



**SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK AND
PUMP STATION IMPROVEMENTS
SAWS Job No. 12-6114
Solicitation No. B-14-054-RA**

ADDENDUM NO. 1

August 12, 2014

PROPOSAL OPENING DATE: August 18, 2014

2:00 p.m. Central Standard Time

Consulting Engineer: CP&Y, Inc.

TBPE Registration No. F-1741

To: All Document Holders of Record

This addendum, applicable to work referenced above, forms a part of the Contract Documents and modifies the original Contract Documents dated July 2014. Acknowledge receipt of this addendum by entering the addendum number and issue date in the spaces provided on submitted copies of the proposals. Failure to do so may subject Respondent to disqualification.

Addendum No. 1 consists of 71 items outlined in 19 pages. In addition to these 19 pages, Addendum No. 1 includes 2 re-issued specifications, Sections 02510 and 15072 and includes 9 re-issued sheets, Drawings C-11, C-12, C-13, C-14, C-17, C-18, C-19, C-20 and C-21 and 3 revised figures for sheets, T-2, T-3 and T-7.



ADDENDUM NO. 1

A. GENERAL QUESTIONS/CLARIFICATIONS

1. Question: Bidding date. The current bid date is Monday 8/18 at 10:00am. Monday mornings are the worst time for a bid and the contractor respectfully requests the bid be moved to Tuesday, 8/19 at 10:00am.

Response: SAWS considered the recommendation. After reviewing the schedule carefully, SAWS decided to move the proposal due date to 2:00 p.m., August 18, 2014.

2. Question: I would like to request that the pre-proposal meeting be moved to Thursday, 8/7. There is another SAWS project bidding at 10 am on Tuesday and 30 minutes does not allow much time to get the results and get our thoughts together before we go to the prebid. At a minimum I would request that the meeting be held in the afternoon of the 5th.

Response: SAWS considered the recommendation. However, after reviewing the schedule carefully, SAWS decided that the current schedule should remain unchanged.

3. Question: Bidding date. Please consider moving the bid opening date to August 19th at 2 p.m.

Response: SAWS considered the recommendation. After reviewing the schedule carefully, SAWS decided to move the proposal due date at 2:00 p.m., August 18, 2014.

4. Question: Schedule extension. Could you please consider extending the schedule for the construction?

Response: Refer to Items Nos. 55 and 57 in the Specification section below for modifications to the construction Schedule.

5. Question: Phase completion days. Per Spec 01015, Phase 1 is to be completed within 240 calendar days of NTP. This will not be enough time to complete the tank and associated equipment in this phase of work. Giving consideration to the cost to expedite this work and the LD's associated with the project, the contractor respectfully requests 330 days to complete Phase 1, 390 days for Phase 2, 420 days for Miscellaneous Structural Components and Site Improvements and 450 days for Final Completion.

Response: Refer to Items Nos. 55 and 57 in the Specification section below for modifications to the construction Schedule.

6. Question: Liquidated damages. The liquidated damages (Supplemental Condition Article VIII) are set at \$9200/day "if the capacity of the pump station is affected due to

the delay”. The capacity of the pump station is not clearly defined. Since this is not a pump station, please provide clarification as to what SAWS will base the \$9200/day liquidated damages upon. It is very important that the contractor know exactly what will trigger LD’s so that they may account for this unusually high cost per day. Especially if additional days are not provided as requested above.

Response: The Supplemental Condition section has been replaced. Refer to Item No. 56 in the Specification section below for modifications.

7. Question: Pump station capacity. Could you please clarify the capacity of pump station for liquidated damages?

Response: The Supplemental Condition section has been replaced. Refer to Item No. 56 in the Specification section below for modifications.

8. Question: References. Please remove references to design under heading Price Item No. 1 (see paragraph 1.04A 1.b.(iii), d.(i) and f.(i)(a)). Based on the contract documents it would appear that design has been provided by the engineer.

Response: Correct, the design has been completed by Engineer. Refer to Item No. 58 in the Specification section below for modifications.

9. Question: SCADA. In spec 01150, please clarify the difference between “SCADA System” in Price Item No. 1 (see paragraph 1.04A 1.g.(iii)) and “SCADA Programming” in Price Item No. 4 (see paragraph 1.04D). Is Price Item No. 1 intended to include everything except SCADA programming?

Response: Correct. The SCADA work associated with Price Item No. 1 is referring to the installation of hard wiring and physical connections, etc. required to complete the SCADA changes, whereas, Price Item No. 4 is the programming of the system based on upgrading the entire New World site. Refer to Item No. 58 in the Specification section below for modifications.

10. Question: PCSI Vendor Qualifications. System Controls & Instrumentation (SCI) respectfully requests to be added to the approved Process Control System Integrator (PCSI) list for the DSP New World Tank & Pump Station Improvements project

Response: Specification Section 17000 for SAWS recommended PCSS vendors has been revised. Refer to Item No. 62 in the Specification section below for modifications.

11. Question: BL Technology, Inc. would like to be added to the list of acceptable vendors for the above listed project in the following categories:

- PCSS- Process Control System Supplier
Please advise on the steps necessary to gain approval.

Response: Refer to Response to Question 10 above.

12. Question: Excavation depth. Where is the 9.25' excavation/replacement depth shown in Sheet T-1 measured from - the underside of the (i) floor slab, (ii) perimeter footing, or (iii) leveling base?

