- B. American Institute of Steel Construction (AISC) Standards.

- C. American Society for Testing and Materials (ASTM) Standards.
- D. American Waterworks Association (AWWA) Standards.
- E. Joint Industrial Council (JIC) Standards.
- F. National Electric Code (NEC).
- G. National Electrical Manufacturer's Association (NEMA) Standards.
- H. Local and State Building Codes.
- I. Occupational Safety and Health Administration (OSHA) Regulations.
- J. Scientific Apparatus Manufacturer's Association (SAMA) Standards.
- K. Instrument Society of American Standards (ISA).
- L. Institute of Electrical and Electronics Engineers (IEEE).

2.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Enclose cabinets and subassemblies in heavy polyethylene envelopes to protect them from dust and moisture. Place corrosive-inhibitive vapor capsules in shipping containers, and related equipment as recommended by the capsule manufacturer.
- B. Storage: All materials and equipment shall be environmentally protected and stored in climate controlled (temperature and humidity, etc.) environment. The Main Instrument Control Panels (designated on the PLANS as "MCPs") and the field control and instrument/monitoring panels shall not be moved from climate controlled storage room to the project site until the construction of the electrical/control room is completed, and, the air-conditioning and heating system of the associated electrical Building is in satisfactory operating condition to the Owner and Engineer.

2.05 CALIBRATION INSTRUMENTS

Each instrument used for calibrating PICS equipment shall bear the seal of a reputable laboratory certifying that instrument has been calibrated within the previous twelve (12) months to a standard endorsed by the National Institute of Standards and Technology (NIST).

2.06 START DATE OF THE SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM WARRANTY (PICS INCLUDING SUBSYSTEMS)

Start Date of the process instrumentation and control system and associated subsystem Warranty (PICS including Subsystems) shall commence the date in which the Warranty period commences for the overall project per the requirements of the Contract Documents.

PART 3 SEQUENCING AND SCHEDULING

3.01 GENERAL

- A. All work provided under this section shall be in accordance with the Engineer-approved Schedule of Submittal Submissions and Schedule of Values.
- B. Specification and Construction Implementation Plan *shown on the PLANS* requires phased installation of equipment and systems.
- C. Wherever language in this section refers to the “PICS”, the entire installed PICS, the entire PICS, or similar language; it shall be interpreted to apply to the individual phases of the work; except the requirements for the Performance Acceptance Test PAT.

3.02 SCHEDULE OF VALUES

- A. Purpose: Project Schedule of Values and Progress Schedule to provide a basis for Partial Payment for Work completed.
- B. Content: Summary of major milestones and associated Partial Payments for Work provided under PICS Subsystems.

3.03 PICS COMPLETION

- A. When Engineer issues Certificate of PICS Completion.
- B. Prerequisites:
 - 1. All PICS submittals have been completed.
 - 2. PICS has successfully completed PAT.
 - 3. Owner training plan is on schedule.

4. All spares, expendables, and test equipment have been delivered to Owner.

3.04 PICS ACCEPTANCE

- A. When Engineer issues a written notice of acceptance.
- B. Prerequisites:
 1. Certificate of PICS Completion issued for the Construction Contract per the requirements of the Contract Documents.
 2. Instrument Installation Reports “IIR” are completed, and all deficiencies are corrected.
 3. Performance Acceptance Test PAT is completed
 4. Punch-list items completed. NOTE: punch list items will be issued 15 Calendar days following completion of the PAT.
 5. Final revisions to O&M manuals accepted.
 6. All Training is completed.

3.05 PREREQUISITE ACTIVITIES AND LEAD TIMES:

- A. Start following key Project activities when prerequisite activities and lead times listed below have been completed and satisfied:

Activity	Prerequisite and Lead Times
Submittal reviews by Engineer	Engineer acceptance of Schedule of Values and Progress Schedule and completion of the Pre-Submittal conference
PICS hardware purchasing, fabrication, and assembly	Associated shop drawing submittals completed
SCADA System design, fabrication and assembly	Associated shop drawing submittals completed
All remaining PICS instruments, components, hardware, fabrication, assembly, etc.	Associated shop drawing submittals completed
Shipment	Completion of PICS shop drawing submittals, preliminary O&M manuals

Activity
Performance Acceptance Tests PAT

Prerequisite and Lead Times
Application software completed and installed on site by ICS, and the Instruments Installation Report(s) "IIR" completed, and PICS On-Site Demonstration Tests completed, and Contractor letter notification of successful completion of PICS On-Site Demonstration Test and Contractor's readiness for commencement of PAT is submitted. Additionally, the Startup and PAT procedures associated shop drawing submittals must be completed. Note: Owner requires Four (4) weeks notice prior to start PAT.
Completion of PAT.

Owner training

PART 4 PRODUCTS

4.01 GENERAL

Refer to requirements of PICS Subsystem provided in Division-17 Specifications.

4.02 SOURCE QUALITY CONTROL

A. General:

1. Test all PICS elements, both hardware (instruments, components, devices, PLCs, etc.) and specific software, to demonstrate that PICS satisfies all requirements.
2. On-Site Tests Described Under PART 5 - EXECUTION:
 - a. Performance Acceptance Tests "PAT".
3. Procedures, Forms, and Checklists:
 - a. Conduct all tests in accordance with, and documented on, Engineer accepted procedures, forms, and checklists.
 - b. Describe each test item to be performed.
 - c. Have space after each test item description for sign off by appropriate party after satisfactory completion.

4. Required Test Documentation: Test procedures, forms, and checklists. All signed by Owner/Engineer and Contractor.
5. Conducting Tests:
 - a. All special testing materials and equipment.
 - b. Wherever possible, perform tests using actual process variables, equipment, and data.
 - c. If it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation.
 - d. Define simulation techniques in test procedures.
6. Owner/Engineer will actively participate in many of the tests.
7. Owner/Engineer reserves the right to test or retest all specified functions whether or not explicitly stated Test Procedures.
8. Owner's/Engineer's decision will be final regarding acceptability and completeness of all testing.

PART 5 EXECUTION

5.01 EXAMINATION

- A. Equipment furnished by Supplier or any other subcontractor and installed by the ICS requires Supplier to observe and advise on installation to extent required to certify that equipment has been properly installed and will perform as required.
- B. For equipment not provided by Supplier, but that directly interfaces with the PICS, verify the following conditions:
 1. Proper installation.
 2. Calibration and adjustment of all instrumentation and control devices.
 3. Correct control action.
 4. Switch settings.
 5. Opening and closing speeds and travel stops.

6. Input and output signals.

5.02 INSTALLATION

A. General:

1. Install all equipment in accordance with the PLANS and instructions furnished by the manufacturer. Inspect each new instrument, control component, etc., before installation. Replace deficient items.
2. Instruments Installation Report(s) IIR: After installation, the manufacturer's non-sales type technical representatives shall inspect the installation and prepare a report or reports to include the following:
 - a. A list of all deficiencies found.
 - b. Recommended corrective action for all facilities.
 - c. Certification that the item or system is properly installed, calibrated and tested except as noted.
3. The IIR shall be prepared for the following instruments:
 - a. Flow Indicator/Transmitter Instruments.
 - b. Level Measuring Indicators/Transmitters/Transducers.
 - c. Intelligent Temperature Measuring Indicators/Transmitters
 - d. Intelligent Pressure Measuring Indicators/Transmitters
 - e. Vibration Measuring Indicators/Transmitters

Note: The IIR is required in addition to all the other tests, calibration and checkout procedures required under Subsection "Field Quality Control" (of this Section), and other similar requirements identified in all PICS Subsystems Specifications (Division-17, at its entirety). The IIR must be completed and all deficiencies must be corrected by the ICS prior to commencing the PAT.

B. Wiring:

1. All wiring connected to PICS components and assemblies including shall be in accordance to the requirements of Division 16 and 17 of the Specifications.

5.03 FIELD QUALITY CONTROL

- A. General: All requirements listed in Subsection Source Quality Control, above, also apply to this Subsection Field Quality Control.
- B. Onsite Supervision:
 1. The ICS Project Site Representative to supervise and coordinate all onsite PICS activities.
 2. The ICS Project Site Representative shall be On-Site during total period required to complete all On-Site PICS activities.
- C. Startup and Testing Team:
 1. Startup and Testing Team will consist of ICS firm and equipment supplier non-sales type technical representatives. The entire Process Instrumentation and Control System PICS shall be tested together.
 2. Thoroughly check installation, termination, and adjustment for all PICS Subsystems and their components.
 3. On-Site tests.
 4. Complete On-Site training.
 5. Provide and conduct startup services.
 6. PICS On-Site Demonstration Tests: Prior to startup of the Performance Acceptance Test "PAT", the ICS firm shall test the PICS equipment and systems:
 - a. Conduct the On-Site Demonstration Tests with entire PICS installed to demonstrate that it is operational and interconnected.
 - b. PICS Subsystems: each portion of the PICS Subsystem shall be tested (entire system interconnected). NOTE: This shall also include the testing of the application software.

- c. SCADA System Loop-Specific Functions including discrete, analog, etc.
 - d. Loop-Specific Functions for Remaining PICS Subsystems including discrete, analog, etc.
 - e. Make following documentation available to Owner/Engineer at test site both before and during the tests:
 - 1) Master copy of On-Site Tests Procedures.
 - 2) List of equipment to be tested including make, model, and serial number.
 - 3) Shop Drawing hardware and software submittals for equipment being tested.
 - f. Daily schedule for the Test:
 - 1) Begin each day meeting to review day's test schedule.
 - 2) End each day with each meeting to review day's test results and to review or revise next day's test schedule.
7. During the PICS On-Site Demonstration Tests, the Contractor shall maintain a list, henceforth called the PICS On-Site Demonstration Tests Corrective Action List that identifies, with a detailed description, each problem found, the affected equipment, and the corrective measures taken to correct each problem. The Contractor shall submit the PICS On-Site Demonstration Tests Corrective Action List for review if requested by the Owner and shall submit the PICS On-Site Demonstration Tests Corrective Action List within seven calendar days of the requested date. The Contractor shall claim and validate thorough PICS On-Site Demonstration Tests were performed successfully and all resulting corrective action measures taken were performed successfully and re-tested successfully. Upon successful completion of the PICS On-Site Demonstration Tests, the Contractor shall submit letter notification to the Owner stating that all PICS On-Site Demonstration Tests have been successfully completed. The letter notification shall further state that the ICS is ready to begin the Performance Acceptance Test.

D. Performance Acceptance Tests "PAT":

1. Minimum duration of the PAT shall be a cumulative total of thirty (30) calendar days. The cumulative total quantity of calendar days shall be consumed in association and in synch with the overall construction sequence for the project. Any Holidays that occur during the PAT shall result in a corresponding number of days being added to the duration of the PAT. The PAT encompasses startup and testing period of the instrumentation and control system for the associated process and mechanical equipment that are controlled and monitored by the instrumentation and control system. The PAT shall be conducted using application software developed by the Contractor. The ICS shall test functions installed and the hard-wired system and the entire associated instrumentation and control system including validating the operation and monitoring and control functions of the all instruments, all control devices, all instrument and control components, control functions, alarm function, monitoring function, calibration ranges, control/alarm setpoint operations, etc. The Contractor shall closely and carefully coordinate and perform the testing of the application software functions with the Owner. The ICS shall also test the SCADA System.
2. Commissioning of PICS and Facility in General: The facility and the PICS along with the associated process and mechanical equipment shall not be considered ready for operation and commissioning until the PAT is successfully completed and it is completed to the satisfaction of the Owner/Engineer.
3. The ICS shall startup and test the operation of the instrumentation and control system for the associated process and mechanical equipment that shall be monitored and controlled by the instrumentation and control system. The ICS shall demonstrate that the PICS is operating as required by the Contract Documents. Demonstrate each required function on a paragraph-by-paragraph, loop-by-loop, point-by-point basis, function by function basis, event by event basis, control function by control function basis, step by step logic test basis, etc.
4. Loop specific tests except that the entire installed PICS tested using actual process variables and all functions demonstrated, as minimum.
 - a. Check the PICS for proper installation, calibration, and adjustment on a component-by-component basis.
 - b. Use Loop Status Report to organize and track inspection, adjustment, and calibration of each loop.

- c. Calibrations, Setting and Testing, for example, but not limited to:
 - 1) Analog and Sonic-Echo Devices: Actual inputs and outputs at 0, 25, 50, 75, and 100 percent of span, rising and falling.
 - 2) Discrete Devices: Actual trip points and reset points.
 - 3) Indicators/Transmitters/Controllers: alarm and control set point as well as setpoint function tests in association with their respective interface with the control logic of the associated process mechanical equipment.
 - 4) Closed and open loop PID type control algorithms.
 - 5) I/O Modules: Actual inputs or outputs of 0, 25, 50, 75, and 100 percent of span, rising and falling.
5. Maintain Loop Status Reports, Valve Adjustment Sheets, and Component Calibration Sheets at Project site and make them available to Owner/Engineer at all time. The ICS shall develop project specific Loop Status Reports, Valve Adjustment Sheets, and Component Calibration Sheets and submit a sample report of each type for review by Owner/Engineer at least 60 Calendar days prior to commencing the PAT.
6. Perform local and manual tests for each loop before proceeding to remote and automatic modes.
7. Complete control logic simulation and actual/live test in all modes of operations.
8. Make updated versions of documentation required for PAT available to Owner/Engineer at Project site, both before and during tests.
9. Make one copy of all O&M manuals available to Owner and Engineer at the Project site both before and during testing.
10. The Owner and/or Engineer shall witness all Tests.
11. The PAT shall be completed in coordination with the Owner/Engineer and the ICS firm.
12. Prolonged and Excessive Startup and Testing During the PAT (startup and testing period of the instrumentation and control system for the

associated process and mechanical equipment that are controlled and monitored by the instrumentation and control system): If parts of a startup and testing of equipment fail and must be redone following the completion of the allotted PAT period and/or startup and testing extends past the PAT period as a result of deficiencies found in the installation of the PICS, and/or startup and testing extends past the PAT period due to prolonged test per piece of equipment resulting from Lack of complete readiness of the ICS and/or the Contractor as well as the associated systems to commence the PAT, and/or not being completely ready to perform the PAT, etc; Any additional time expended by the ICS shall reimburse the Owner for the additional time at the rate of \$150.00 per hour. Additional time is defined as any-time in excess of the total number of allotted Calendar days, based on normal business working hours during the PAT period, for these costs the Owner/Engineer will document work hours and other expenses required during the additional time.

13. Final Maintenance Report: Summarizing maintenance performed during PAT:
 - a. Tasks performed and person-hours required for the performance.
 - b. Numbers and types of components repaired or replaced, name and address of repair firm, extent of repairs, and time required for their completion.
 - c. Recommended additional components, test equipment, tools, and other facilities for maintenance not supplied under this contract.

5.04 APPLICATION SOFTWARE DEVELOPMENT

- A. The ICS shall not develop the application software on equipment in use by the Owner. The ICS shall provide the means necessary to perform application software development at its office.
- B. Once the ICS has installed the proposed application software on site, the ICS shall generate complete software archives (backups) when any modifications to the installed application software are made by the ICS. These application software archives shall be made on a day-by-day basis, as required, with two (2) copies provided to the Owner on CD ROM. The archives shall be configured and labeled such to facilitate a complete application software restoration to the previous day's results. The ICS shall provide and maintain all application software archives on CD ROM, with a minimum of two (2) copies of each archive for the entire construction course of the project. Note

that the software archives shall include, as a minimum, all OIUs, SAWS SCADA Office HMI system, and PLCs application software.

- C. The SAWS SCADA Office HMI system is used for monitoring and control of multiple active/operational sites through the SAWS distribution system. At no time shall modifications be performed by the ICS to compromise the availability and reliability of the SAWS SCADA Office HMI system. Coordinate all modifications to the SAWS SCADA Office HMI system with the owner in writing a minimum of two weeks in advance and attain owner approval prior to making modifications to the SAWS SCADA Office HMI system.
- D. Where input/output points are made available to the PLCs/OIU/SAWS SCADA Office HMI system via serial data connection links shown on the PLANS, the Contractor shall incorporate data transfer via the serial data connection into the application software development.
- E. The OIU and SAWS SCADA Office graphic screens and associated application software shall identify all components and process flow on the process/mechanical diagrams/PLANS and all items in the process flow stream. The objects on the screens shall adhere to the color coding and associated dynamic color changes in adherence to the aforementioned Owner programming standards.
- F. The ICS shall be responsible for procuring all required licenses for the work entailed for this project including, but not limited to, any MODBUS TCP communication licenses. The cost for all such licenses shall be included in the contractor's bid. All licenses shall be in the name of the owner at no additional cost to the owner.

5.05 MEASUREMENT AND PAYMENT

No separate measurement or payment for work performed under this Section, except as indicated below. Include cost of same in Contract price bid for work of which this is a component part.

END OF SECTION

WATER QUANTITIES

205.2	HOT MIX ASPHALTIC PVMT TYPE B (10" COMP DEPTH)	SY	300
205.4	HOT MIX ASPHALTIC PVMT TYPE D (2" COMP DEPTH)	SY	600
208.1	SALVAGING, HAULING & STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT (2" COMP DEPTH)	SY	600
△ 500.1	CONCRETE CURB	LF	17
515	TOP SOIL (4")	CY	40
516.1	BERMUDA SODDING	SY	310
550	TRENCH EXCAVATION SAFETY PROTECTION	LF	978 △
△ 814	12" DUCTILE IRON PIPE WATERLINE	LF	9
814	16" DUCTILE IRON PIPE WATERLINE	LF	3
818	8" PVC WATERLINE	LF	8
818	12" PVC WATERLINE	LF	786 △
818	16" PVC WATERLINE	LF	172
828	12" GATE VALVES	EA	1
828	16" GATE VALVES	EA	1
831	16" x 16" TEE CUT IN	EA	1
836	PIPE FITTINGS, ALL SIZES AND TYPES	TON	2.93 △
840	8" WATER TIE-IN	EA	1
840	12" WATER TIE-IN	EA	1
841	HYDROSTATIC TESTING	EA	1
844	2" BLOWOFF, TEMPORARY	EA	1
856.1	JACKING, BORING, OR TUNNELING 24"	LF	40
856.2	12" CARRIER PIPE FOR JACKING, BORING, TUNNELING	LF	40
856.3	STEEL CASING 24"	LF	40
3000.14	REMOVAL, TRANSPORTATION AND DISPOSAL OF AC PIPE	EA	1
3000.15	ASBESTOS ABATEMENT WORK PLAN	EA	1

WATER GENERAL NOTES:

- NO METER BOXES TO BE SET IN DRIVEWAYS. ANY METER BOXES SET IN DRIVEWAYS SHALL BE RELOCATED BY CONTRACTOR AT CONTRACTOR'S EXPENSE.
- WORK COMPLETED BY CONTRACTOR WHICH HAS NOT RECEIVED A WORK ORDER OR THE NOTICE TO PROCEED WITH THE SAN ANTONIO WATER SYSTEM CONSTRUCTION INSPECTION DIVISION WILL BE SUBJECT TO REMOVAL AND REPLACEMENT BY AND AT THE EXPENSE OF THE CONTRACTOR.
- THE CONTRACTOR WILL KEEP THE AREA ON TOP OF AND AROUND THE WATER METER BOX FREE OF ALL OBJECTS AND DEBRIS.
- BURIED WATER PIPING TO BE RESTRAINED, OUTSIDE THE BOOSTER STATION SITE AT LENGTHS NOTED ON SHEET W3 AND W4. RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C. PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF COVER IS ASSUMED TO BE 4 FEET. NOTE: THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTHS SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION. SEE SAWS SPECIFICATION BOOK.
- ASBESTOS CEMENT (AC) PIPE, ALSO KNOWN AS TRANSITE PIPE AND WHICH IS KNOWN TO CONTAIN ASBESTOS-CONTAINING MATERIAL (ACM), MAY BE LOCATED WITHIN THE PROJECT LIMITS. SPECIAL WASTE MANAGEMENT PROCEDURES AND HEALTH AND SAFETY REQUIREMENTS WILL BE APPLICABLE WHEN REMOVAL AND/OR DISTURBANCE OF THIS PIPE OCCUR. PAYMENT FOR SUCH WORK IS TO BE MADE UNDER SPECIAL SPECIFICATION ITEM NO. 3000, "SPECIAL SPECIFICATION FOR HANDLING ASBESTOS CEMENT PIPE".
- CONTRACTOR SHALL HTH CHLORINATE NEW WATER MAINS.
- NSPI STANDS FOR NO SEPARATE PAY ITEM.
- FOR CONSTRUCTION DETAILS OF APPLICABLE ITEMS WITHIN THE PLAN SET, SEE CURRENT SAWS SPECIFICATIONS FOR WATER AND SANITARY SEWER CONSTRUCTION.
- ALL ABOVE GROUND VALVES SHALL OPEN LEFT. ALL BURIED VALVES SHALL OPEN RIGHT.
- PRIOR TO RELEASE FOR SERVICE, CONTRACTOR SHALL COORDINATE WITH SAWS OPERATIONS FOR OPENING OF THE DIVISION VALVE LOCATED ON CRESCENT LEDGE TO THE NORTHEAST OF THE PROJECT LIMITS.

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION DRAWINGS\PLANS\CIVIL\1103280202IND.DWG PLOT DATE:10/25/2012 10:17 AM PLOT BY:AVICUNA

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STATE OF TEXAS

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JULIAN P. BIELAWSKI
84456

PROFESSIONAL ENGINEER

Julian Bielawski 10-25-12

NO.	REVISION	DRAWN	APPROVED	DATE
△	ADDENDUM NO. 3		SHT	10/24/12
REVISION				

SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION

**WATER GENERAL NOTES
AND QUANTITIES**

SAN ANTONIO, TEXAS

DEVELOPER: SAWS	
CONT.	BUDGET PROJ.
SUBMITTED _____	
APPROVED _____	
MAP NO.	SCALE: N.T.S.
SECT. NO.	
DR.	CK.
JOB NO. 12-6006	

SHEET
W1

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION DRAWINGS\PLANS\CIVL\1103280202IND.DWG PLOT DATE: 10/25/2012 9:54 AM PLOT BY: AVICUNA

HORIZONTAL DATA (DISCHARGE MAIN D2)

Tangent #1 Data			
Description	PT Station	Northing	Easting
Start:	10+00.000	13791499.82	2089232.408
End:	10+42.475	13791488.17	2089273.256
Parameter	Value	Parameter	Value
Length:	42.475	Course:	S 74° 05' 21.3156" E
Curve #1 Data			
Description	Station	Northing	Easting
PC:	10+42.475	13791488.17	2089273.256
RP:		13789973.51	2088841.486
PT:	13+57.102	13791372.37	2089565.234
Parameter	Value	Parameter	Value
Delta:	11° 26' 44.0091"	Type:	RIGHT
Radius:	1575		
Length:	314.626	Tangent:	157.838
Mid-Ord:	7.85	External:	7.889
Chord:	314.103	Course:	S 68° 21' 59.3110" E
Tangent #2 Data			
Description	PT Station	Northing	Easting
Start:	13+57.102	13791372.37	2089565.234
End:	14+65.205	13791322.7	2089661.248
Parameter	Value	Parameter	Value
Length:	108.104	Course:	S 62° 38' 37.3065" E
Curve #2 Data			
Description	Station	Northing	Easting
PC:	14+65.205	13791322.7	2089661.248
RP:		13790643.25	2089309.713
PT:	15+37.775	13791286.35	2089724.025
Parameter	Value	Parameter	Value
Delta:	05° 26' 06.6970"	Type:	RIGHT
Radius:	765		
Length:	72.569	Tangent:	36.312
Mid-Ord:	0.86	External:	0.861
Chord:	72.542	Course:	S 59° 55' 33.9580" E
Tangent #3 Data			
Description	PT Station	Northing	Easting
Start:	15+37.775	13791286.35	2089724.025
End:	16+00.000	13791252.64	2089776.334
Parameter	Value	Parameter	Value
Length:	62.225	Course:	S 57° 12' 30.6094" E

HORIZONTAL DATA (DISCHARGE MAIN D1)

Tangent Data			
Description	PT Station	Northing	Easting
Start:	100+00.00	13791641.86	2089281.83
End:	100+03.20	13791641.86	2089281.83
Parameter	Value	Parameter	Value
Length:	3.20	Course:	N 90° 00' 00" W
Tangent Data			
Description	PT Station	Northing	Easting
Start:	100+03.20	13791641.86	2089278.63
End:	100+26.91	13791658.63	2089261.86
Parameter	Value	Parameter	Value
Length:	23.71	Course:	N 45° 00' 00" W
Tangent Data			
Description	PT Station	Northing	Easting
Start:	100+26.91	13791658.63	2089261.86
End:	103+09.98	13791943.9	2089262.48
Parameter	Value	Parameter	Value
Length:	285.28	Course:	N 00° 07' 28" E
Tangent Data			
Description	PT Station	Northing	Easting
Start:	103+12.19	13791943.90	2089262.48
End:	103+30.43	13791956.80	2089275.38
Parameter	Value	Parameter	Value
Length:	18.24	Course:	N 45° 00' 00" E
Tangent Data			
Description	PT Station	Northing	Easting
Start:	103+30.426	13791956.80	2089275.38
End:	103+32.819	13791959.19	2089275.38
Parameter	Value	Parameter	Value
Length:	2.39	Course:	N 00° 07' 28" E

HORIZONTAL DATA (SUCTION MAIN S1)

Tangent #1 Data			
Description	PT Station	Northing	Easting
Start:	200+00.00	13791628.56	2089281.82
End:	200+03.19	13791628.56	2089278.63
Parameter	Value	Parameter	Value
Length:	3.19	Course:	S 89° 59' 59.98" W
Tangent #2 Data			
Description	PT Station	Northing	Easting
Start:	200+03.19	13791628.56	2089278.63
End:	200+10.01	13791623.74	2089273.81
Parameter	Value	Parameter	Value
Length:	6.82	Course:	S 44° 59' 60" W
Tangent #3 Data			
Description	PT Station	Northing	Easting
Start:	200+10.01	13791623.74	2089273.81
End:	201+53.79	13791479.96	2089273.81
Parameter	Value	Parameter	Value
Length:	143.78	Course:	S 00° 00' 00.00" W
Tangent #4 Data			
Description	PT Station	Northing	Easting
Start:	201+53.79	13791479.96	2089273.81
End:	201+68.79	13791465.25	2089270.88
Parameter	Value	Parameter	Value
Length:	15.00	Course:	S 11° 15' 00.00" W

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84456
PROFESSIONAL ENGINEER
Julian Bielawski 10-25-12

NO.	REVISION	DRAWN	APPROVED	DATE
1	ADDENDUM NO. 3		SHT	10/24/12

REVISION

SAWS SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION

HORIZONTAL DATA

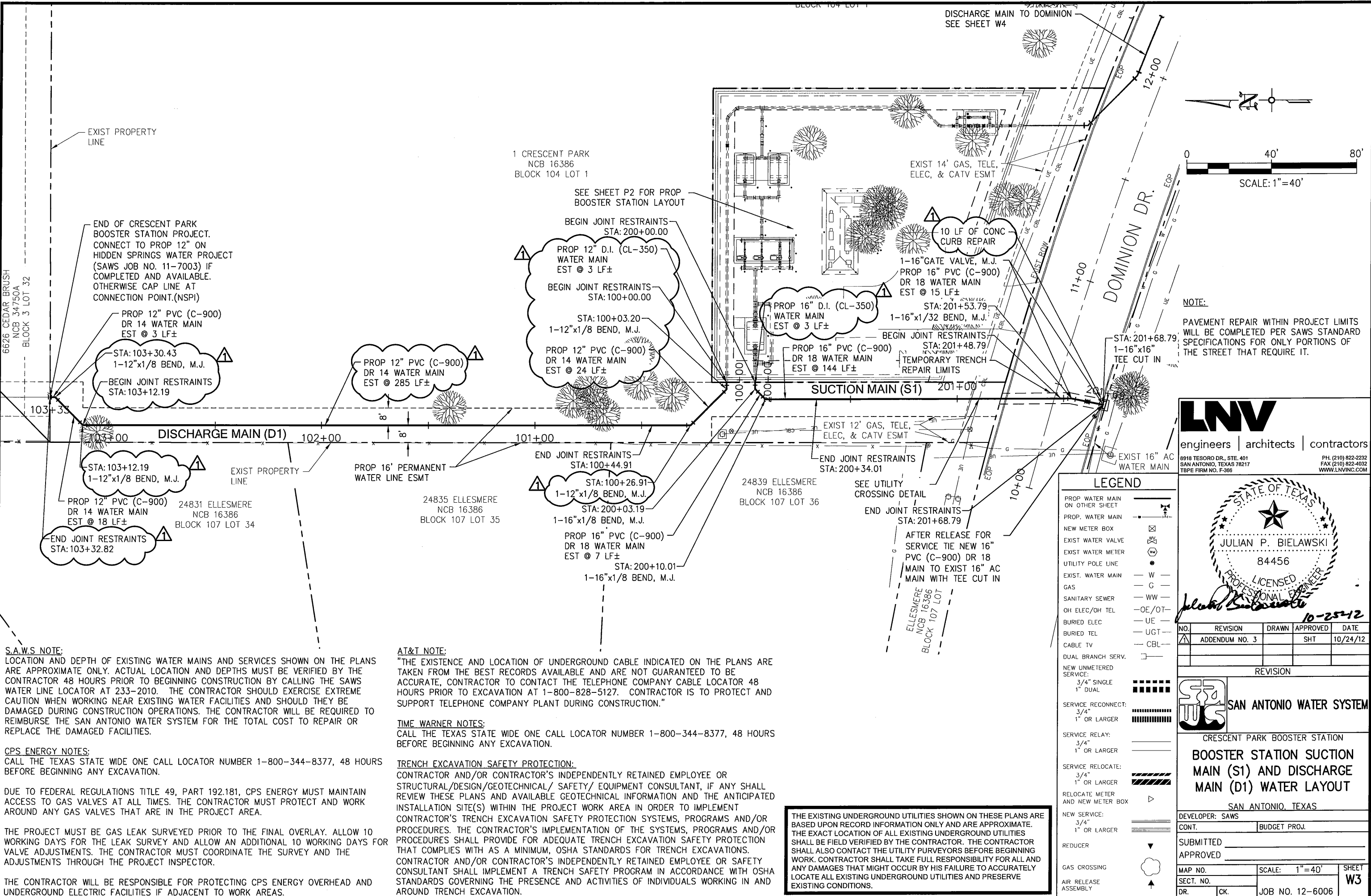
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. BUDGET PROJ.

SUBMITTED
APPROVED

MAP NO. SCALE: N.T.S. SHEET
SECT. NO. W2
DR. CK. JOB NO. 12-6006

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\PLANS\CIVIL\1103280202\WPN01.DWG PLOT DATE: 10/25/2012 9:02 AM PLOT BY: AVICUNA



S.A.W.S. NOTE:
LOCATION AND DEPTH OF EXISTING WATER MAINS AND SERVICES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. ACTUAL LOCATION AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR 48 HOURS PRIOR TO BEGINNING CONSTRUCTION BY CALLING THE SAWS WATER LINE LOCATOR AT 233-2010. THE CONTRACTOR SHOULD EXERCISE EXTREME CAUTION WHEN WORKING NEAR EXISTING WATER FACILITIES AND SHOULD THEY BE DAMAGED DURING CONSTRUCTION OPERATIONS. THE CONTRACTOR WILL BE REQUIRED TO REIMBURSE THE SAN ANTONIO WATER SYSTEM FOR THE TOTAL COST TO REPAIR OR REPLACE THE DAMAGED FACILITIES.

CPS ENERGY NOTES:
CALL THE TEXAS STATE WIDE ONE CALL LOCATOR NUMBER 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

THE PROJECT MUST BE GAS LEAK SURVEYED PRIOR TO THE FINAL OVERLAY. ALLOW 10 WORKING DAYS FOR THE LEAK SURVEY AND ALLOW AN ADDITIONAL 10 WORKING DAYS FOR VALVE ADJUSTMENTS. THE CONTRACTOR MUST COORDINATE THE SURVEY AND THE ADJUSTMENTS THROUGH THE PROJECT INSPECTOR.

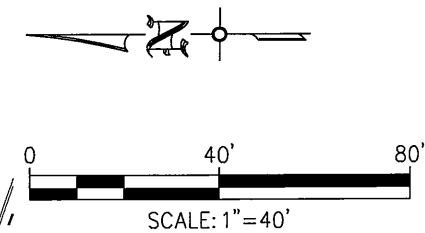
THE CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING CPS ENERGY OVERHEAD AND UNDERGROUND ELECTRIC FACILITIES IF ADJACENT TO WORK AREAS.

AT&T NOTE:
"THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 1-800-828-5127. CONTRACTOR IS TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION."

TIME WARNER NOTES:
CALL THE TEXAS STATE WIDE ONE CALL LOCATOR NUMBER 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

TRENCH EXCAVATION SAFETY PROTECTION:
CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL/DESIGN/GEOTECHNICAL/SAFETY/EQUIPMENT CONSULTANT, IF ANY SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES. THE CONTRACTOR'S IMPLEMENTATION OF THE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLIES WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

THE EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE BASED UPON RECORD INFORMATION ONLY AND ARE APPROXIMATE. THE EXACT LOCATION OF ALL EXISTING UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL ALSO CONTACT THE UTILITY PURVEYORS BEFORE BEGINNING WORK. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL AND ANY DAMAGES THAT MIGHT OCCUR BY HIS FAILURE TO ACCURATELY LOCATE ALL EXISTING UNDERGROUND UTILITIES AND PRESERVE EXISTING CONDITIONS.



NOTE:
PAVEMENT REPAIR WITHIN PROJECT LIMITS WILL BE COMPLETED PER SAWS STANDARD SPECIFICATIONS FOR ONLY PORTIONS OF THE STREET THAT REQUIRE IT.

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LICENSED PROFESSIONAL ENGINEER
10-25-12

NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION

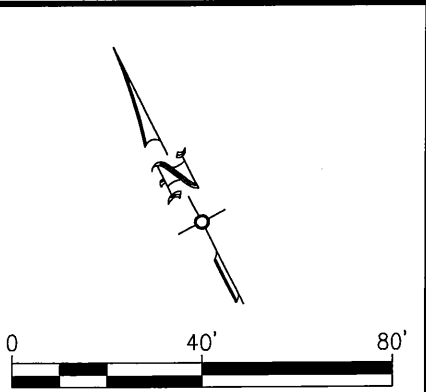
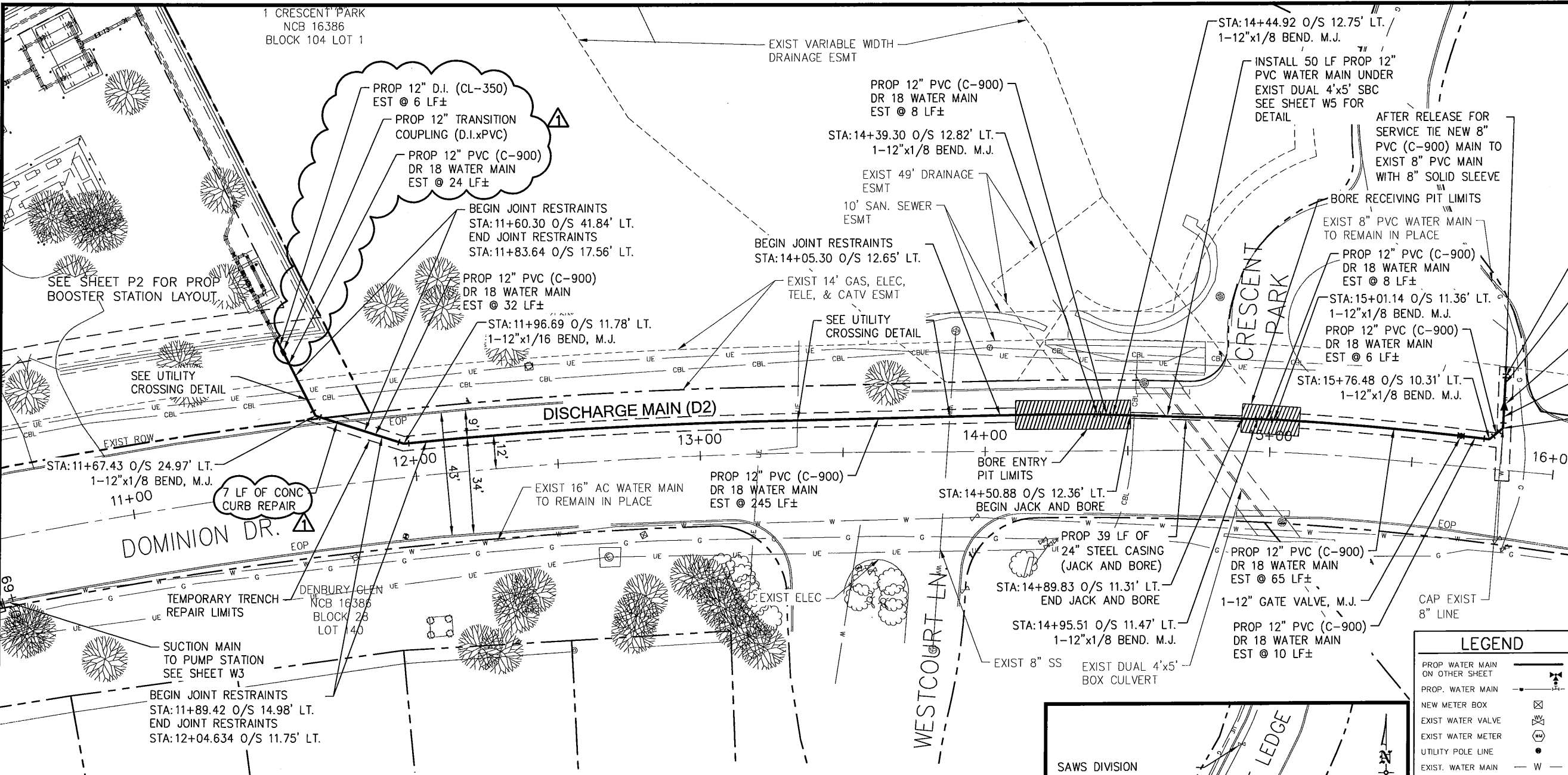
SAWS
SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION
BOOSTER STATION SUCTION MAIN (S1) AND DISCHARGE MAIN (D1) WATER LAYOUT
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. BUDGET PROJ.

SUBMITTED
APPROVED

MAP NO. SCALE: 1"=40' SHEET
SECT. NO. DR. CK. JOB NO. 12-6006 W3

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NOTE:
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STATE OF TEXAS
JULIAN P. BIELAWSKI
84456
PROF. LICENSED ENGINEER
10-25-12

NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION
SAWS
SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION
**DISCHARGE MAIN (D2)
WATER LAYOUT**
SAN ANTONIO, TEXAS

DEVELOPER: SAWS		BUDGET PROJ.	
SUBMITTED		APPROVED	
MAP NO.	SCALE: AS NOTED	SHEET	
SECT. NO.		W4	
DR.	CK.	JOB NO. 12-6006	

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CPS ENERGY NOTES:
CALL THE TEXAS STATE WIDE ONE CALL LOCATOR NUMBER 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181, CPS ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

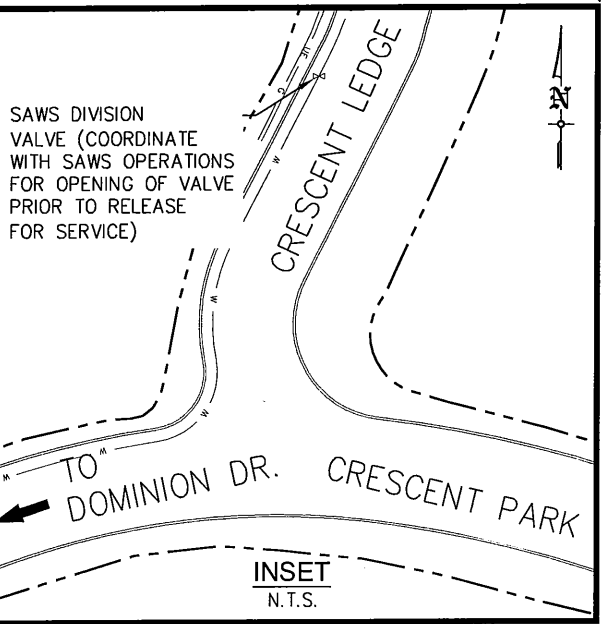
THE PROJECT MUST BE GAS LEAK SURVEYED PRIOR TO THE FINAL OVERLAY. ALLOW 10 WORKING DAYS FOR THE LEAK SURVEY AND ALLOW AN ADDITIONAL 10 WORKING DAYS FOR VALVE ADJUSTMENTS. THE CONTRACTOR MUST COORDINATE THE SURVEY AND THE ADJUSTMENTS THROUGH THE PROJECT INSPECTOR.

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"THE EXISTENCE AND LOCATION OF UNDERGROUND CABLE INDICATED ON THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE, CONTRACTOR TO CONTACT THE TELEPHONE COMPANY CABLE LOCATOR 48 HOURS PRIOR TO EXCAVATION AT 1-800-828-5127. CONTRACTOR IS TO PROTECT AND SUPPORT TELEPHONE COMPANY PLANT DURING CONSTRUCTION."

TIME WARNER NOTES:
CALL THE TEXAS STATE WIDE ONE CALL LOCATOR NUMBER 1-800-344-8377, 48 HOURS BEFORE BEGINNING ANY EXCAVATION.

TRENCH EXCAVATION SAFETY PROTECTION:
CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR STRUCTURAL/DESIGN/GEOTECHNICAL/ SAFETY/ EQUIPMENT CONSULTANT, IF ANY SHALL REVIEW THESE PLANS AND AVAILABLE GEOTECHNICAL INFORMATION AND THE ANTICIPATED INSTALLATION SITE(S) WITHIN THE PROJECT WORK AREA IN ORDER TO IMPLEMENT CONTRACTOR'S TRENCH EXCAVATION SAFETY PROTECTION SYSTEMS, PROGRAMS AND/OR PROCEDURES. THE CONTRACTOR'S IMPLEMENTATION OF THE SYSTEMS, PROGRAMS AND/OR PROCEDURES SHALL PROVIDE FOR ADEQUATE TRENCH EXCAVATION SAFETY PROTECTION THAT COMPLIES WITH AS A MINIMUM, OSHA STANDARDS FOR TRENCH EXCAVATIONS. CONTRACTOR AND/OR CONTRACTOR'S INDEPENDENTLY RETAINED EMPLOYEE OR SAFETY CONSULTANT SHALL IMPLEMENT A TRENCH SAFETY PROGRAM IN ACCORDANCE WITH OSHA STANDARDS GOVERNING THE PRESENCE AND ACTIVITIES OF INDIVIDUALS WORKING IN AND AROUND TRENCH EXCAVATION.

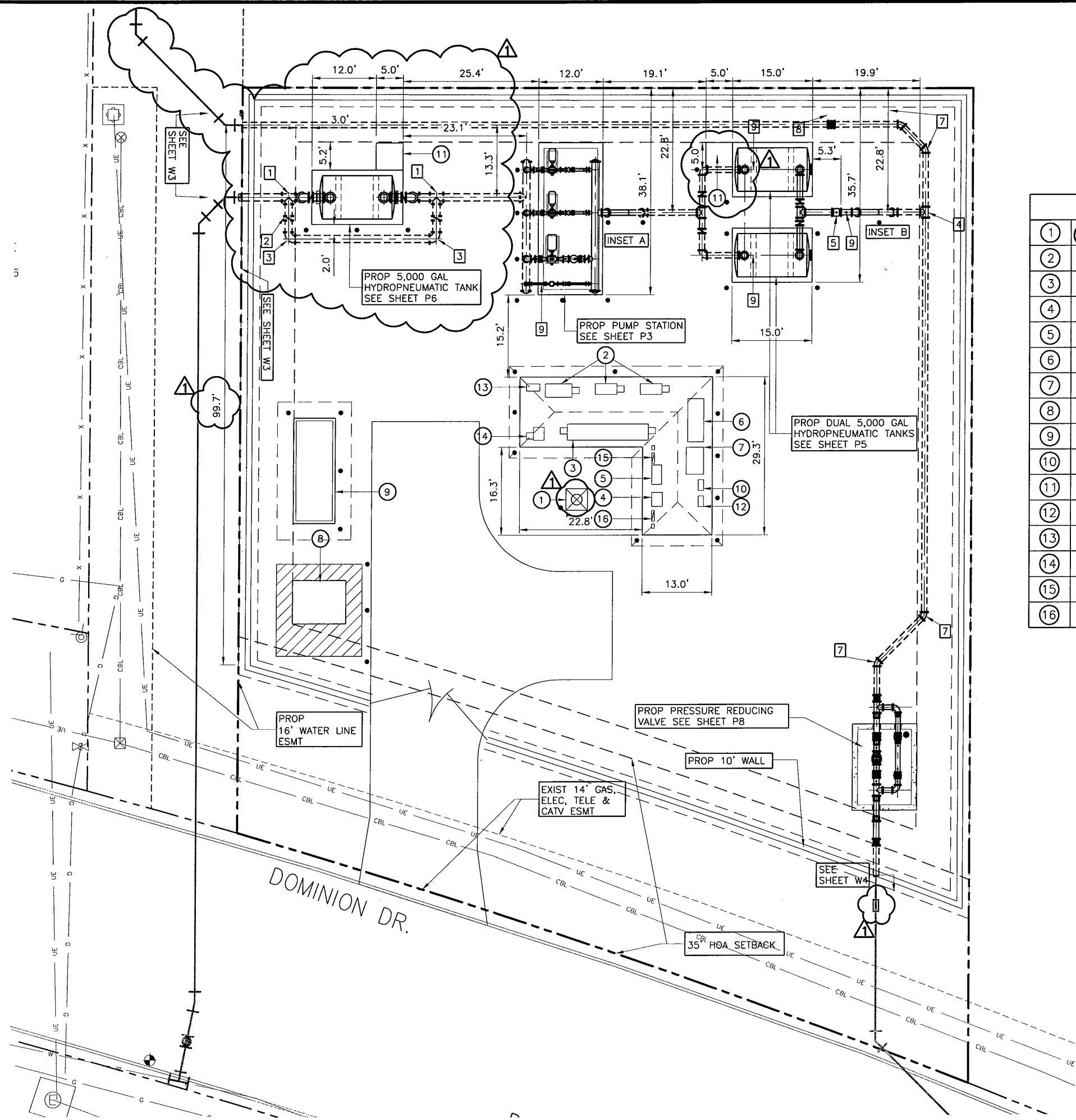


THE EXISTING UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE BASED UPON RECORD INFORMATION ONLY AND ARE APPROXIMATE. THE EXACT LOCATION OF ALL EXISTING UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL ALSO CONTACT THE UTILITY PURVEYORS BEFORE BEGINNING WORK. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL AND ANY DAMAGES THAT MIGHT OCCUR BY HIS FAILURE TO ACCURATELY LOCATE ALL EXISTING UNDERGROUND UTILITIES AND PRESERVE EXISTING CONDITIONS.

LEGEND

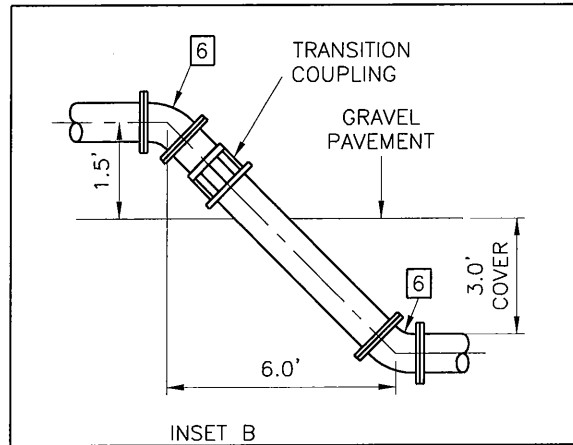
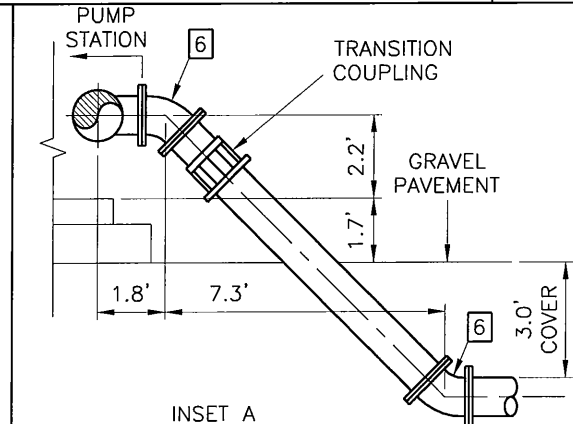
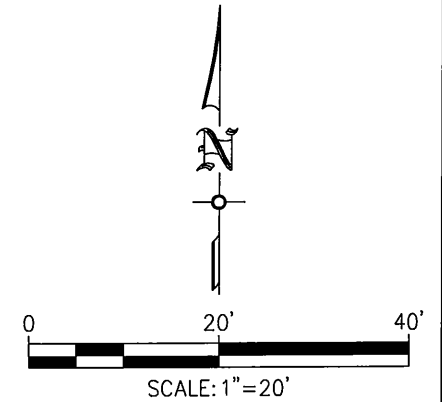
- PROP. WATER MAIN ON OTHER SHEET
- PROP. WATER MAIN
- NEW METER BOX
- EXIST. WATER VALVE
- EXIST. WATER METER
- UTILITY POLE LINE
- EXIST. WATER MAIN
- GAS
- SANITARY SEWER
- OH ELEC/OH TEL
- BURIED ELEC
- BURIED TEL
- CABLE TV
- DUAL BRANCH SERV.
- NEW UNMETERED SERVICE:
- 3/4" SINGLE
- 1" DUAL
- SERVICE RECONNECT:
- 3/4"
- 1" OR LARGER
- SERVICE RELAY:
- 3/4"
- 1" OR LARGER
- SERVICE RELOCATE:
- 3/4"
- 1" OR LARGER
- RELOCATE METER AND NEW METER BOX
- NEW SERVICE:
- 3/4"
- 1" OR LARGER
- REDUCER
- GAS CROSSING
- AIR RELEASE ASSEMBLY

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\CIVIL\PI-SITE LAYOUT.DWG PLOT DATE:10/26/2012 11:06 AM PLOT BY:AVICUNA



SITE INFORMATION	
①	20' MONOPOLE ANTENNA
②	VARIABLE FREQUENCY DRIVE
③	MAIN CONTROL/SCADA PANEL
④	ULTRA-ISOLATION XFMR
⑤	DRY-TYPE XFMR
⑥	480 VOLT MOTOR CONTROL CENTER
⑦	AUTOMATIC TRANSFER SWITCH
⑧	CPS ENERGY PAD MOUNTED XFMR
⑨	DIESEL ENGINE DRIVEN STAND-BY GENERATOR
⑩	CIRCUIT BREAKER DISCONNECT SWITCH
⑪	5'x5' CONCRETE PAD FOR AIR COMPRESSOR
⑫	LIGHTING CONTACTOR
⑬	REDUCED VOLTAGE SOFT STARTER
⑭	SECURITY CONTROL PANEL
⑮	CONTROL POWER PANEL AND TVSS
⑯	LIGHTING PANEL AND TVSS

PIPING INFORMATION	
①	16" TEE
②	16" BFV
③	16" 90°-BEND
④	12" TEE
⑤	12" MAGNETIC FLOW METER
⑥	12" 90°-BEND
⑦	12" 45°-BEND
⑧	12" GATE VALVE
⑨	PRESSURE INDICATING TRANSMITTER



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STATE OF TEXAS
JULIAN P. BIELAWSKI
84456
PROFESSIONAL ENGINEER
10-26-12

NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION

SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION

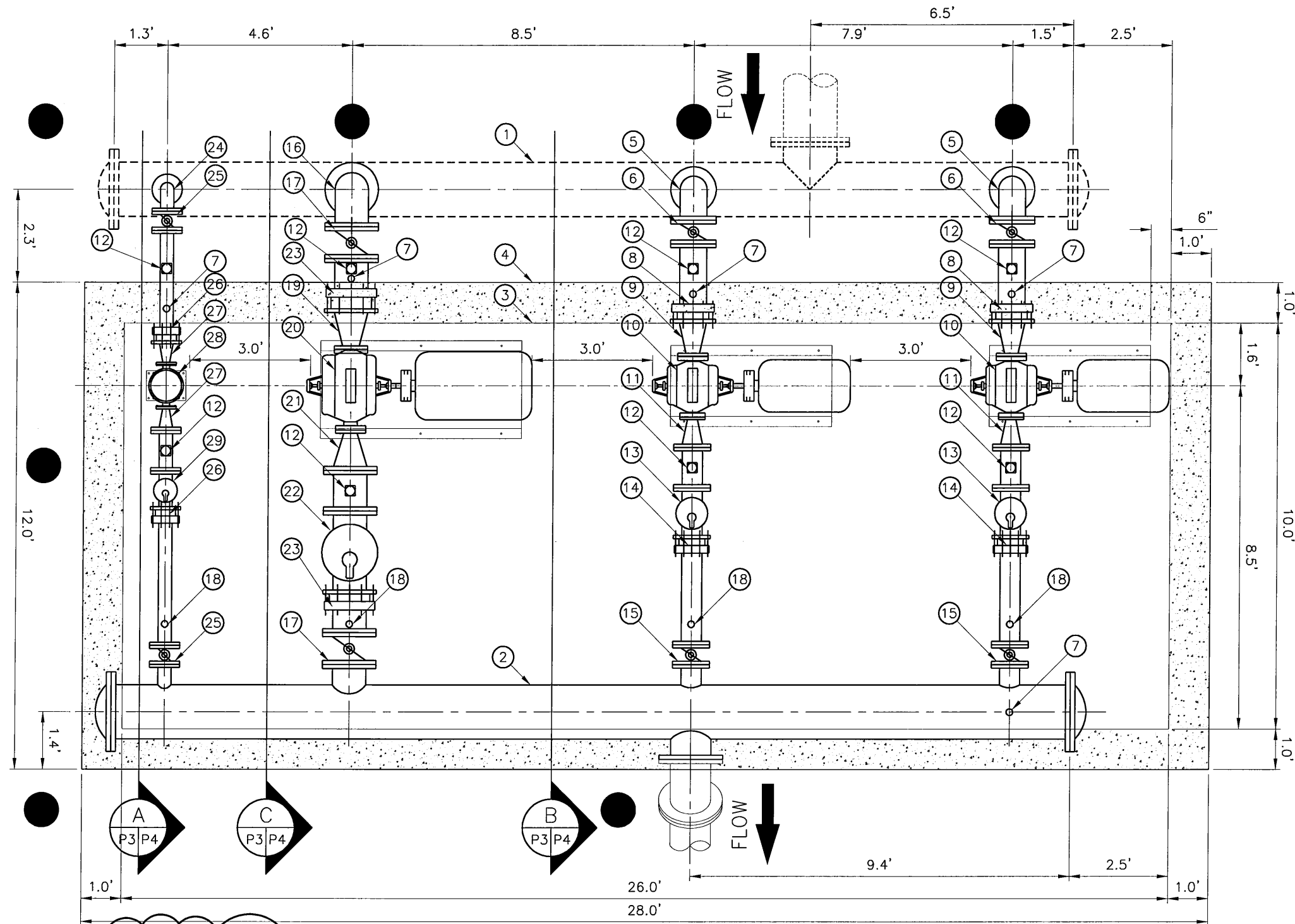
SITE LAYOUT
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. BUDGET PROJ.

SUBMITTED
APPROVED

MAP NO. SCALE: 1"=20' SHEET P2
SECT. NO.
DR. CK. JOB NO. 12-6006

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\PLANS\CIVIL\P2-PUMP STATION.DWG PLOT DATE: 10/24/2012 4:11 PM PLOT BY: AVICUNA



NOTE:

DRAIN FOR SEAL WATER WILL BE PROVIDED ON EACH PUMP THROUGH THE SLAB. CONTRACTOR TO COORDINATE WITH PUMP SKID MANUFACTURERS FOR LOCATION AND SIZES.

①	16" SUCTION HEADER (DIP)	⑪	6"x3" REDUCER	⑳	10"x5" REDUCER
②	16" DISCHARGE HEADER (STEEL)	⑫	PRESSURE GAGE	㉑	10" CHECK VALVE
③	PUMP STATION SKID	⑬	6" CHECK VALVE	㉒	10" FLANGE COUPLING ADAPTER
④	CONCRETE PAD	⑭	6" FLANGE COUPLING ADAPTER	㉓	4" 90°-BEND
⑤	8" 90°-BEND	⑮	6" BUTTERFLY VALVE	㉔	4" BUTTERFLY VALVE
⑥	8" BUTTERFLY VALVE	⑯	10" 90°-BEND	㉕	4" FLANGE COUPLING ADAPTER
⑦	AIR RELEASE VALVE	㉀	10" BUTTERFLY VALVE	㉖	4"x2 1/2" REDUCER
⑧	8" FLANGE COUPLING ADAPTER	㉁	DRAIN AND SAMPLE TAP	㉗	130 GPM PUMP
⑨	8"x4" REDUCER	㉂	10"x6" REDUCER	㉘	4" CHECK VALVE
⑩	500 GPM PUMP	㉃	1000 GPM PUMP		

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JULIAN P. BIELAWSKI
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LICENSED PROFESSIONAL ENGINEER
Julian P. Bielawski 10-25-12

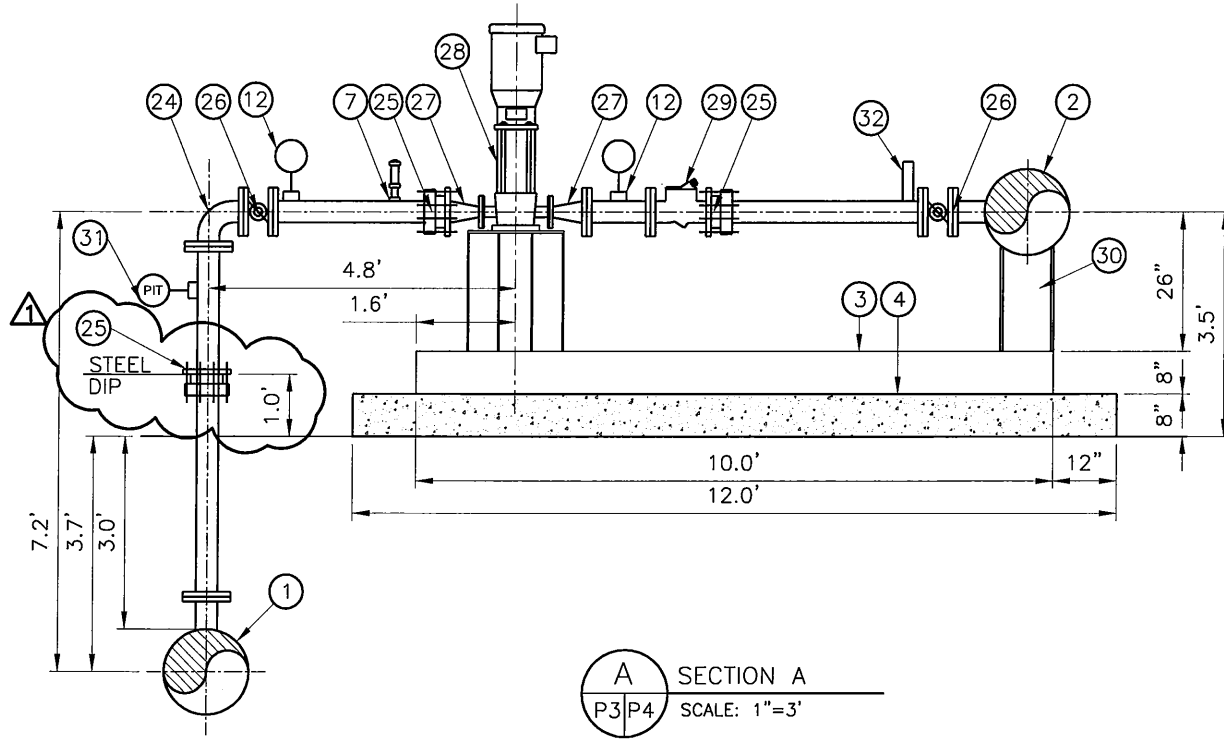
NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION
SAWS SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION
PUMP STATION PLAN
SAN ANTONIO, TEXAS

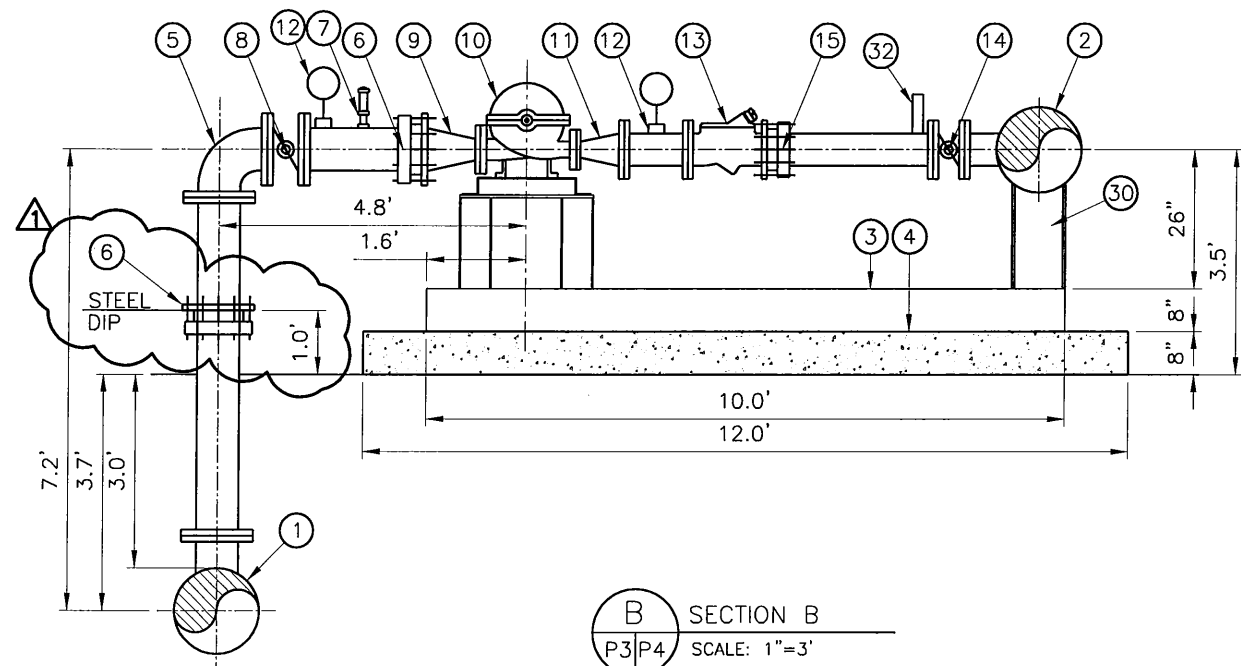
DEVELOPER: SAWS
CONT. _____ BUDGET PROJ. _____
SUBMITTED _____
APPROVED _____
MAP NO. _____ SCALE: 1"=3' SHEET
SECT. NO. _____ **P3**
DR. _____ CK. _____ JOB NO. 12-6006

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\PLANS\CIVIL\VP3-PUMP STATION SECTIONS.DWG PLOT DATE:10/24/2012 4:27 PM PLOT BY:AVICUNA

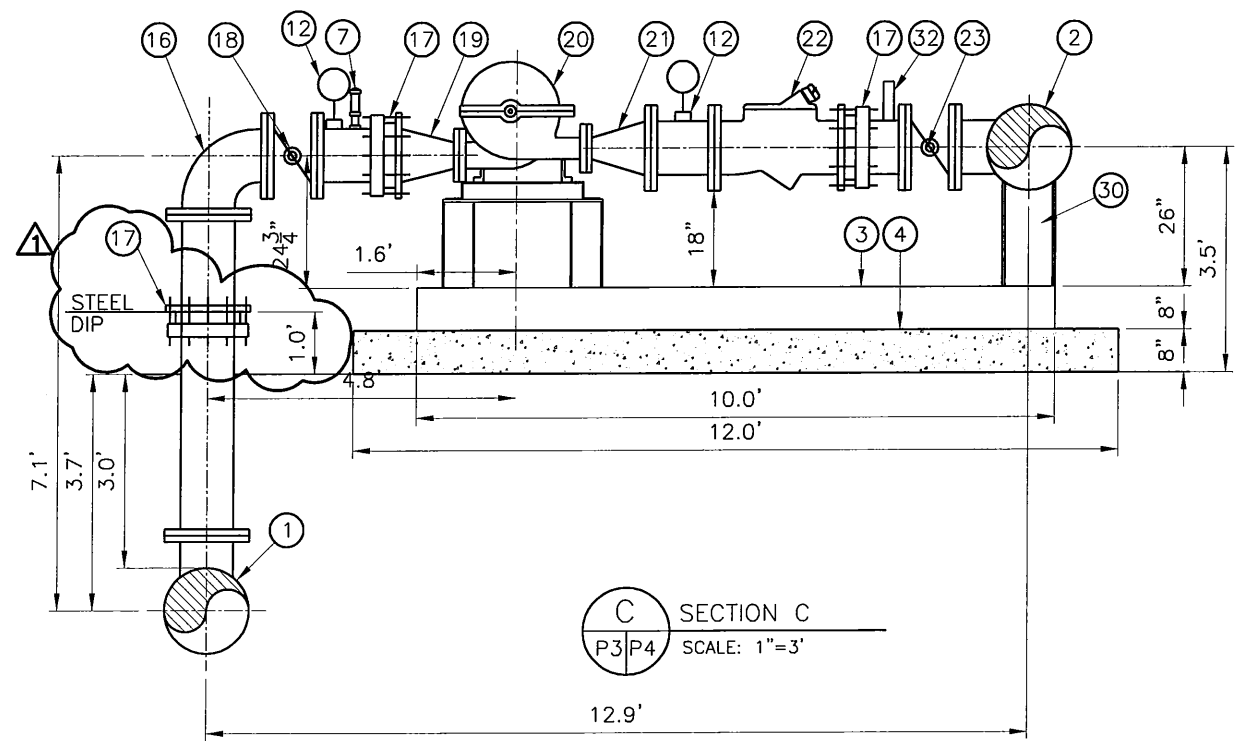


A SECTION A
P3/P4 SCALE: 1"=3'

1	16" SUCTION HEADER (DIP)	16	10" 90°-BEND	31	PRESSURE INDICATING TRANSMITTER
2	16" DISCHARGE HEADER (STEEL)	17	10" FLANGE COUPLING ADAPTER	32	DRAIN AND SAMPLE TAP
3	PUMP STATION SKID	18	10" BUTTERFLY VALVE		
4	CONCRETE PAD	19	10"x6" REDUCER		
5	8" 90°-BEND	20	1000 GPM PUMP		
6	8" FLANGE COUPLING ADAPTER	21	10"x5" REDUCER		
7	AIR RELEASE VALVE	22	10" CHECK VALVE		
8	8" BUTTERFLY VALVE	23	10" BUTTERFLY VALVE		
9	8"x4" REDUCER	24	4" 90°-BEND		
10	500 GPM PUMP	25	4" FLANGE COUPLING ADAPTER		
11	6"x3" REDUCER	26	4" BUTTERFLY VALVE		
12	PRESSURE GAGE	27	4"x2 1/2" REDUCER		
13	6" CHECK VALVE	28	130 GPM PUMP		
14	6" BUTTERFLY VALVE	29	4" CHECK VALVE		
15	6" FLANGE COUPLING ADAPTER	30	PIPE SUPPORT		AS PER SKID MANUFACTURERS SPECIFICATIONS



B SECTION B
P3/P4 SCALE: 1"=3'



C SECTION C
P3/P4 SCALE: 1"=3'

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84456
LICENSED PROFESSIONAL ENGINEER

Julian Bielawski 10-25-12

NO.	REVISION	DRAWN	APPROVED	DATE
1	ADDENDUM NO. 3		SHT	10/24/12

REVISION

SAWS SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION

PUMP STATION SECTION

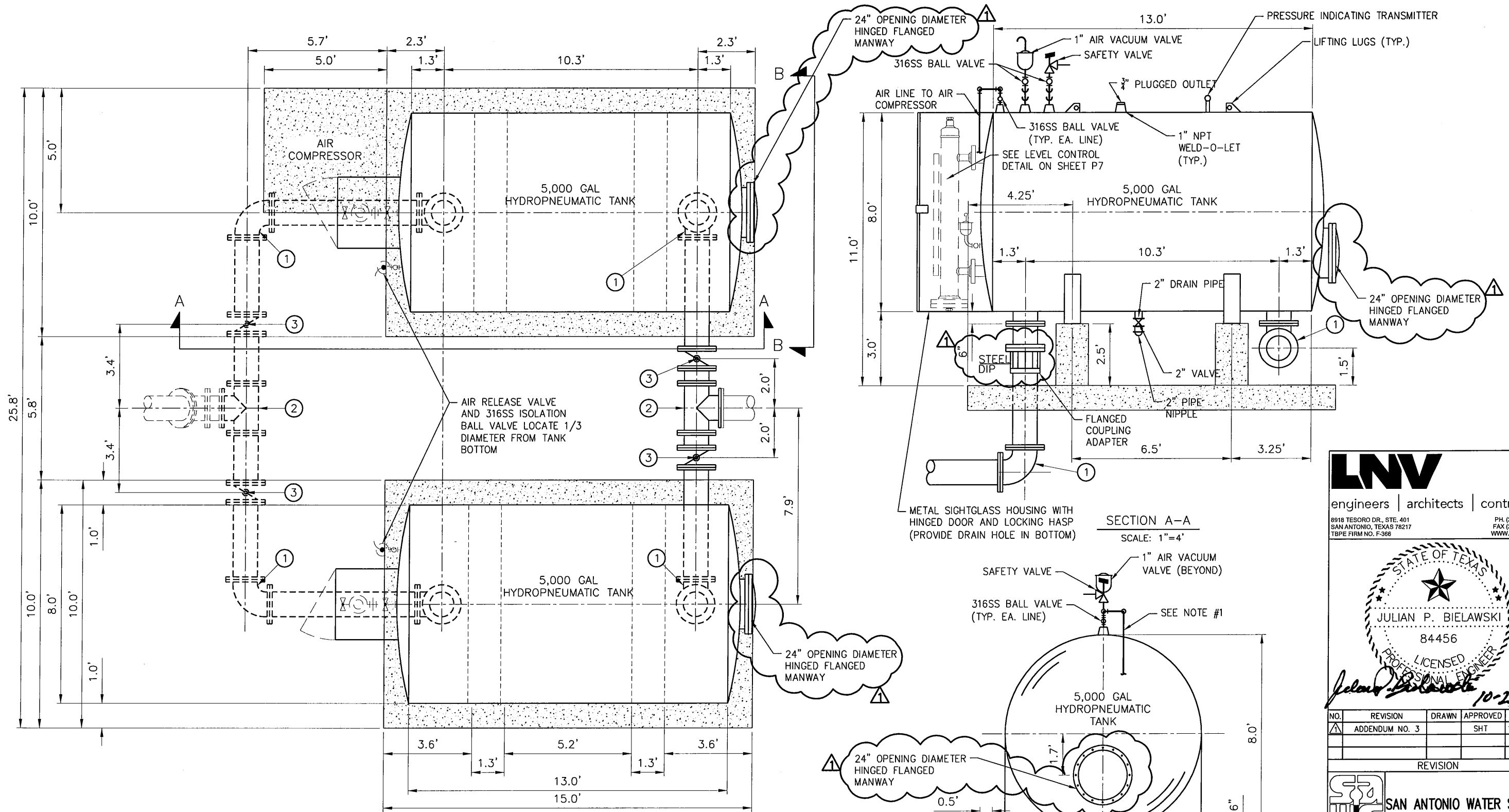
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. BUDGET PROJ.

SUBMITTED _____
APPROVED _____

MAP NO. _____ SCALE: 1"=3' SHEET
SECT. NO. _____ P4
DR. CK. JOB NO. 12-6006

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\CIVIL\4-DUAL HYDRO-TANK 5000.DWG PLOT DATE:10/24/2012 3:51 PM PLOT BY:AVICUNA



①	12" 90°-BEND
②	12" TEE
③	12" BUTTERFLY VALVE

NOTE:

- CONTRACTOR TO PROVIDE FLEXIBLE AIR LINE FOR VIBRATION ISOLATION. TANK MANUFACTURER TO PROVIDE SUPPORT BRACING (5-FOOT MAX. SPACING) FOR COMPRESSOR AIR LINE, TYPICAL BOTH TANKS.
- SEE S2 FOR FOUNDATION DETAILS.

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LICENSED PROFESSIONAL ENGINEER
Julian P. Bielawski 10-25-12

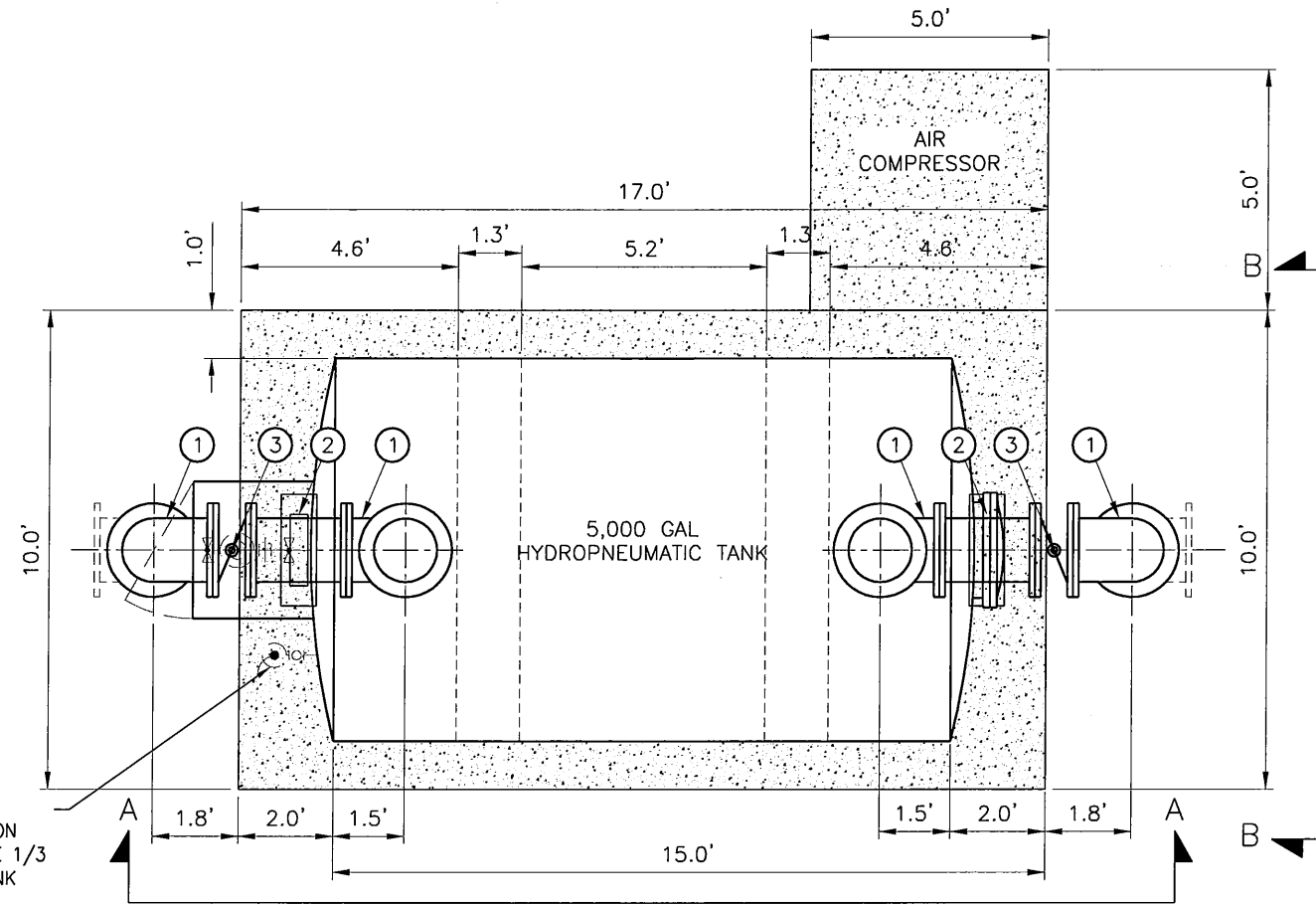
NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION

SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION
**DISCHARGE SIDE
DUAL 5,000 GAL
HYDROPNEUMATIC
TANK LAYOUT**
SAN ANTONIO, TEXAS

DEVELOPER: SAWS	
CONT.	BUDGET PROJ.
SUBMITTED	
APPROVED	
MAP NO.	SCALE: 1"=4'
SECT. NO.	SHEET
DR.	CK.
JOB NO. 12-6006	
P5	

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\PLANS\CIVIL\PS-HYDRO-TANK 5000.DWG PLOT DATE:10/24/2012 3:56 PM PLOT BY:AVICUNA

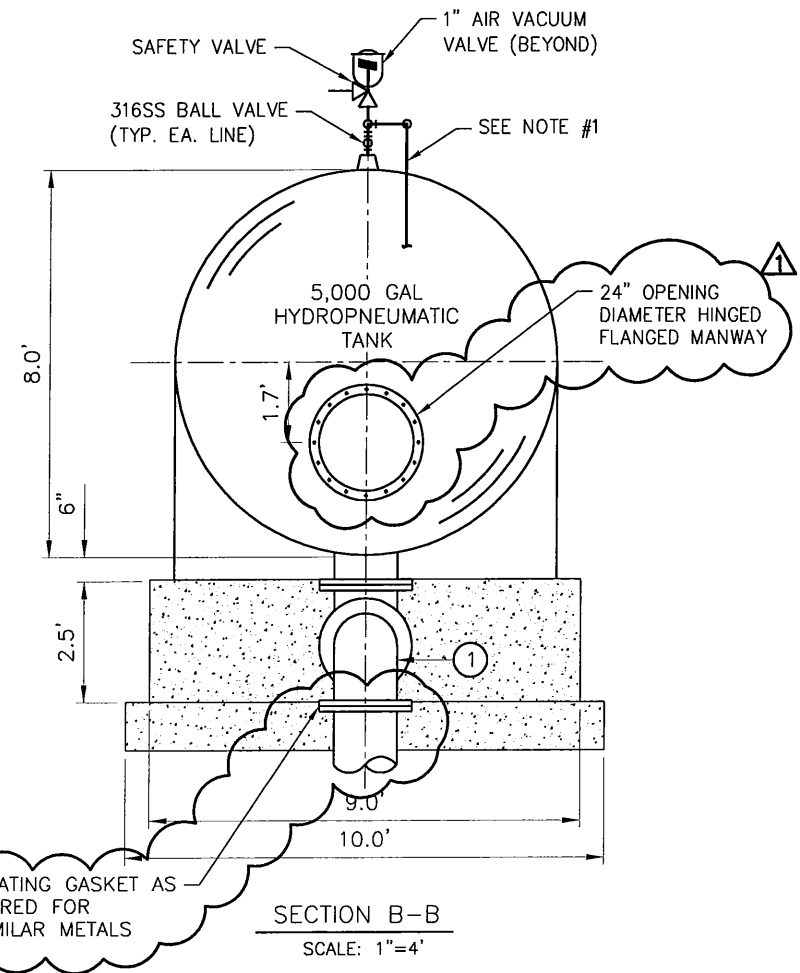
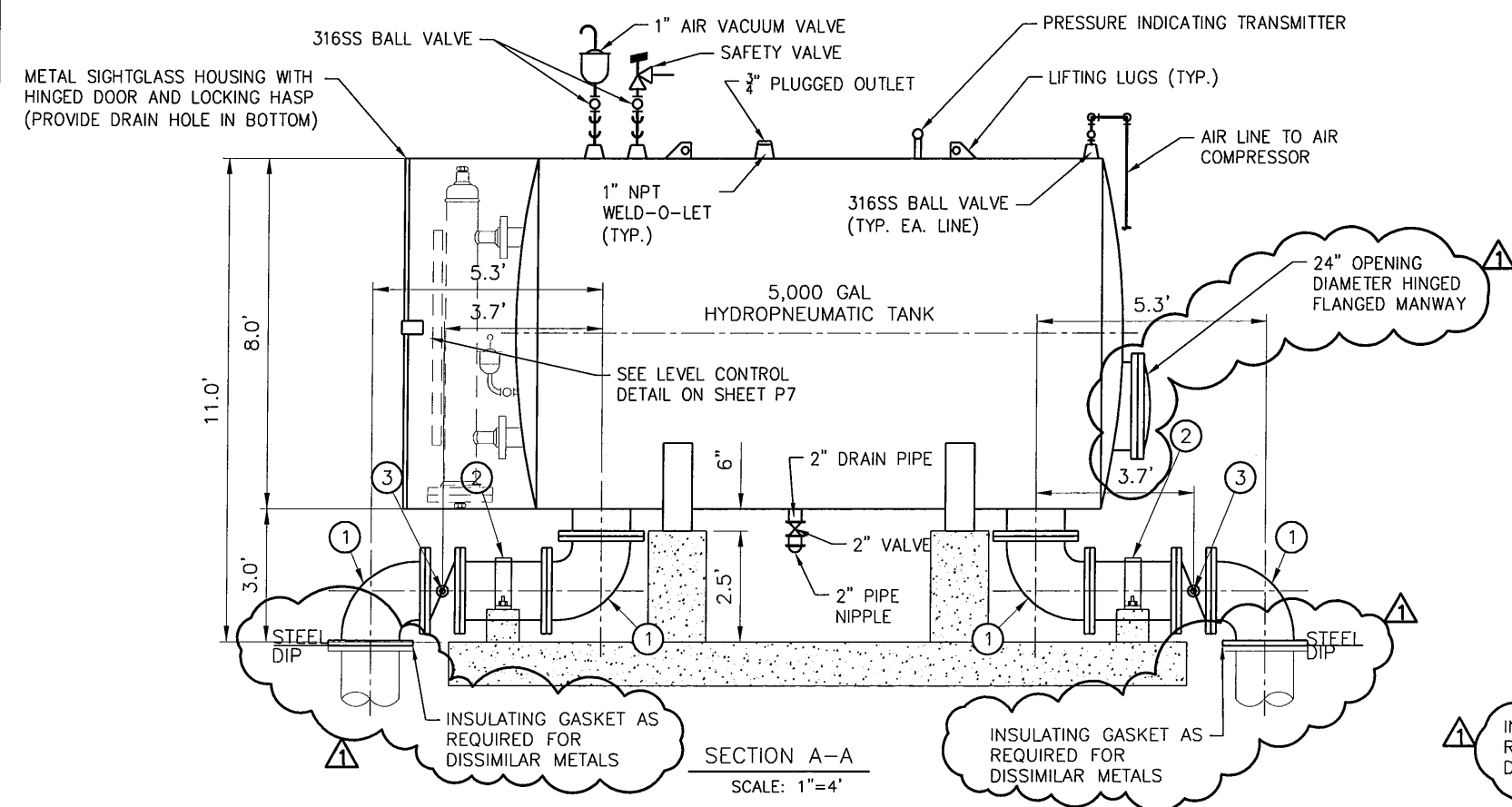


AIR RELEASE VALVE AND 316SS ISOLATION BALL VALVE LOCATE 1/3 DIAMETER FROM TANK BOTTOM

①	16" 90°-BEND
②	CONCRETE PIPE SUPPORT
③	16" BUTTERFLY VALVE

- NOTE:
- CONTRACTOR TO PROVIDE FLEXIBLE AIR LINE FOR VIBRATION ISOLATION. TANK MANUFACTURER TO PROVIDE SUPPORT BRACING (5-FOOT MAX. SPACING) FOR COMPRESSOR AIR LINE, TYPICAL.
 - SEE S2 FOR FOUNDATION DETAILS.

5,000 GAL HYDROPNEUMATIC TANK LAYOUT
SCALE: 1"=4'



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Δ	ADDENDUM NO. 3		SHT	10/24/12

REVISION

SAN ANTONIO WATER SYSTEM

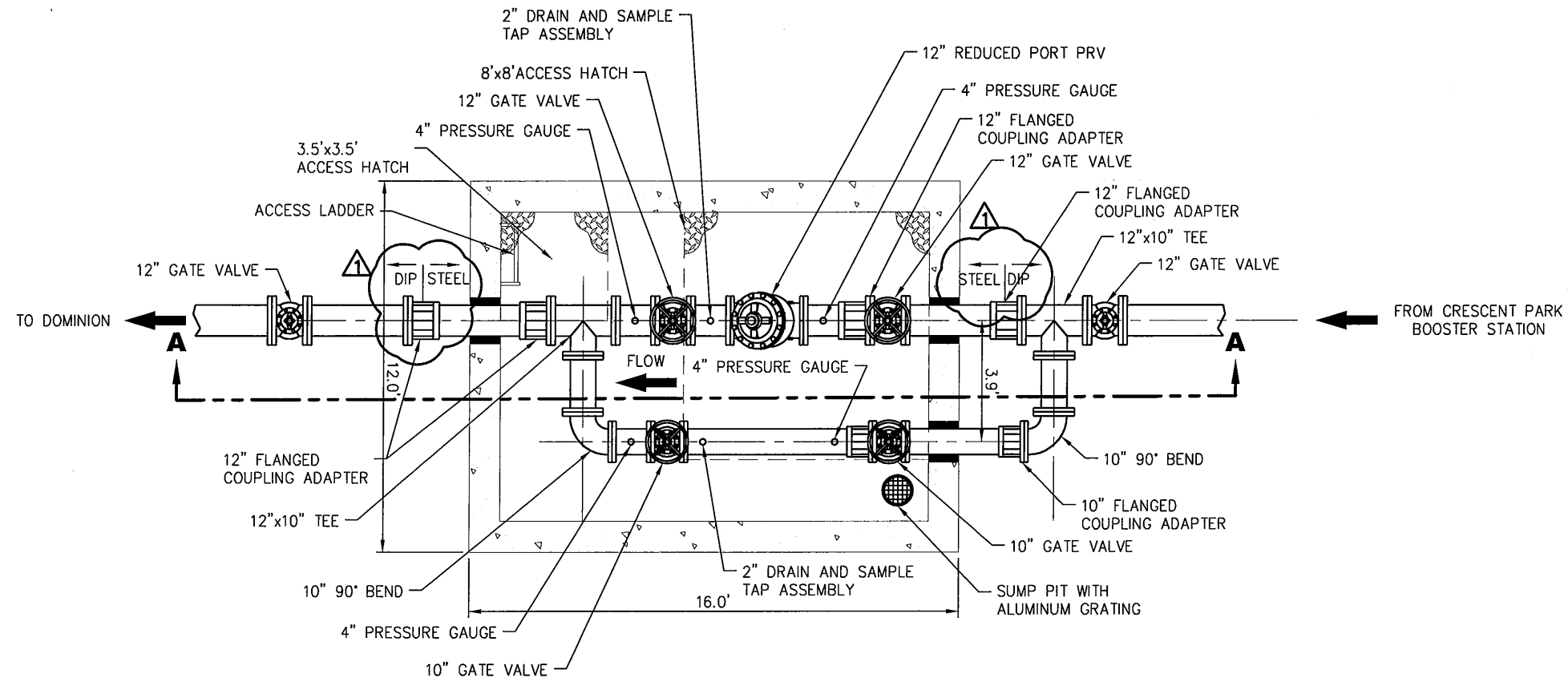
CRESCENT PARK BOOSTER STATION
SUCTION SIDE
5,000 GAL
HYDROPNEUMATIC
TANK LAYOUT
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. _____ BUDGET PROJ. _____

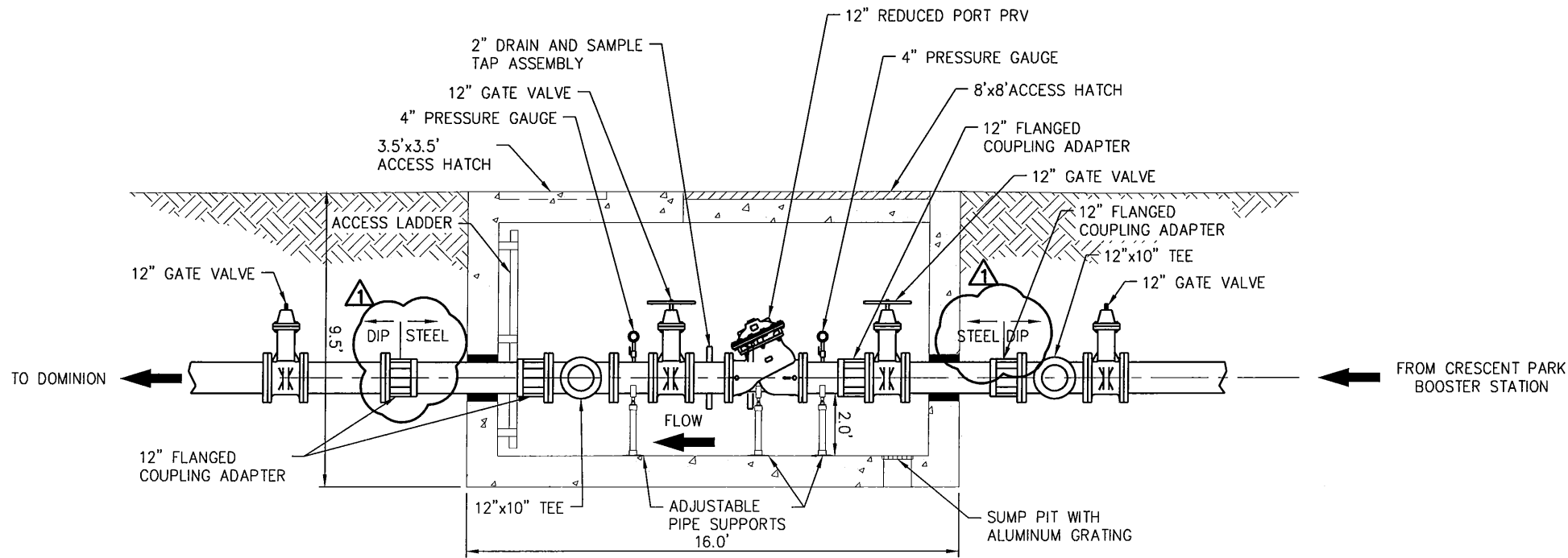
SUBMITTED _____
APPROVED _____

MAP NO. _____ SCALE: 1"=4' SHEET
SECT. NO. _____ P6
DR. _____ CK. _____ JOB NO. 12-6006

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PLAN VIEW
NTS



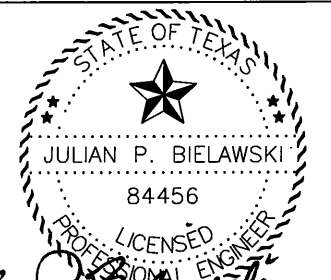
SECTION A-A
NTS

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SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION

PRV PLAN AND SECTION

SAN ANTONIO, TEXAS

DEVELOPER: SAWS

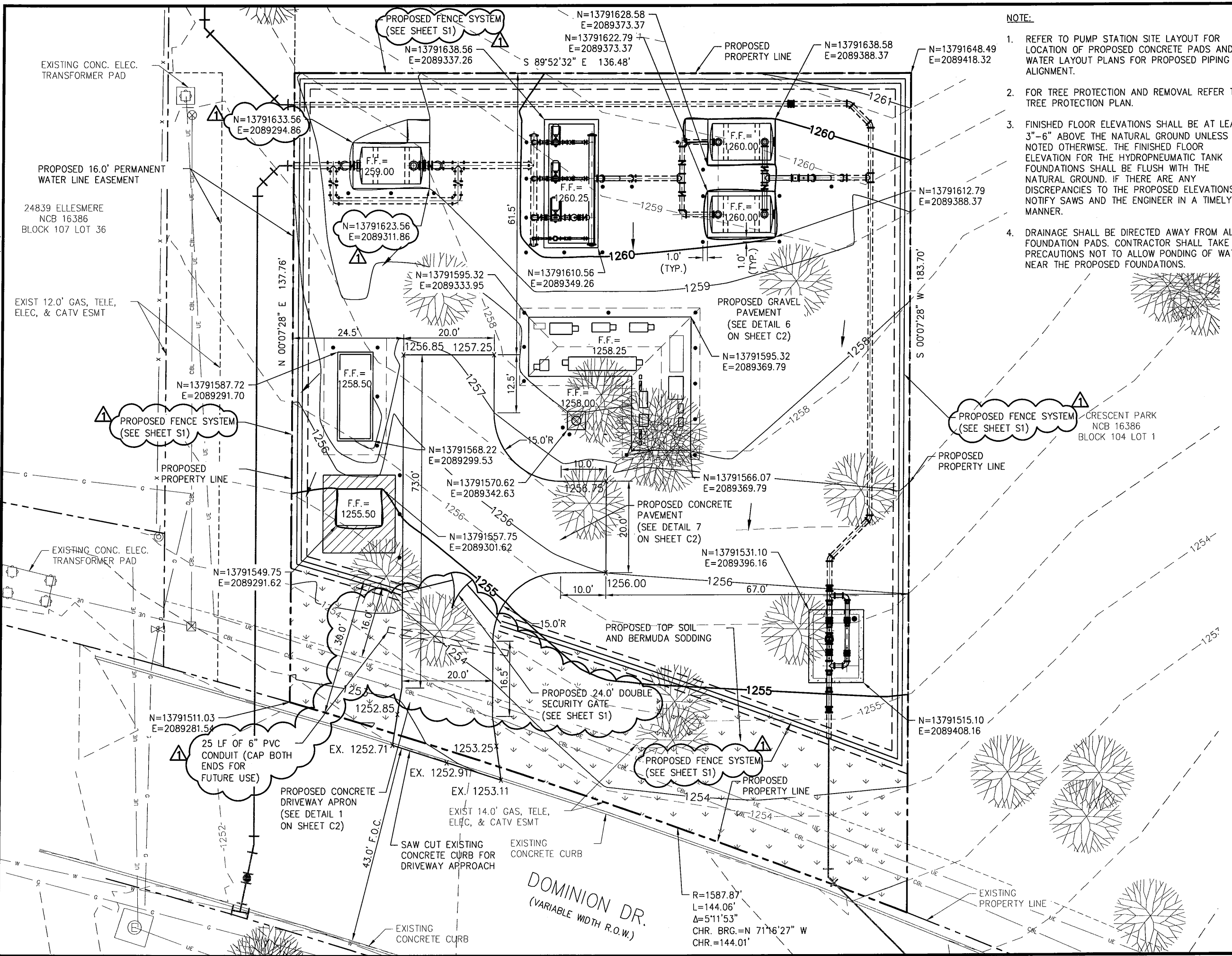
CONT. BUDGET PROJ.

SUBMITTED

APPROVED

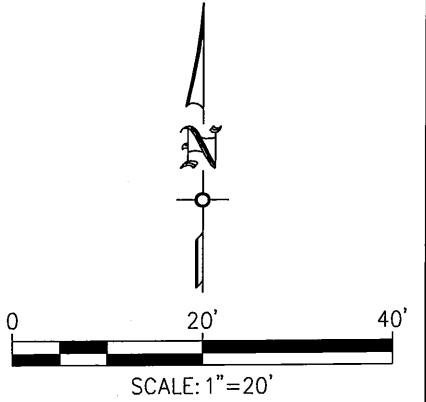
MAP NO.	SCALE: N.T.S.	SHEET
SECT. NO.		P8
DR.	CK.	JOB NO. 12-6006

S:\PROJECTS\SAWS\110328 - SAWS 2011 ENG DESIGN SRVS REPLMNT & IMP\020 CRESCENT PARK BOOSTER STATION\DRAWINGS\PLANS\CIVIL\1103280202SPN01.DWG PLOT DATE: 10/24/2012 5:11 PM PLOT BY: ECASSTILLO



NOTE:

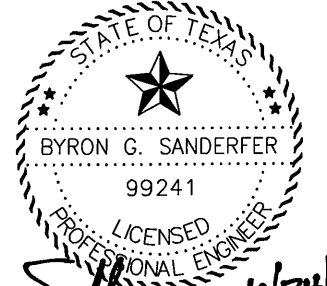
1. REFER TO PUMP STATION SITE LAYOUT FOR LOCATION OF PROPOSED CONCRETE PADS AND WATER LAYOUT PLANS FOR PROPOSED PIPING ALIGNMENT.
2. FOR TREE PROTECTION AND REMOVAL REFER TO TREE PROTECTION PLAN.
3. FINISHED FLOOR ELEVATIONS SHALL BE AT LEAST 3"-6" ABOVE THE NATURAL GROUND UNLESS NOTED OTHERWISE. THE FINISHED FLOOR ELEVATION FOR THE HYDROPNEUMATIC TANK FOUNDATIONS SHALL BE FLUSH WITH THE NATURAL GROUND. IF THERE ARE ANY DISCREPANCIES TO THE PROPOSED ELEVATIONS NOTIFY SAWS AND THE ENGINEER IN A TIMELY MANNER.
4. DRAINAGE SHALL BE DIRECTED AWAY FROM ALL FOUNDATION PADS. CONTRACTOR SHALL TAKE PRECAUTIONS NOT TO ALLOW PONDING OF WATER NEAR THE PROPOSED FOUNDATIONS.



LEGEND

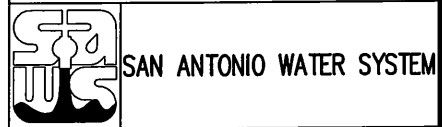
- 100— EXIST. CONTOUR
- 100— PROP. CONTOUR
- x100.00 PROP. TOP OF CONCRETE
- PROP. BOLLARD
- F.F. FINISHED FLOOR ELEVATION

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Byron G. Sanderfer 10/24/12

NO.	REVISION	DRAWN	APPROVED	DATE
Δ	ADDENDUM NO. 3		SHT	10/24/12



REVISION

SAN ANTONIO WATER SYSTEM
 CRESCENT PARK BOOSTER STATION

**PUMP STATION
 SITE AND GRADING PLAN**

SAN ANTONIO, TEXAS

DEVELOPER: SAWS
 CONT. _____ BUDGET PROJ. _____

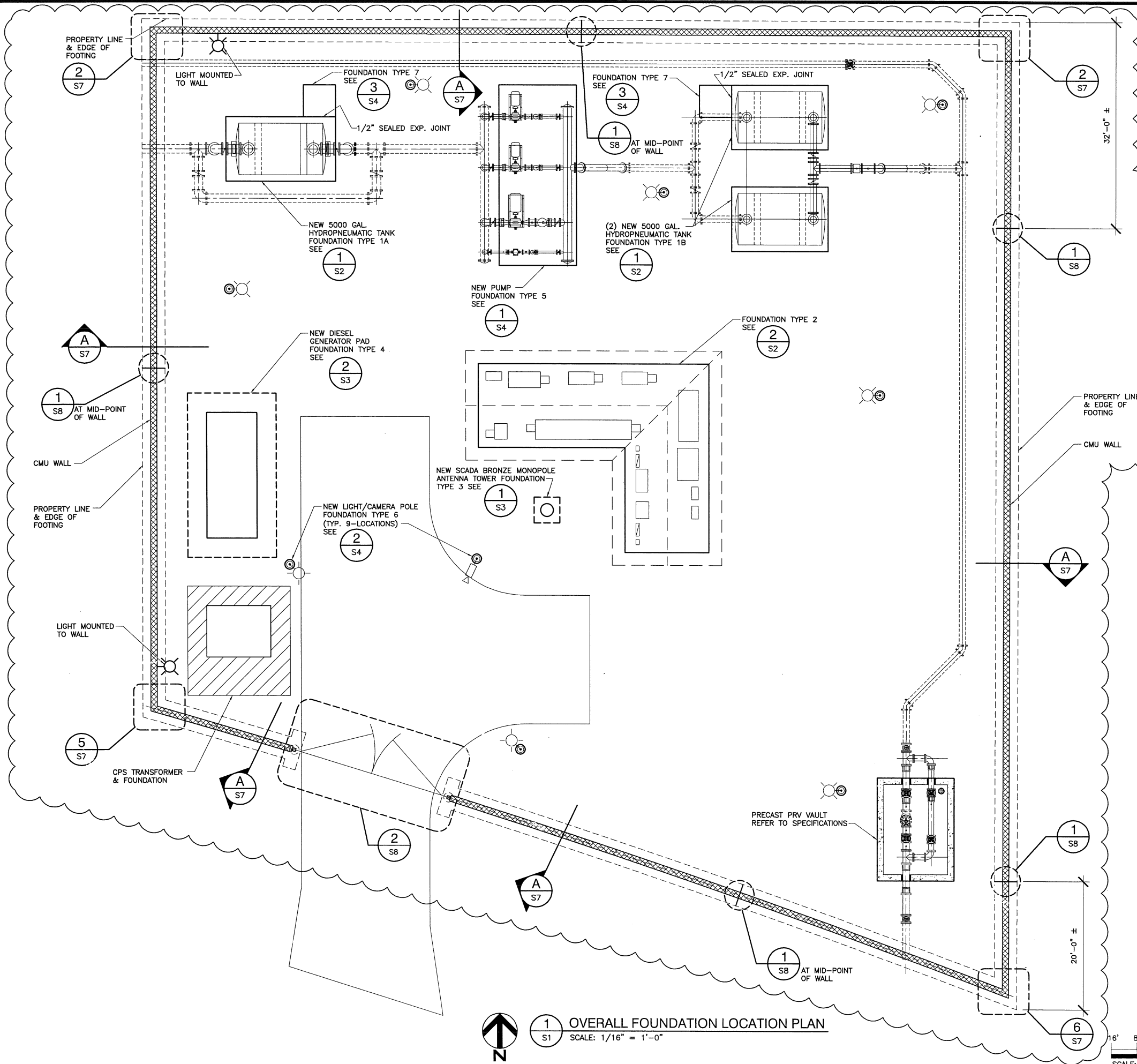
SUBMITTED _____
 APPROVED _____

MAP NO.	SCALE: 1"=20'	SHEET
SECT. NO.		C1
DR. CK.	JOB NO. 12-6006	

DOMINION DR.
 (VARIABLE WIDTH R.O.W.)

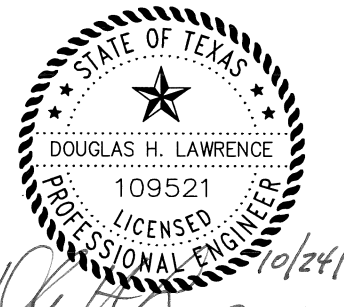
R=1587.87'
 L=144.06'
 Δ=5°11'53"
 CHR. BRG.=N 71°16'27" W
 CHR.=144.01'

U:\SAWS\100069 - HIDDEN SPRINGS\300\DRAWINGS\STRUCTURAL\S1 - FOUNDATION LOCATION PLAN.DWG PLOT DATE:10/24/2012 1:17 PM PLOT BY:CKNESEK



NOTE:
 1. REFER TO SHEET P2 & C1 FOR EXACT LOCATIONS OF FOUNDATIONS & WALL.
 2. PLACE CONTROL JOINTS IN THE WALL AT 34' ± O.C., CONSTRUCTION JOINTS IN FOOTING AT 45' ± O.C.

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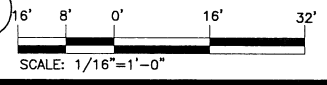


NO.	ADDENDUM 3	CK	DL	10/24/12
REVISION		DRAWN	APPROVED	DATE



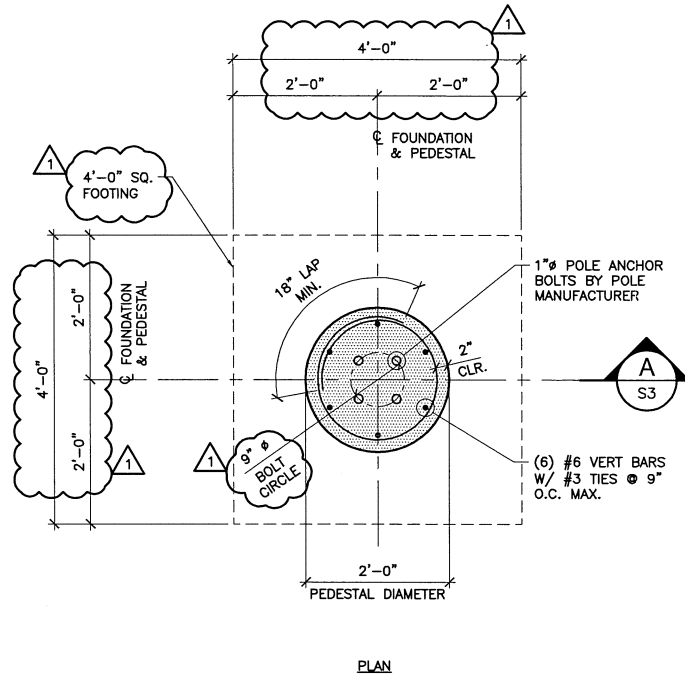
SAN ANTONIO WATER SYSTEM
 CRESCENT PARK BOOSTER STATION
OVERALL FOUNDATION LOCATION PLAN
 SAN ANTONIO, TEXAS
 DEVELOPER: SAWS
 CONT. BUDGET PROJ.
 SUBMITTED _____
 APPROVED _____
 MAP NO. SCALE: AS NOTED SHEET S1
 SECT. NO.
 DR. C.K. CK. D.L. JOB NO. 12-6006

1/S1 OVERALL FOUNDATION LOCATION PLAN
 SCALE: 1/16" = 1'-0"



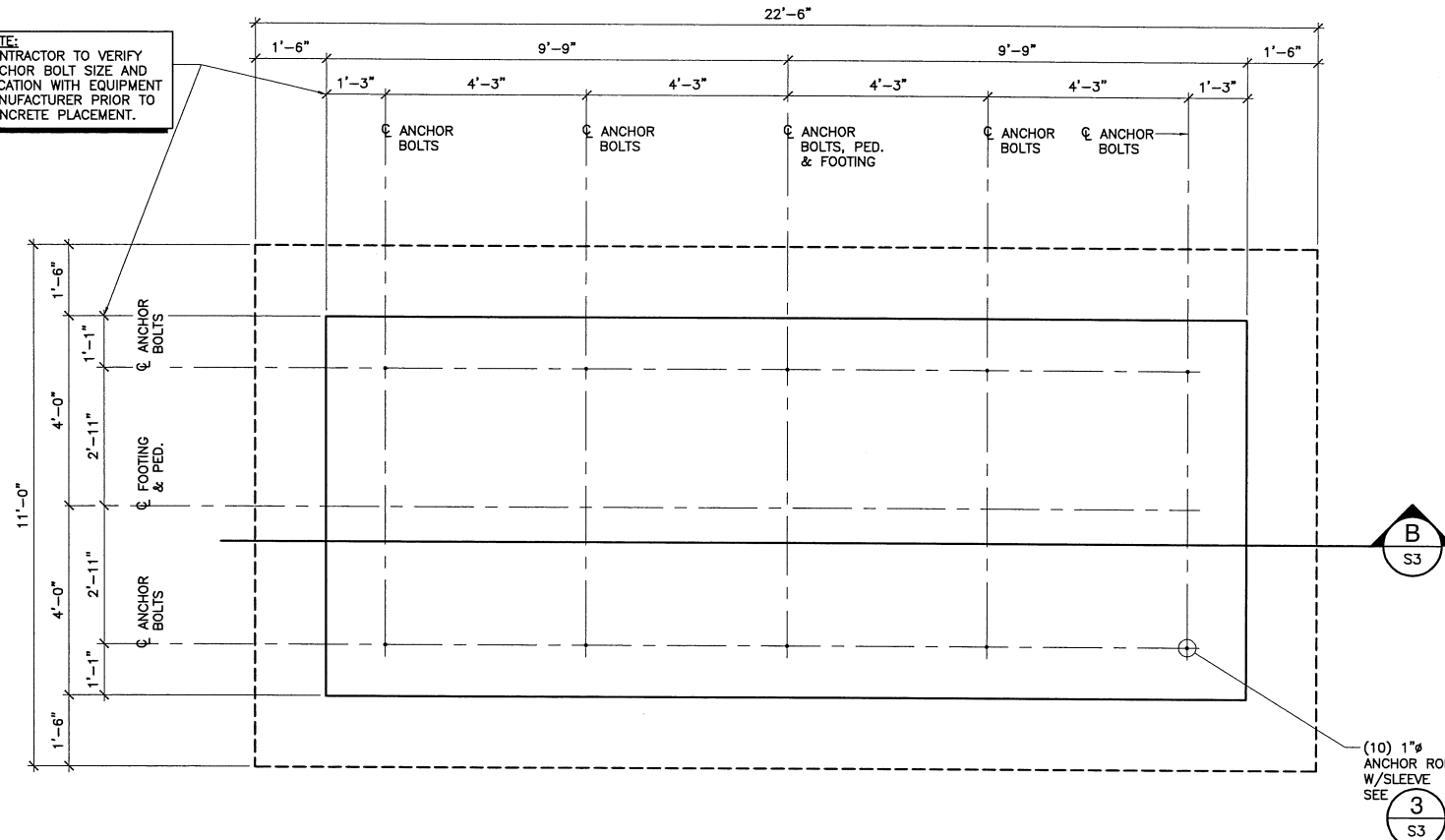
U:\SAWS\100069 - HIDDEN SPRINGS\DRAWINGS\STRUCTURAL\S3 - TYPE 3 & 4 FOUNDATIONS.DWG PLOT DATE:10/24/2012 1:18 PM PLOT BY:MHESSELTIME

NOTE:
1. CONTRACTOR SHALL VERIFY ANCHOR BOLT DIMENSIONS AND ANCHOR BOLT CIRCLE WITH POLE MANUFACTURER PRIOR TO ANY FABRICATION AND CONSTRUCTION.

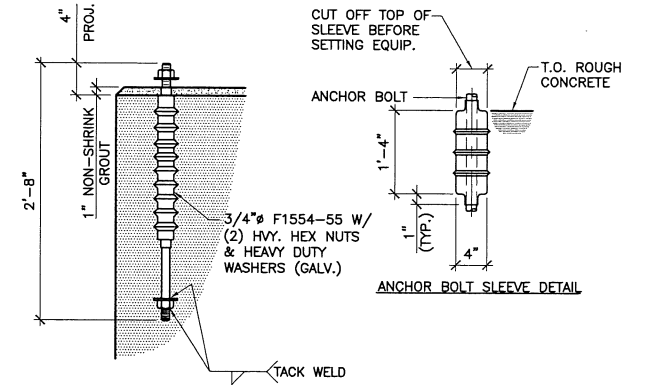


1 PLAN @ FOUNDATION TYPE 3
S3 SCALE: 3/8" = 1'-0"

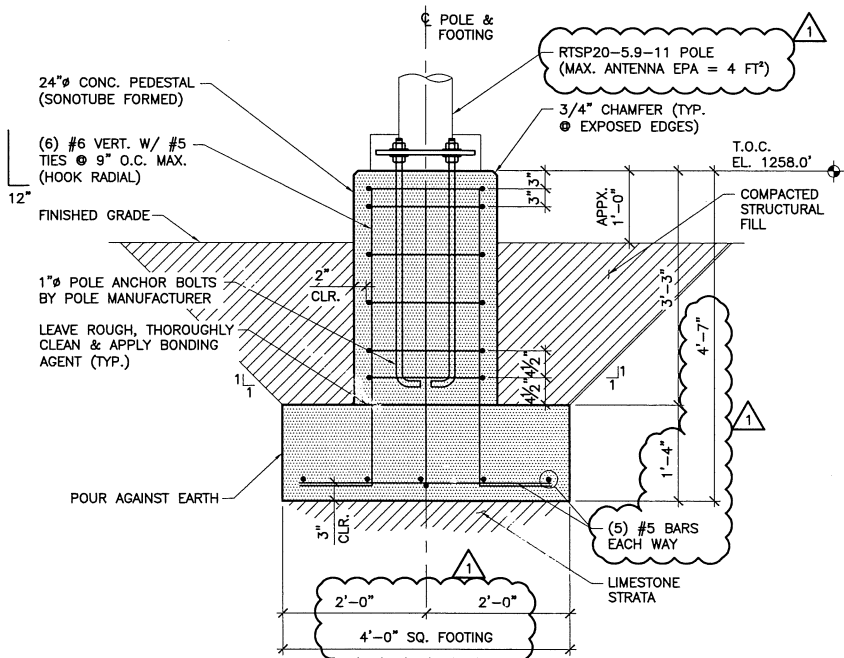
NOTE:
CONTRACTOR TO VERIFY ANCHOR BOLT SIZE AND LOCATION WITH EQUIPMENT MANUFACTURER PRIOR TO CONCRETE PLACEMENT.



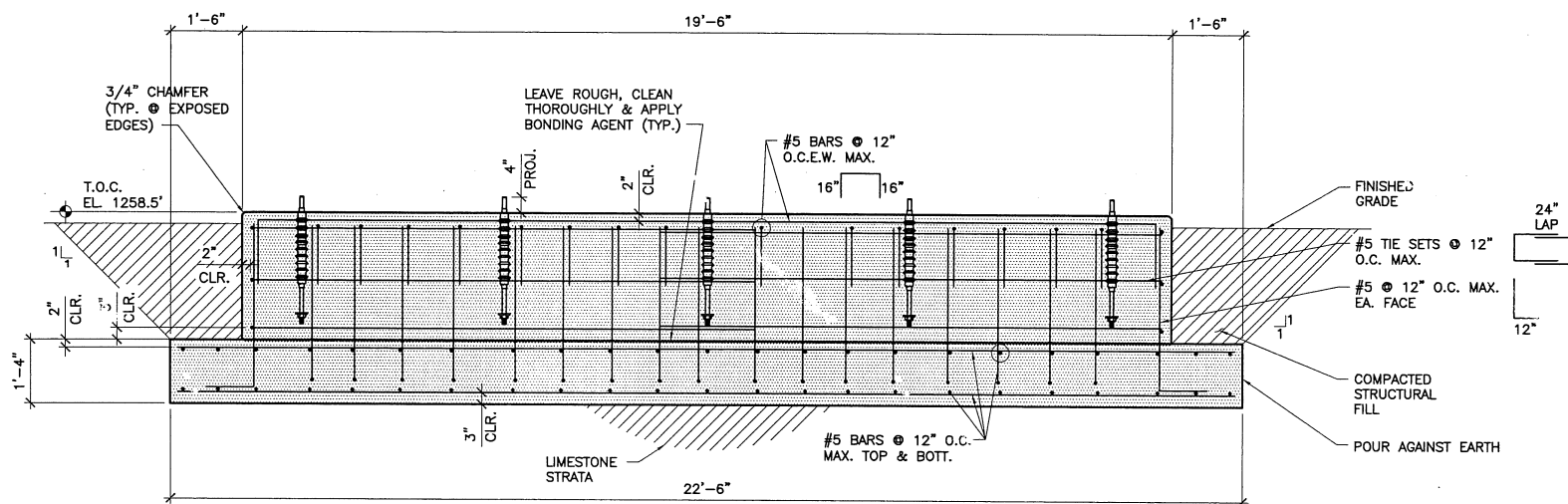
2 PLAN @ FOUNDATION TYPE 4
S3 SCALE: 1/4" = 1'-0"



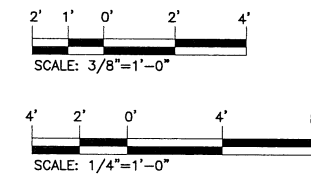
3 TYP. ANCHOR BOLT DETAIL
S3 N.T.S.



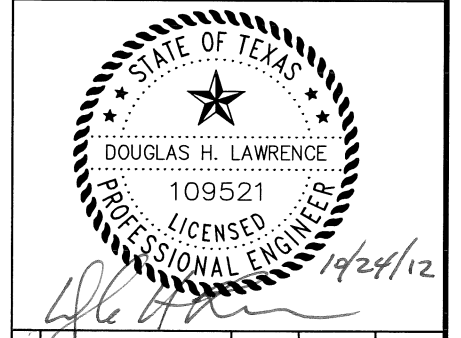
A SECTION @ FOUNDATION TYPE 3
S3 SCALE: 3/8" = 1'-0"



B SECTION @ FOUNDATION TYPE 4
S3 SCALE: 1/4" = 1'-0"



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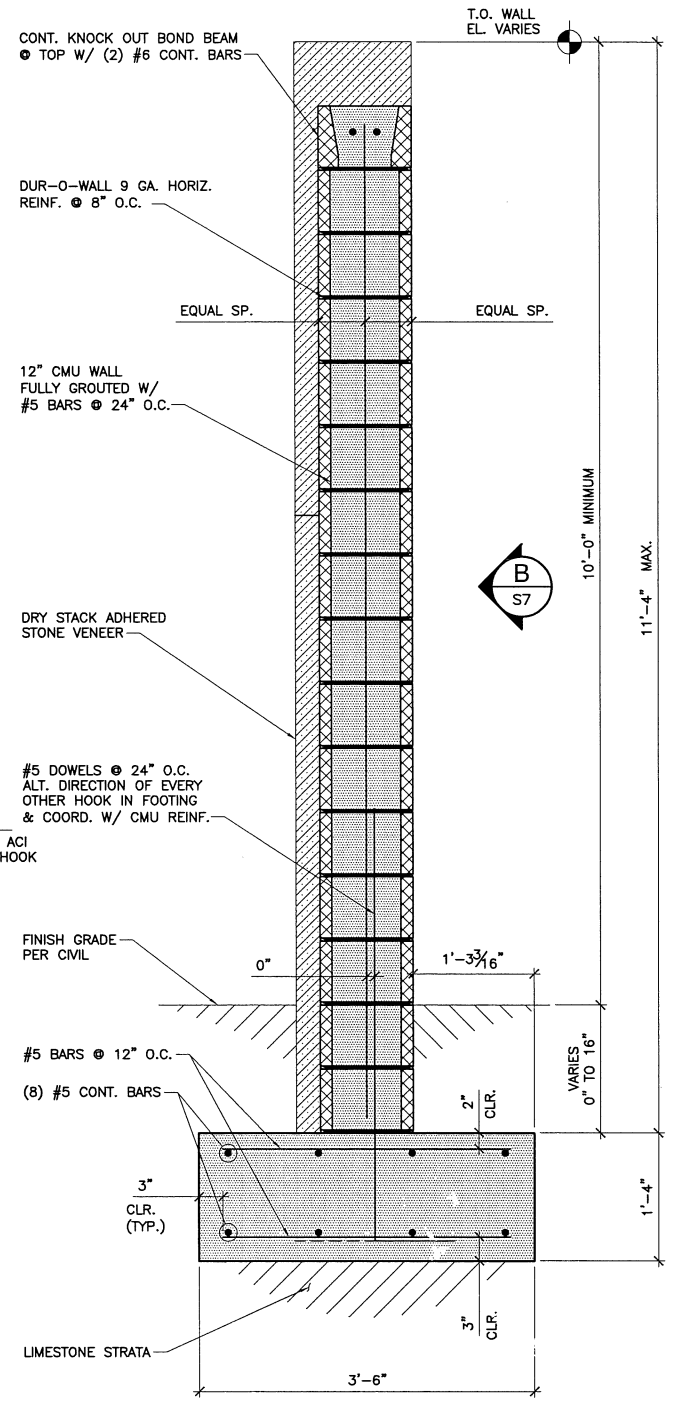


NO.	ADDENDUM 3	C.K.	D.L.	10/24/12
	REVISION	DRAWN	APPROVED	DATE

SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION
FOUNDATION TYPE 3 & 4
PLANS AND SECTIONS
SAN ANTONIO, TEXAS

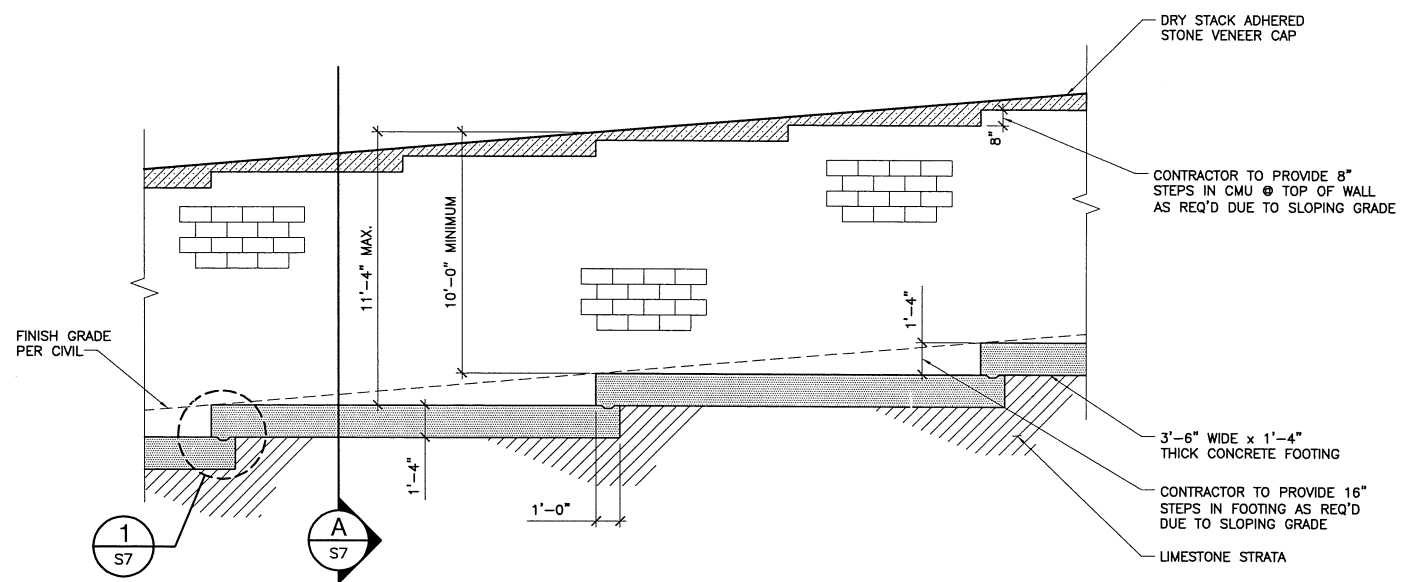
DEVELOPER: SAWS	BUDGET PROJ.	
CONT.		
SUBMITTED		
APPROVED		
MAP NO.	SCALE: AS NOTED	SHEET S3
DR. C.K.	CK. D.L.	JOB NO. 12-6006

U:\SAWS\100069 - HIDDEN SPRINGS\000\DRAWINGS\STRUCTURAL\S7 - CMU WALL SECT & DETAILS.DWG PLOT DATE:10/24/2012 1:18 PM PLOT BY:CKNESEK

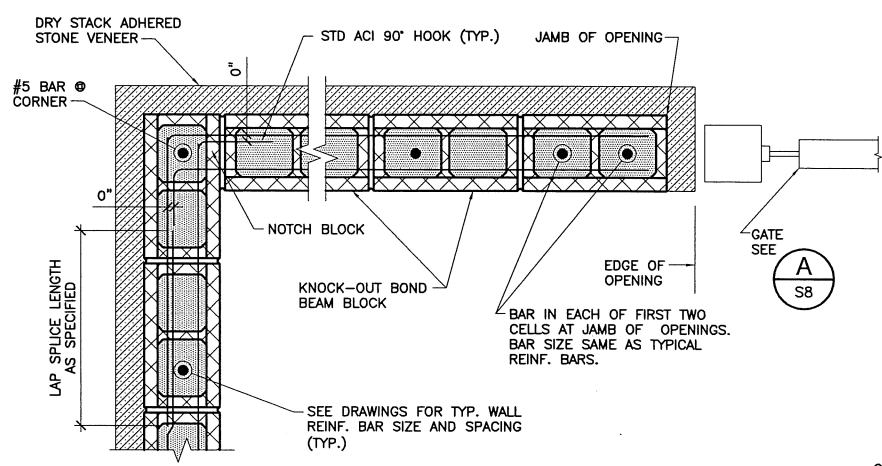


NOTE:
FOR WALL LENGTH AND
LOCATION, REFER TO SHEET S1

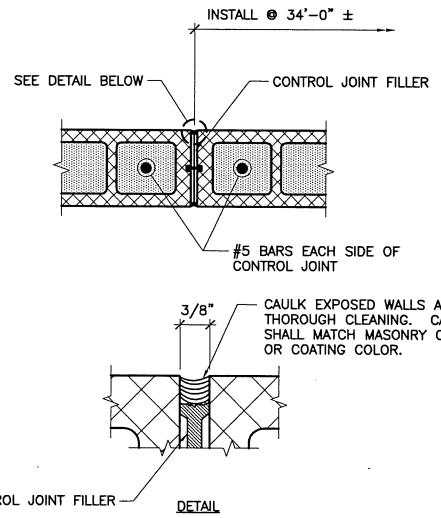
A SECTION
S7 SCALE: 1/2" = 1'-0"



B STEPPED WALL ELEVATION
S7 SCALE: 1/8" = 1'-0"



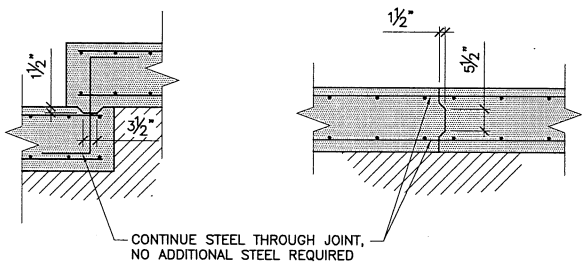
2 CMU 90° CORNER & JAMB WALL DETAIL
S7 N.T.S.



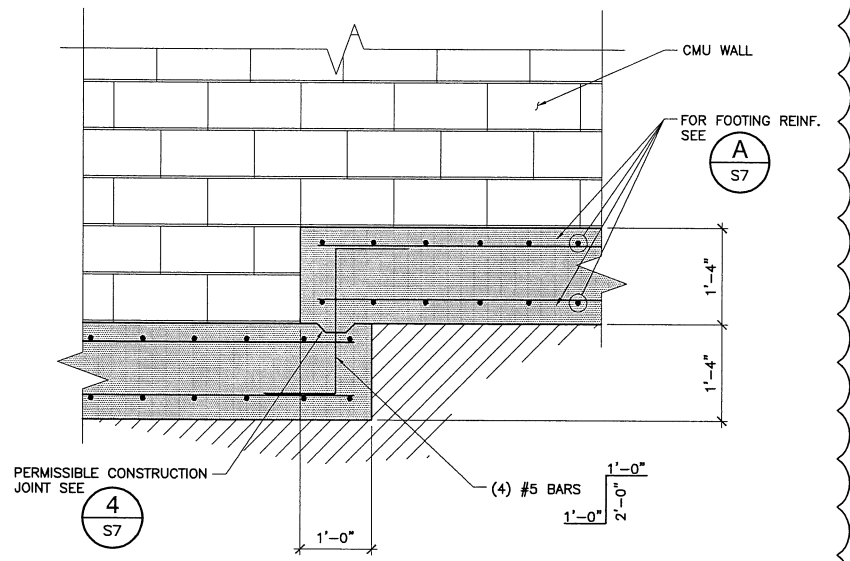
3 CMU CONTROL JOINT DETAIL
S7 N.T.S.

CONCRETE MASONRY PARTITION WALL NOTES:

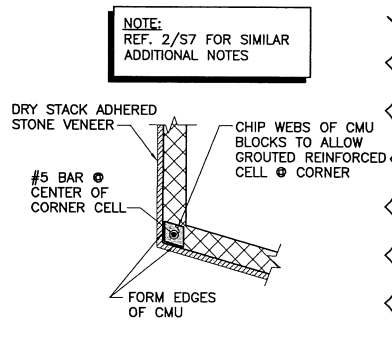
1. ALL DOWELS FOR ANCHORING CMU WALL SHALL BE PLACED AS SHOWN AND COORDINATE WITH WALL REINFORCING.
2. PROVIDE GALVANIZED 9 GA. HORIZONTAL JOINT REINFORCING, TRUSS TYPE, DUROWALL OR EQUAL, @ 8 INCHES O.C.
3. CMU BLOCKS SHALL HAVE A UNIT STRENGTH OF 1,900 PSI. REINFORCED CMU SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF $F_w = 1,500$ PSI. GROUT FOR CMU WALLS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI W/ MAXIMUM 3/8" PEA GRAVEL. GROUT SLUMP SHALL BE 7 ± 1 AND ACHIEVED USING SUPERPLASTICIZER.
4. JOINT MORTAR SHALL BE IN CONFORMANCE WITH ASTM C270, TYPE S.
5. CONCRETE MASONRY UNITS (CMU) SHALL CONFORM TO THE REQUIREMENTS OF THE ASTM C90. ALL CMU CONSTRUCTION SHALL CONFORM TO ACI 530. ALL WORK SHALL ALSO COMPLY WITH APPLICABLE PROJECT SPECIFICATIONS.
6. PROVIDE TEMPORARY BRACING DURING INSTALLATION OF MASONRY WORK.
7. BOND BEAM, STEEL & HORIZONTAL JOINT REINFORCING SHALL BE DISCONTINUOUS AT CONTROL JOINTS.
8. ALL CMU CELLS SHALL BE FILLED IN APPROXIMATELY 4' TO 6' MAX. LIFTS.
9. CONTRACTOR SHALL SUBMIT, AT CONTRACTORS COST, COMPRESSIVE WALL DESIGN STRENGTH (F_w) VERIFIED BY PRISM TEST BEFORE MASONRY CONSTRUCTION BEGINS. PROVIDE UNIT MASONRY STRENGTH, GROUT MIX DESIGN AND MORTAR MIX DESIGN.
10. SPLICES SHALL BE 48 BAR DIAMETER MINIMUM, U.N.O.
11. INTERIOR OF CMU WALL TO BE PAINTED TO MATCH COLOR OF GATE.



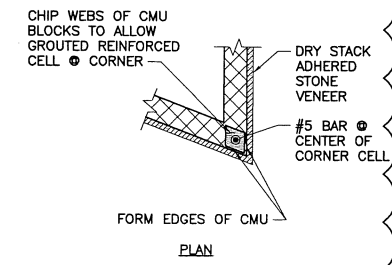
4 TYPICAL FOOTING CONSTRUCTION JOINT DETAILS
S7 SCALE: 1/4" = 1'-0"



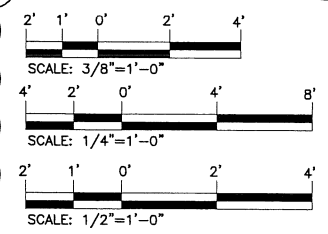
1 FOOTING STEP DETAIL
S7 SCALE: 3/8" = 1'-0"



5 CMU SKEWED CORNER WALL DETAIL
S7 N.T.S.



6 CMU SKEWED CORNER WALL DETAIL
S7 N.T.S.



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STATE OF TEXAS
DOUGLAS H. LAWRENCE
109521
PROFESSIONAL ENGINEER
10/24/12

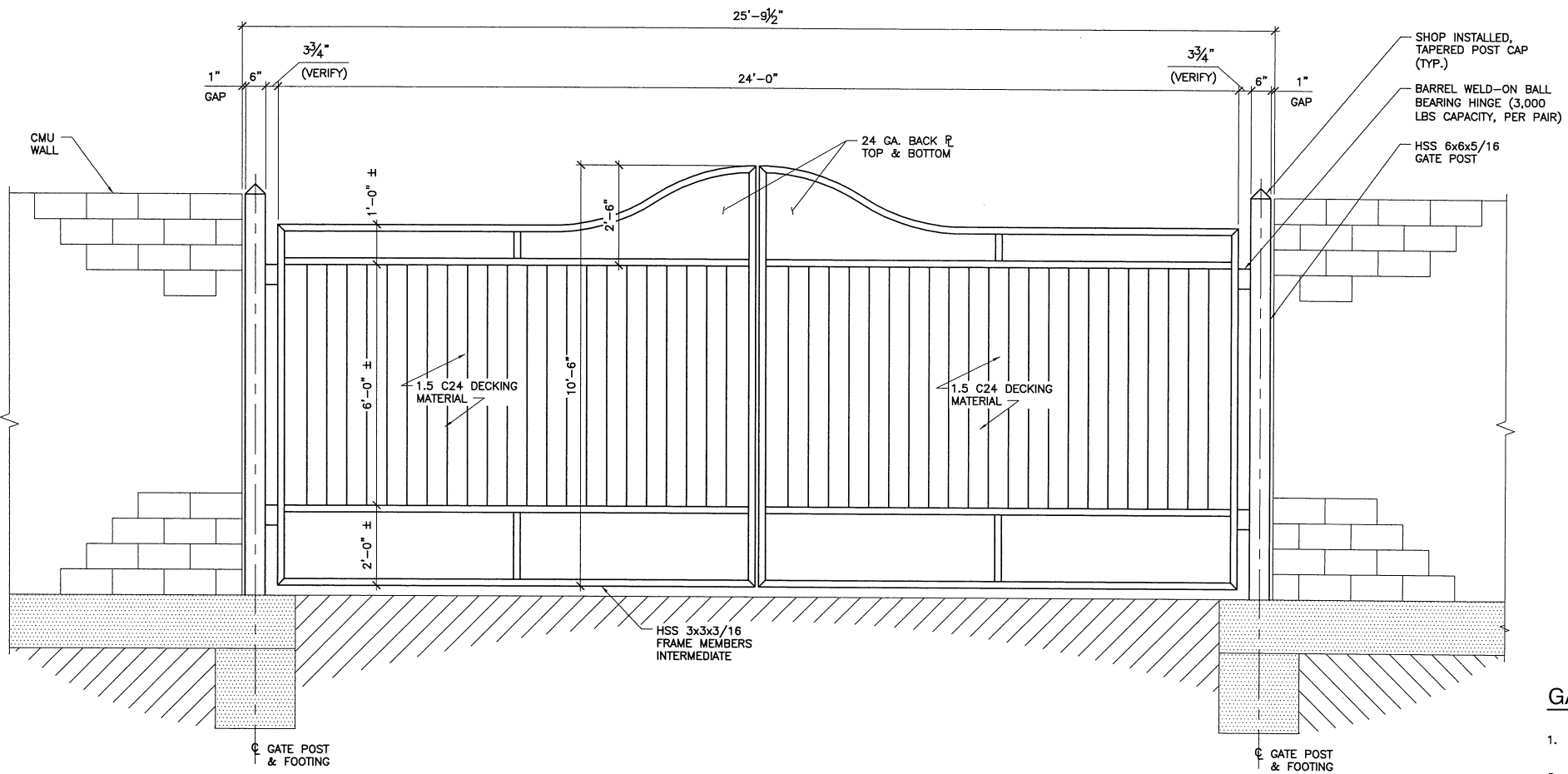
NO.	REVISION	CK	DL	DATE
1	ADDENDUM 3	CK	DL	10/24/12

SAN ANTONIO WATER SYSTEM

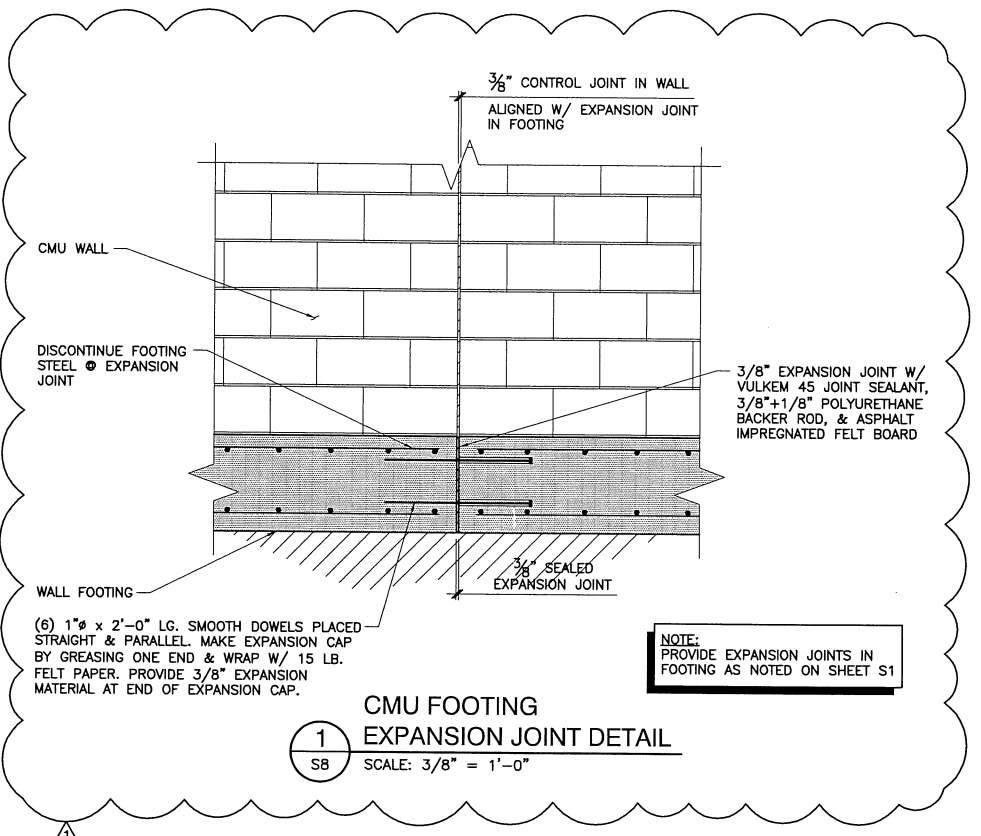
CRESCENT PARK BOOSTER STATION
CMU WALL SECTIONS & DETAILS
SAN ANTONIO, TEXAS

DEVELOPER: SAWS	BUDGET PROJ.	
SUBMITTED	APPROVED	
MAP NO.	SCALE: AS NOTED	SHEET S7
SECT. NO.	DR. C.K.	CK. D.L.
JOB NO. 12-6006		

U:\SAWS\100069 - HIDDEN SPRINGS\000\DRAWINGS\STRUCTURAL\S8 - GATE DETAILS.DWG PLOT DATE:10/24/2012 1:18 PM PLOT BY:CKNESEK



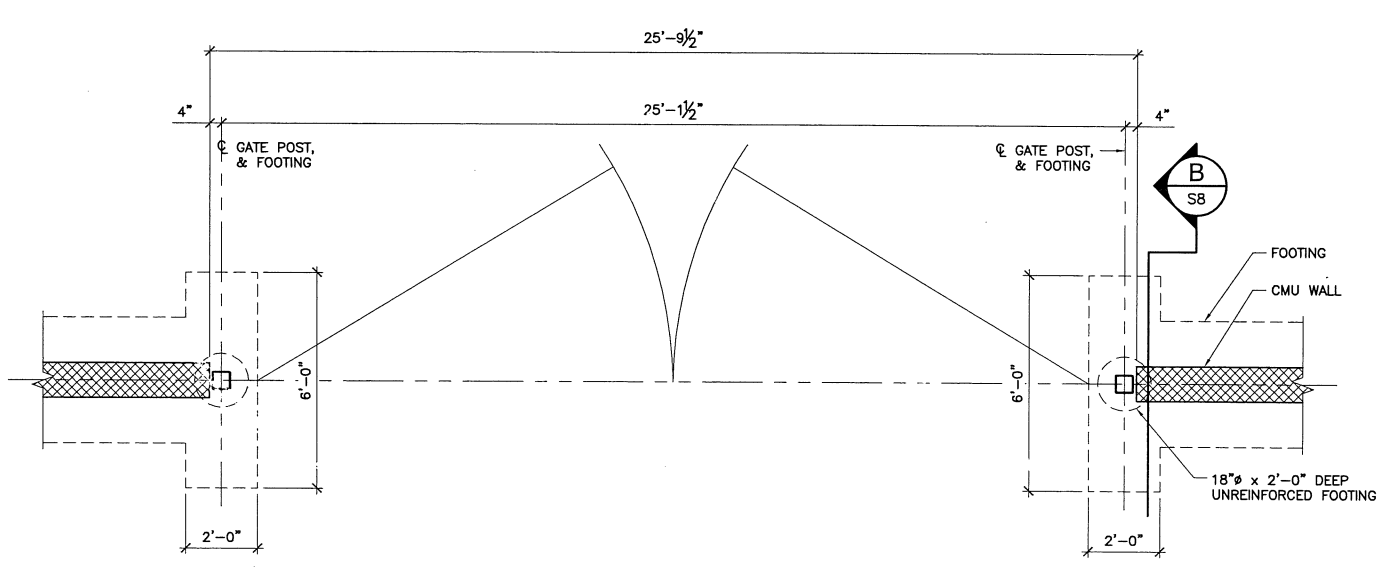
A GATE ELEVATION
S8 SCALE: 1/4" = 1'-0"



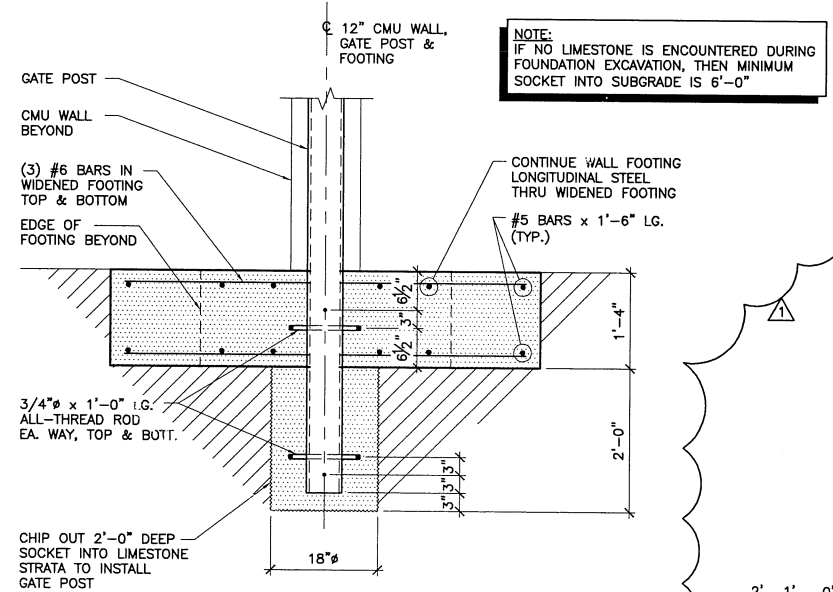
1 CMU FOOTING EXPANSION JOINT DETAIL
S8 SCALE: 3/8" = 1'-0"

GATE NOTES:

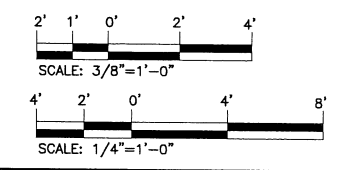
- CONTRACTOR SHALL PROVIDE FABRICATION & INSTALLATION OF GATE, HINGES & CENTER LOCKING HARDWARE.
- CONTRACTOR MUST SUBMIT SHOP DRAWINGS FOR ENGINEER, SAWS & HOA APPROVAL PRIOR TO ANY FABRICATION OR CONSTRUCTION.
- ALL GATE MEMBERS SHALL BE FULLY WELDED AND ALL EXPOSED WELDS SHALL BE GROUND SMOOTH.
- MAXIMUM WEIGHT OF BOTH GATES, HINGES & CENTER LOCKING HARDWARE SHALL BE 1,550 LBS.
- THE GATE, POST AND ALL HARDWARE SHALL BE POWDER-COATED WITH A COLOR TO MATCH THE WALL. PRIOR TO FABRICATION, CONTRACTOR SHALL SUBMIT COLOR SAMPLE FOR SAWS AND HOA APPROVAL.



2 GATE PLAN
S8 SCALE: 3/16" = 1'-0"



B SECTION
S8 SCALE: 3/8" = 1'-0"



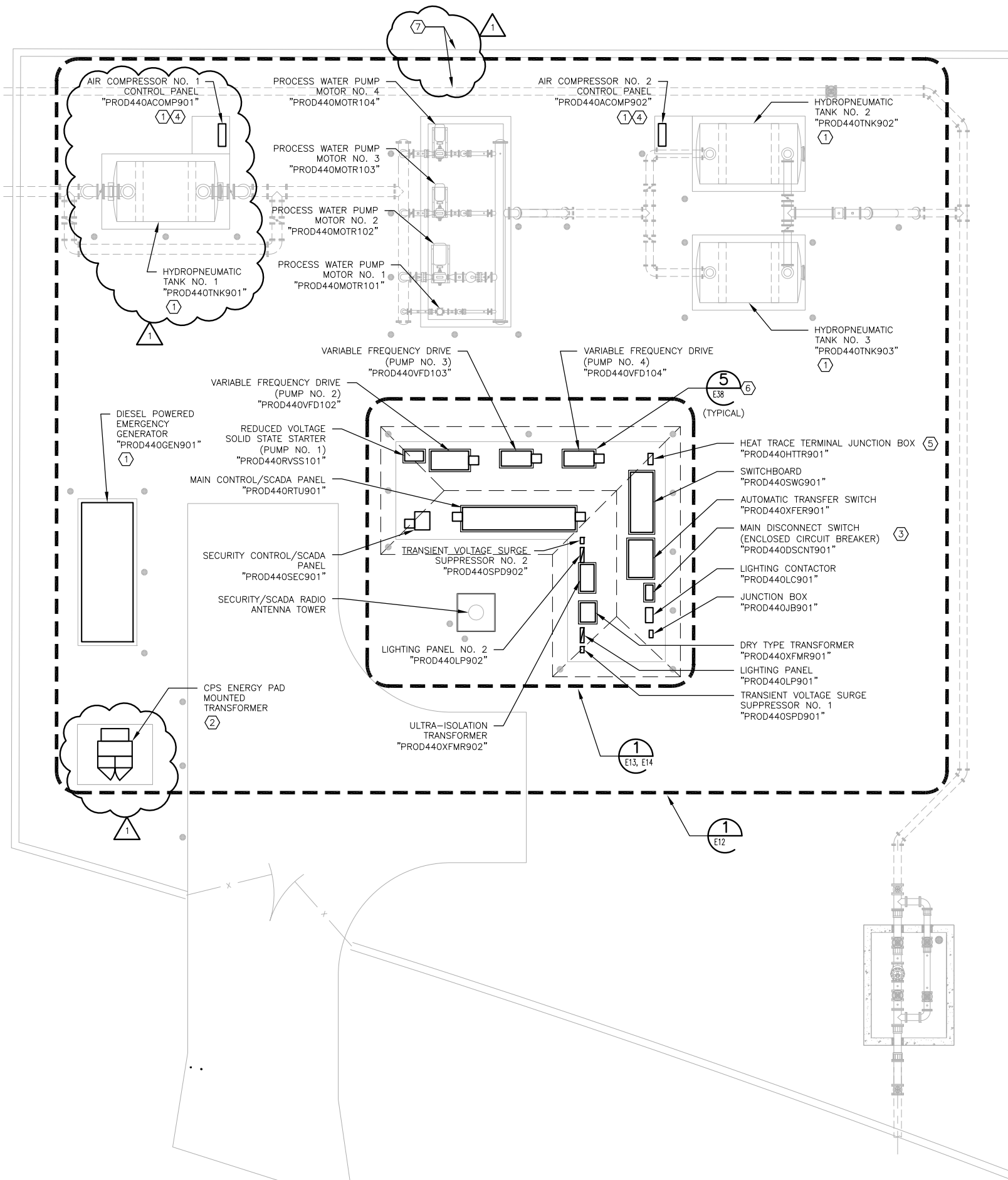
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PROFESSIONAL ENGINEER
10/24/12

ADDENDUM 3	JR	DL	10/24/12
NO.	REVISION	DRAWN	APPROVED DATE

SAN ANTONIO WATER SYSTEM
CRESCENT PARK BOOSTER STATION
GATE ELEVATION & DETAILS
SAN ANTONIO, TEXAS

DEVELOPER: SAWS
CONT. BUDGET PROJ.
SUBMITTED
APPROVED
MAP NO. SCALE: AS NOTED SHEET S8
SECT. NO.
DR. JR CK. D.L. JOB NO. 12-6006



KEY NOTES:

- ① FURNISHED BY EQUIPMENT MANUFACTURER AS PART OF PACKAGED SYSTEM. INSTALL PER PLAN DRAWINGS AND EQUIPMENT MANUFACTURER'S RECOMMENDATIONS. REFER TO FIELD INTERFACE WIRING SCHEMATICS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- ② TRANSFORMER FURNISHED AND INSTALLED BY CPS ENERGY. COORDINATE WITH CPS ENERGY FOR REQUIREMENTS.
- ③ FURNISH AND INSTALL ENCLOSED CIRCUIT BREAKER WITH 42KA SHORT CIRCUIT INTERRUPT RATING, AT MINIMUM. REFER TO ONE-LINE DRAWINGS FOR ADDITIONAL INFORMATION.
- ④ COORDINATE WITH PACKAGED SYSTEM MANUFACTURER FOR EXACT DIMENSIONS OF AIR COMPRESSOR CONTROL PANEL. ORIENT PER MANUFACTURER/MECHANICAL/OWNER INSTRUCTIONS.
- ⑤ FURNISH AND INSTALL JUNCTION BOX WITH BACK PANEL AND TERMINAL BLOCKS TO FACILITATE INTERCONNECTION OF HEAT TRACE BRANCH WIRING TO TEMPERATURE SWITCH.
- ⑥ FURNISH AND INSTALL REINFORCED CONCRETE EQUIPMENT HOUSEKEEPING PAD ON TOP OF STRUCTURAL FOUNDATION. EQUIPMENT HOUSEKEEPING PAD SHALL BE FURNISHED AND INSTALLED FOR ALL FREE STANDING ELECTRICAL/INSTRUMENTATION AND CONTROLS/SECURITY EQUIPMENT WHETHER SHOWN ON THIS DRAWING OR NOT.
- ⑦ FOR ADDITIONAL INFORMATION REGARDING REVISIONS TO THE PUMP STATION PERIMETER WALL AND THE UNDERGROUND PROCESS PIPE LOCATION REFER TO THE REVISED CIVIL/MECHANICAL/STRUCTURAL DRAWINGS.

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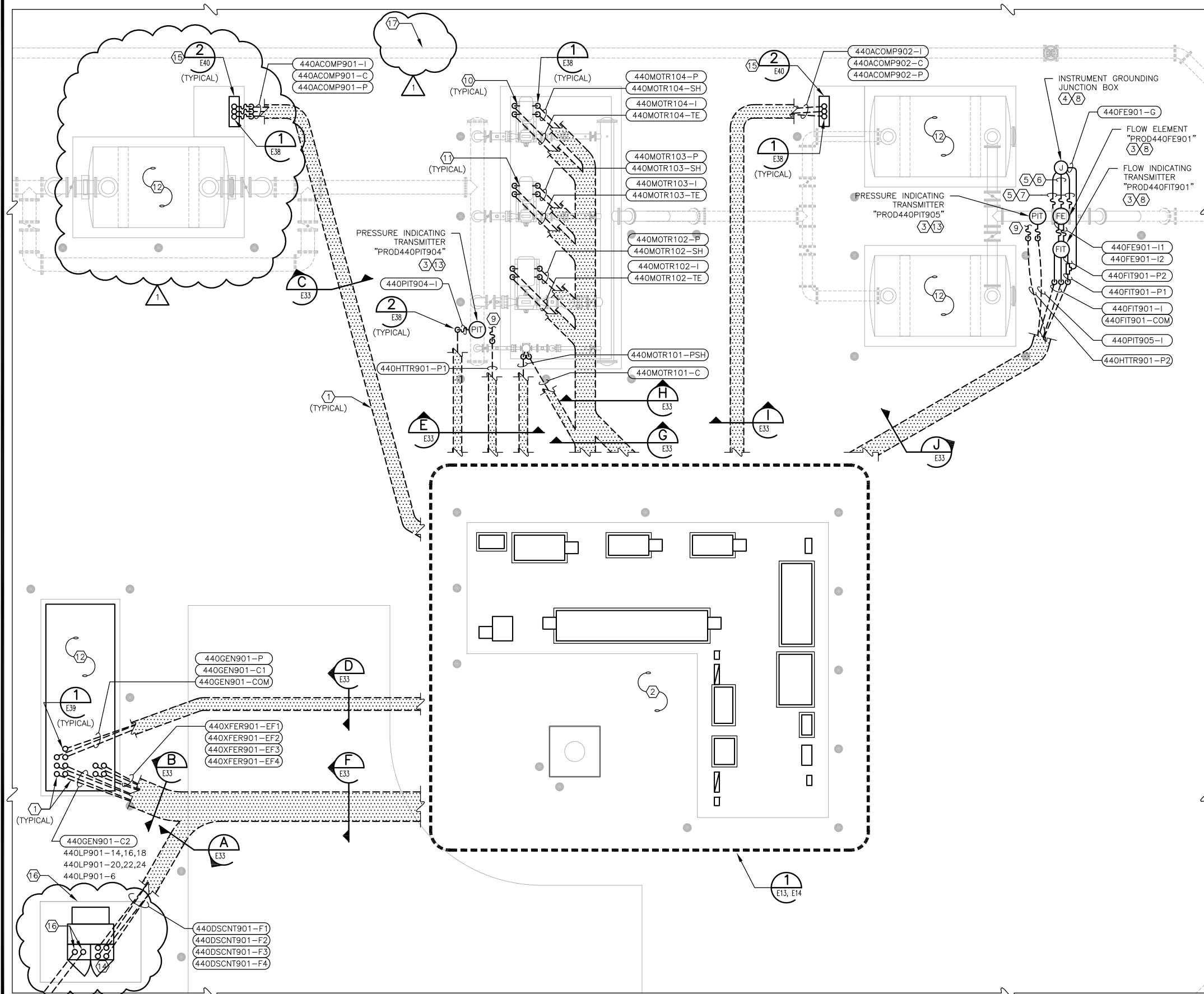
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1	ADDENDUM 3	HEI	HEI	10/25/12
NO.	REVISION	DRAWN	APPROVED	DATE



SAN ANTONIO WATER SYSTEM
 CRESCENT PARK BOOSTER STATION
 SITE EQUIPMENT LOCATION PLAN
 SAN ANTONIO, TEXAS

DEVELOPER: SAWS	
CONT.	BUDGET PROJ.
SUBMITTED _____	
APPROVED _____	
MAP NO.	SCALE: 1/8" = 1'-0" SHEET
SECT. NO.	JOB NO. 12-6006
DR. HEI CK. HEI	



POWER, INSTRUMENTATION AND CONTROLS ENLARGED PLAN 1
 SCALE: 3/16"=1'-0" E11

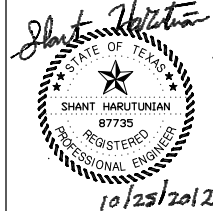
KEY NOTES:

- 1 ROUTE CONDUIT/WIRE IN UNDERGROUND ELECTRICAL DUCT BANK PER THE APPLICABLE DETAILS ON DRAWING NO. E42. STUB-UP LOCATIONS SHOWN ARE APPROXIMATE. COORDINATE EXACT LOCATIONS OF CONDUIT STUB-UPS WITH ALL EQUIPMENT MANUFACTURERS/STRUCTURAL/MECHANICAL/ETC. PRIOR TO INSTALLATION OF UNDERGROUND DUCT BANK.
- 2 UNDERGROUND ELECTRICAL DUCT BANKS CONTINUE TO/FROM ELECTRICAL EQUIPMENT. REFER TO DRAWING NO. E13 FOR CONTINUATION.
- 3 COORDINATE EXACT LOCATION OF INSTRUMENT PRIOR TO INSTALLATION OF CONDUIT/WIRE AND UNDERGROUND DUCT BANK.
- 4 FURNISH AND INSTALL JUNCTION BOX MINIMALLY SIZED 12" X 8" X 6" AND CONTAINING MANUFACTURER PROVIDED BACK PANEL. FURNISH AND INSTALL WIRE/CABLE CONNECTOR, IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS, WITH SUFFICIENT NUMBER OF PORTS TO SPICE GROUNDING CONDUCTORS ROUTED TO/FROM THE FLOW ELEMENT SENSOR AND THE SENSOR PIPE GROUND DISKS WITH THE GROUNDING CONDUCTOR ROUTED TO/FROM THE MAIN CONTROL PANEL "PROD440RTU901". REFER TO DETAIL 1 ON DRAWING NO. 126 FOR ADDITIONAL INFORMATION.
- 5 FURNISH AND INSTALL NO. 10 AWG INSULATED GROUNDING CONDUCTOR. GROUNDING CONDUCTOR SHALL SPlice IN JUNCTION BOX AND ROUTE EXPOSED TO FLOW ELEMENT SENSOR HOUSING AND SENSOR PIPE GROUND DISKS. SECURE/SUPPORT EXPOSED GROUNDING CONDUCTOR TO SUPPORT CHANNEL/CONDUIT/EQUIPMENT/ETC. WITH WIRE TIES. COORDINATE WITH INSTRUMENT MANUFACTURER TO IMPLEMENT POTENTIAL MATCHING. REFER TO INSTRUMENT WIRING SCHEMATICS FOR ADDITIONAL INFORMATION. REFER TO DETAIL 1 ON DRAWING NO. 126 FOR ADDITIONAL INFORMATION.
- 6 CONNECT NO. 10 AWG GROUNDING CONDUCTOR DIRECTLY TO FLOW ELEMENT SENSOR HOUSING EXTERNAL GROUNDING TERMINAL.
- 7 CONNECT NO. 10 AWG GROUNDING CONDUCTOR DIRECTLY TO PIPE GROUND DISK FURNISHED BY FLOW ELEMENT SENSOR MANUFACTURER.
- 8 INSTRUMENT, FLOW ELEMENT, JUNCTION BOX, AND CONDUIT/WIRE SHOWN APART FOR CLARITY. FURNISH CONCRETE EQUIPMENT PAD AND COMMON SUPPORT RACK AND INSTALL WITH SUN SHIELD PER DETAIL 1 ON DRAWING NO. 126.
- 9 CONDUIT/WIRE CONTINUES TO/FROM PRESSURE INDICATING TRANSMITTER HEAT TRACING. COORDINATE WITH MECHANICAL/PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS) FOR REQUIRED LOCATION/LENGTH AND FIELD ROUTE CONDUIT/WIRE.
- 10 MOTOR POWER, SPACE HEATER, AND MACHINE MONITORING TERMINATION BOXES NOT SHOWN FOR CLARITY. COORDINATE WITH MECHANICAL AND MOTOR MANUFACTURER FOR REQUIREMENTS. FLEXIBLE CONDUIT CONNECTION TO TERMINATION BOXES NOT SHOWN FOR CLARITY.
- 11 CONDUIT/WIRE TERMINATION LOCATIONS SHOWN ARE APPROXIMATE. COORDINATE EXACT EQUIPMENT CONDUIT TERMINATION LOCATIONS PRIOR TO INSTALLATION OF CONDUIT/WIRE/DUCT BANK.
- 12 FURNISH, INSTALL, AND SIZE CONDUIT/WIRE/DUCT BANKS BETWEEN PACKAGED SYSTEM COMPONENTS EVEN IF CONDUIT/WIRE IS NOT SHOWN ON PLAN DRAWINGS OR CONDUIT/WIRE SCHEDULE. REFER TO FIELD INTERFACE WIRING SCHEMATICS AND COORDINATE WITH THE MANUFACTURER OF THE PACKAGED SYSTEM PRIOR TO INSTALLATION OF CONDUIT/WIRE AND UNDERGROUND DUCT BANK.
- 13 INSTALL PRESSURE INDICATING TRANSMITTER AND SUN SHIELD PER DETAIL 2 ON DRAWING NO. 126.
- 14 STUB-UP LOCATIONS SHOWN ARE APPROXIMATE. COORDINATE WITH CPS ENERGY FOR EXACT STUB-UP LOCATIONS AND REQUIREMENTS.
- 15 COORDINATE WITH PACKAGED SYSTEM MANUFACTURER FOR EXACT DIMENSIONS OF AIR COMPRESSOR CONTROL PANEL. ORIENT PER MANUFACTURER/MECHANICAL/OWNER INSTRUCTIONS, PRIOR TO INSTALLATION OF UNDERGROUND DUCT BANK AND CONDUIT STUB-UPS.
- 16 CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL COSTS INCURRED BY THE OWNER FOR CPS ENERGY IMPROVEMENTS REQUIRED TO EXTEND UNDERGROUND POWER LINES TO THE BOOSTER STATION PROPERTY. COSTS MAY INCLUDE BUT NOT BE LIMITED TO INSTALLATION OF UNDERGROUND DUCT BANK FROM AN EXISTING CPS ENERGY MANHOLE TO A NEW CPS ENERGY DISTRIBUTION SWITCHGEAR LOCATION, INSTALLATION OF NEW DISTRIBUTION SWITCHGEAR, INSTALLATION OF UNDERGROUND DUCT BANK FROM CPS ENERGY SWITCHGEAR TO THE BOOSTER STATION SERVICE TRANSFORMER, AND INSTALLATION OF THE CPS ENERGY SERVICE TRANSFORMER AND METERING EQUIPMENT. CONTRACTOR SHALL COORDINATE WITH CPS ENERGY AND SHALL CONSULT PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.

KEY NOTES (CONTINUED):

- 17 FOR ADDITIONAL INFORMATION REGARDING REVISIONS TO THE PUMP STATION UNDERGROUND PROCESS PIPE LOCATION REFER TO THE REVISED CIVIL/MECHANICAL/STRUCTURAL DRAWINGS.

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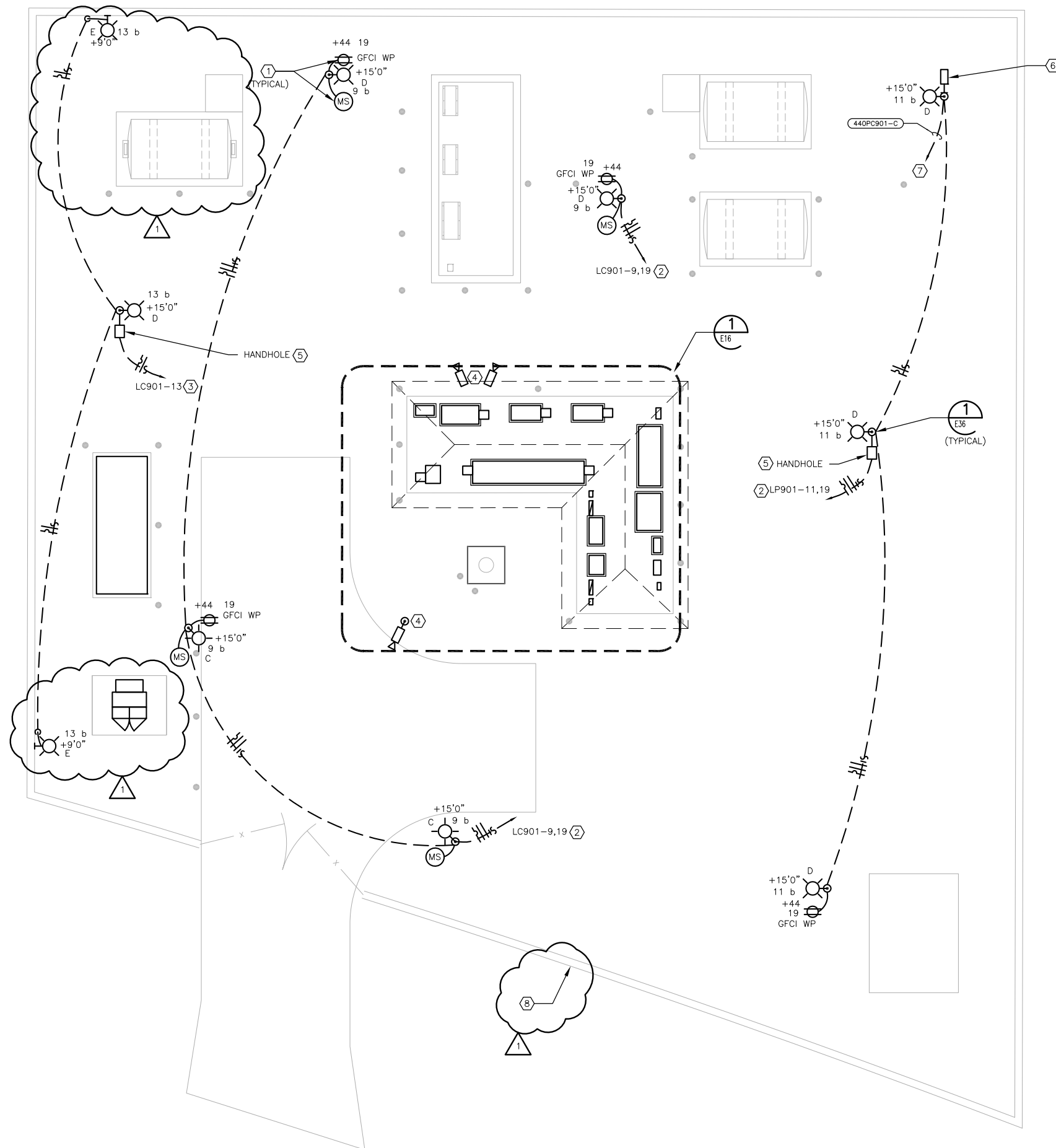
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		DRAWN	APPROVED	DATE
1	ADDENDUM 3			



SAN ANTONIO WATER SYSTEM
 CRESCENT PARK BOOSTER STATION
 SITE
POWER AND I&C PLAN
 SAN ANTONIO, TEXAS

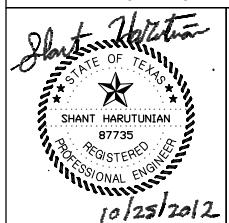
DEVELOPER: SAWS	BUDGET PROJ.
CONTR.:	
SUBMITTED	
APPROVED	
MAP NO.	SCALE: 3/16"=1'-0" SHEET
SECT. NO.	E12
DR. HEI	CK. HEI
JOB NO. 12-6006	



KEY NOTES:

- ① RECEPTACLES AND MOTION SENSOR MOUNT TO LIGHT POLE PER DETAIL 1 ON DRAWING NO. E36. MOTION SENSOR WILL REMAIN ON FOR A MAXIMUM OF FIVE MINUTES.
- ② CONDUIT CONTINUES TO JUNCTION BOX "PROD440JB901" REFER TO DRAWING NO. E16 FOR ADDITIONAL INFORMATION.
- ③ CONDUIT CONTINUES TO LIGHTING CONTACTOR "PROD440LC901" REFER TO DRAWING NO. E16 FOR ADDITIONAL INFORMATION.
- ④ SECURITY CAMERAS SHOWN HERE FOR REFERENCE ONLY. REFER TO DRAWING NO. E16 FOR ADDITIONAL INFORMATION.
- ⑤ FURNISH AND INSTALL HANDHOLE PER DETAIL 3 ON DRAWING NO. E41.
- ⑥ MOUNT PHOTOCELL ON POLE PER DETAIL 1 ON DRAWING NO. E36. ORIENT PHOTOCELL FACING THE NORTH.
- ⑦ PHOTOCELL CONTROL WIRE CONDUIT CONTINUES TO LIGHTING CONTACTOR "PROD440LC901" ON DRAWING NO. E16.
- ⑧ FOR ADDITIONAL INFORMATION REGARDING REVISIONS TO THE PUMP STATION PERIMETER WALL REFER TO THE REVISED CIVIL/MECHANICAL/STRUCTURAL DRAWINGS.

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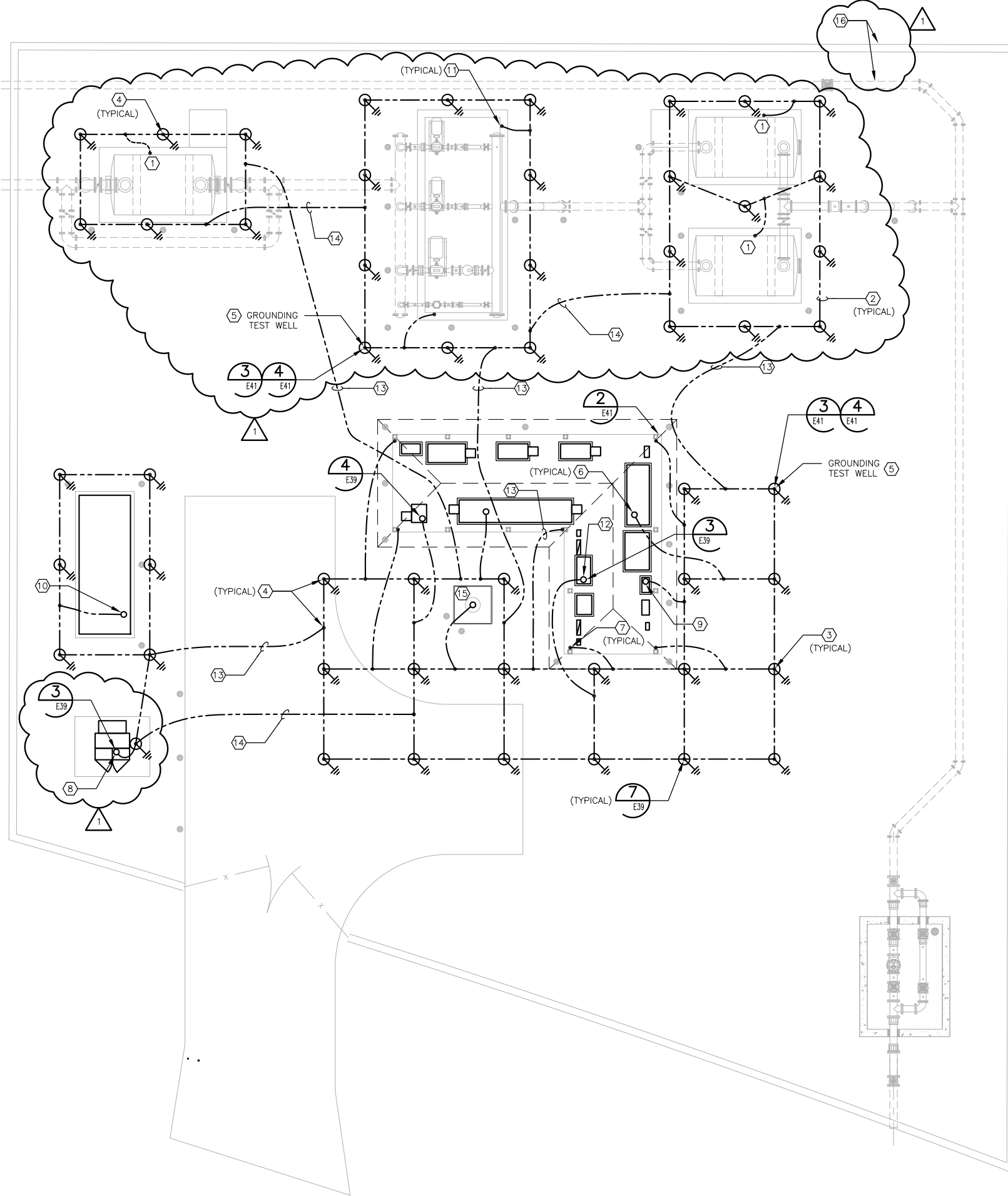
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SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION
 SITE LIGHTING, AUXILIARY POWER AND SECURITY SYSTEMS PLAN
 SAN ANTONIO, TEXAS

DEVELOPER: SAWS
 CONT. BUDGET PROJ.
 SUBMITTED _____
 APPROVED _____
 MAP NO. SCALE: 1/8" = 1'-0" SHEET
 SECT. NO. _____ E15
 DR. HEI CK. HEI JOB NO. 12-6006



KEY NOTES:

- ① BOND METAL SUPPORT BRACKETS/FOOTINGS/COMPONENTS OF EACH HYDRO-PNEUMATIC TANK TO AREA GROUND GRID USING 1-#1/0 AWG INSULATED GROUNDING CONDUCTOR IN 1-1/4" PVC CONDUIT.
- ② 1 - #250 kCMIL BARE GROUNDING CONDUCTOR BURIED AT A MINIMAL DEPTH OF 30 INCHES BELOW FINISHED SLAB/GRADE. (TYPICAL BETWEEN ALL GROUND RODS).
- ③ COPPER GROUND ROD. THE LAYOUT/PLACEMENT OF GROUND RODS IS APPROXIMATE. CONTRACTOR SHALL COORDINATE THE FINAL GROUND ROD LAYOUT WITH CIVIL/STRUCTURAL/MECHANICAL/ELECTRICAL TO AVOID CONFLICTS AND MAINTAIN A MINIMUM SPACING OF 10'-0" AND A MAXIMUM SPACING OF 13'-0" CENTER TO CENTER BETWEEN ALL GROUND ROD LOCATIONS. MINIMUM BURIAL DEPTH SHALL BE 2'-6" BELOW FINISH SLAB/GRADE. SOME GROUND ROD LOCATIONS MAY HOWEVER FALL IN LOCATIONS REQUIRING INCREASED DEPTH. TRANSITION TO/FROM THESE LOWER ELEVATIONS SHALL BE COORDINATED, FURNISHED, AND INSTALLED AS REQUIRED, BY CONTRACTOR, AT NO ADDITIONAL COST TO OWNER. REFER TO TYPICAL GROUND ROD INSTALLATION DETAIL ON DRAWING NO. E39.
- ④ MAKE ALL CONNECTIONS TO GROUND RODS AND GROUNDING GRID BY MEANS OF EXOTHERMIC WELD EXCEPT WHERE OTHERWISE NOTED.
- ⑤ GROUNDING NETWORK TEST WELL. LOCATION SHOWN IS APPROXIMATE. COORDINATE EXACT LOCATION WITH CIVIL/STRUCTURAL/MECHANICAL. GROUNDING CONDUCTORS FROM THIS PROCESS AREA GROUND GRID SHALL BE ATTACHED TO TEST WELL GROUND ROD BY MEANS OF EXOTHERMIC WELD. GROUNDING CONDUCTORS THAT INTERCONNECT TO OTHER PLANT GROUNDING SYSTEMS SHALL BE ATTACHED BY MECHANICAL CONNECTION INSIDE TEST WELL TO FACILITATE ISOLATION OF PROCESS AREA GROUNDING SYSTEM. REFER TO TEST WELL DETAIL ON DRAWING NO. E41.
- ⑥ 1 - #1/0 INSULATED GROUNDING CONDUCTOR . STUB-UP GROUNDING CONDUCTOR/CONDUIT WITHIN CONFINES OF ELECTRICAL EQUIPMENT ENCLOSURE. STUB-UP LOCATION SHOWN FOR REPRESENTATION ONLY. CLOSELY AND CAREFULLY COORDINATE EXACT STUB-UP LOCATION WITH ELECTRICAL EQUIPMENT MANUFACTURER TO AVOID CONFLICTS. PROVIDE A MINIMUM OF 8 FEET OF GROUNDING CONDUCTOR ABOVE FINISHED STRUCTURAL FLOOR SLAB FOR TERMINATION. STUB-UP SHALL BE A 1-1/2" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED.
- ⑦ 1 - #1/0 INSULATED GROUNDING CONDUCTOR . STUB-UP GROUNDING CONDUCTOR/CONDUIT IMMEDIATELY ADJACENT TO CANOPY STRUCTURAL COLUMN. STUB-UP LOCATION SHOWN FOR REPRESENTATION ONLY. CLOSELY AND CAREFULLY COORDINATE EXACT STUB-UP LOCATION WITH CIVIL/STRUCTURAL/MECHANICAL TO AVOID CONFLICTS. BOND GROUNDING CONDUCTOR TO METAL FRAMEWORK OF CANOPY STRUCTURE SIMILAR TO THE DETAILS ON DRAWING NO. E39. STUB-UP SHALL BE A 1-1/2" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED.
- ⑧ COORDINATE LOCATION OF SERVICE TRANSFORMER GROUND ROD WITH CPS ENERGY ENGINEERED DRAWINGS FOR TRANSFORMER AND TRANSFORMER EQUIPMENT PAD INSTALLATION.
- ⑨ DISCONNECT SWITCH "PROD440DCNT901" SHALL BE EQUIPPED WITH A NEUTRAL BUS FOR TERMINATION OF THE SERVICE ENTRANCE GROUND CONDUCTOR (NEUTRAL). COORDINATE WITH CPS ENERGY FOR SERVICE ENTRANCE NEUTRAL TO GROUND BONDING JUMPER INSTALLATION LOCATION. WHEN REQUIRED, THE DISCONNECT SWITCH NEUTRAL BUS SHALL BE BONDED TO THE DISCONNECT SWITCH GROUND BUS WITH A MANUFACTURER FURNISHED TIN-PLATED BRAIDED COPPER GROUNDING BONDING JUMPER SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE REQUIREMENTS. CONTRACTOR SHALL BOND THE DISCONNECT SWITCH GROUND BUS TO THE GROUNDING NETWORK.
- ⑩ 1 - #1/0 INSULATED GROUNDING CONDUCTOR . STUB-UP GROUNDING CONDUCTOR/CONDUIT WITHIN CONFINES OF STAND-BY GENERATOR ENCLOSURE. STUB-UP LOCATION SHOWN FOR REPRESENTATION ONLY. CLOSELY AND CAREFULLY COORDINATE EXACT STUB-UP LOCATION WITH ELECTRICAL EQUIPMENT MANUFACTURER TO AVOID CONFLICTS. PROVIDE A MINIMUM OF 8 FEET OF GROUNDING CONDUCTOR ABOVE FINISHED STRUCTURAL FLOOR SLAB FOR TERMINATION. STUB-UP SHALL BE A 1-1/2" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED. GENERATOR "PROD440GEN901" NEUTRAL BUS SHALL BE BONDED TO THE GENERATOR GROUND BUS WITH A MANUFACTURER FURNISHED TIN-PLATED BRAIDED COPPER GROUNDING BONDING JUMPER SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE REQUIREMENTS. CONTRACTOR SHALL BOND THE GENERATOR GROUND BUS TO THE GROUNDING NETWORK.
- ⑪ BOND MAIN STRUCTURAL MEMBERS OF PUMP SKID TO GROUNDING NETWORK USING 1-#1/0 INSULATED GROUNDING CONDUCTOR IN 1-1/2" PVC CONDUIT. STUB-UP SHALL BE A 1-1/2" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED.
- ⑫ TERMINATE 250kCMIL ISOLATED GROUNDING CONDUCTOR TO/FROM GROUNDING NETWORK AT MANUFACTURER PROVIDED ISOLATED GROUND BUS WITHIN THE SHIELDED ULTRA ISOLATION TRANSFORMER ENCLOSURE. ISOLATION GROUNDING SYSTEM SHALL BE ELECTRICALLY ISOLATED FROM THE BODY/CASE/EQUIPMENT GROUNDING SYSTEM. STUB-UP GROUNDING CONDUCTOR IN 1-1/2" PVC CONDUIT. STUB-UP WITHIN ULTRA ISOLATION TRANSFORMER ENCLOSURE SHALL BE A 1-1/2" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED. CLOSELY AND CAREFULLY COORDINATE EXACT STUB-UP LOCATION WITH EQUIPMENT MANUFACTURER.
- ⑬ #250 kCMIL INSULATED GROUNDING CONDUCTOR, ROUTE GROUNDING CONDUCTOR IN A 1-1/2" PVC CONDUIT INSTALLED AS PART OF THE DUCT BANK SYSTEM. REFER TO DRAWINGS NO. E12 AND E13 FOR DUCT BANK ROUTING AND ADDITIONAL INFORMATION.
- ⑭ #250 kCMIL BARE GROUNDING CONDUCTOR BURIED AT A MINIMAL DEPTH OF 30 INCHES BELOW FINISHED SLAB/GRADE TO INTERCONNECT PORTIONS OF THE GROUNDING NETWORK. COORDINATE WITH CIVIL/STRUCTURAL/ MECHANICAL/ELECTRICAL TO AVOID CONFLICTS.
- ⑮ 1 - #1/0 INSULATED GROUNDING CONDUCTOR. STUB-UP GROUNDING CONDUCTOR/CONDUIT WITHIN CONFINES OF RADIO ANTENNA POLE. STUB-UP LOCATION SHOWN FOR REPRESENTATION ONLY. CLOSELY AND CAREFULLY COORDINATE EXACT STUB-UP LOCATION WITH ANTENNA POLE MANUFACTURER TO AVOID CONFLICTS. PROVIDE A MINIMUM OF 8 FEET OF GROUNDING CONDUCTOR ABOVE FINISHED STRUCTURAL FLOOR SLAB FOR TERMINATION TO ANTENNA POLE. STUB-UP SHALL BE A 1" PVC CONDUIT (ORIENTATION OF CONDUIT VARIES) DIRECT BURIED AT MINIMUM 30-INCHES BELOW SLAB (NOT CONCRETE ENCASED). PVC CONDUIT TO EXTEND HORIZONTALLY 12 INCHES FROM COUPLING AT 90 DEGREE BEND. GROUNDING CONDUCTOR TO EXTEND TO GROUNDING NETWORK AS INDICATED.
- ⑯ FOR ADDITIONAL INFORMATION REGARDING REVISIONS TO THE PUMP STATION PERIMETER WALL AND THE UNDERGROUND PROCESS PIPE LOCATION REFER TO THE REVISED CIVIL/MECHANICAL/STRUCTURAL DRAWINGS.

REUSE OF DOCUMENTS
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HORIZ. SCALE:

 BAR LENGTH ON ORIGINAL DRAWING EQUALS ONE INCH, ADJUST SCALE ACCORDINGLY.

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1	ADDENDUM 3	HEI	HEI	10/25/12
NO.	REVISION	DRAWN	APPROVED	DATE

REVISION

SAN ANTONIO WATER SYSTEM

CRESCENT PARK BOOSTER STATION

SITE GROUNDING PLAN

SAN ANTONIO, TEXAS

DEVELOPER: SAWS	BUDGET PROJ.	
CONT.		
SUBMITTED		
APPROVED		
MAP NO.	SCALE: 1/8"=1'-0"	SHEET
SECT. NO.		E17
DR. HEI	CK. HEI	JOB NO. 12-6006