Response: The 9.25' of excavation/replacement called for in Sheet T-1 should be measured from elevation 901.00. The approximate minimum overexcavation elevation will be 890.50. (This elevation is a minimum requirement; additional overexcavation may be required dependent on tank manufacturer's design requirements and findings of Contractor's geotechnical engineer.) 890.50 is the elevation taken from the center of the tank. 1.5% drainage slope must additionally be accounted for when establishing the final depth of the excavation at the tank edge. Refer to question 13 below for additional information regarding the tank drainage slope.

13. Question: 1.5% drainage slope. Page 7 of the Geotechnical Report ("Drainage Considerations") recommends that the "top of the subgrade" be sloped downward by 1.5% (presumably from the tank center to the outer perimeter.) Moreover, page 10 recommends that the select fill mat should extend "to a uniform elevation throughout the tank footprint.." (emphasis added). However, if the 1.5% slope does apply to the bottom of the excavation, then this recommendation cannot be adhered to because the 1.5% slope results in a 10"± difference in elevation across the radius of the exposed subgrade.

(a) Which surface is to be sloped – the bottom of the excavation, the bottom of the leveling base, or both?

(b) If the bottom of excavation must be sloped, is there a need for another perimeter drain at that level?

(c) IF the 1.5% slope applies to the bottom of the excavation, can we assume that it is OK to vary the excavation elevation to accommodate this slope?

Response: (a) Bottom of excavation is to be sloped to drain from the center toward the perimeter. (b) Per the geotechnical report, "The soil subgrade must be sloped to permit water drainage out of the select fill. The system may be enhanced by including a perimeter drain where the water is discharged by a gravity system." It is permissible to slope the bottom of the overexcavation elevation such that water does not accumulate within the select fill. (c) Yes, the excavation depth will vary based on drainage slope. Refer to Response to Question 12 above for additional clarification.

The Geotechnical Report is for information purposes only. Contractor will be responsible for completing their own Geotechnical investigation per Specification Section 13205-5, Paragraph 2.01, F.

14. Question: Voids and karst features. Note 12 in drawing Sheet G-2 implies that subterranean voids or karst features might be present under the tank footprint. However, the geotechnical report provides no evidence of such voids or karst features.

What – if any - special methods (such as pilot holes) are recommended/specified to ascertain whether voids or karst features might be present under the tank footprint?

Response: Note 12 will be removed. Refer to Item No. 63 in the Drawings section below for modifications.

15. Question: Floor slab thickness. There is a discrepancy among the project documents regarding the floor slab thickness: Sections 13205-2.01.D and 3.02E, specify a 6” slab, while Sheet T-2, Section 2 shows 4”.

What is the minimum required floor slab thickness – 4” or 6”?

Response: The minimum slab thickness required is 6-inches. Sheet T-2, Section 2 will be updated. Refer to Item No. 67 in the Drawing section below for modifications.

16. Question: Permanent drainage. Page 7 of the Geotechnical Report (“Drainage Considerations”), recommends the installation of a perimeter drain. However, the other project documents do not cite the need for one.

Is a perimeter drain necessary; and if it is, where? [Please see also Question #2 (b) above.]

Response: Perimeter drains are shown on sheets T-1 and T-2 of the drawings. See Underdrain callout.

17. Question: Seismic design. There is a discrepancy among the project documents regarding the seismic design parameters:

(a) According to Section 13205.2.01.B.6 and the Geotechnical Report (page 4, “*Seismic Coefficients*”), the site classification is **Site Class C**. On the other hand, according to Sheet G-6, Note VII, it is **Site Class D**.

(b) Values for mapped spectral accelerations S_S and S_1 vary among the documents as follows:

13205.2.01.B.6:	$S_S = 0.095g$ and $S_1 = 0.052g$
Sheet G-6:	$S_S = 0.081g$ and $S_1 = 0.030g$
Geotech Report, p. 4:	$S_S = 0.079g$ and $S_1 = 0.031g$

What are the correct site classification and the correct mapped accelerations S_S and S_1 ?

Response: Site Class C is correct. Specification 13205 and Sheet G-6 will be revised. Refer to Item Nos. 60 and 64 in the Specification and Drawing sections below for modifications.

18. Question: Sheet G-6 indicates seismic design parameters that differ from those in Specification section 13205, page 4, article 2.01.B.6. Please confirm the seismic site class, short period acceleration (Ss), and 1-second acceleration (S1) values.

Response: Refer to Response to Question 17 above.

19. Question: Geotechnical report. The contractor respectfully requests a copy of the geotechnical report. The contractors need a copy of this report in order to confirm subsurface conditions which in turn provide SAWS with more responsive bids.

Response: Refer to Special Conditions No. 5 (SC5) for instructions on obtaining a copy of the Geotechnical Report. The Geotechnical Report is for information purposes only. Contractor will be responsible for completing their own Geotechnical investigation per Specification Section 13205-5, Paragraph 2.01, F.

20. Question: Moisture Barrier. Section 13205, Page 9, Article 3.02.B indicates that the polyethylene moisture barrier shall be 15 mil. We have utilized 6 mil polyethylene on many projects with great success. Please confirm 6 mil polyethylene will be acceptable for use on this project.

Response: The moisture barrier will be revised down to 10 mils. Refer to Item Nos. 60 and 70 in Specification and Drawing sections in Part C below for modifications.

21. Question: Specification Section 13205-3.01.A states that the Contractor shall retain the services of a geotechnical engineer after bidding to perform a separate geotechnical analysis and provide recommendations for the excavation and backfill for the ground storage tank. Specification Section 13205-3.01.E states that the Tank Contractor shall provide an engineer that verifies that the subgrade is consistent with the geotechnical report and that the geotechnical report and subgrade specified is appropriate for the soils encountered.

- a. Please confirm that the Contractor is furnishing a geotechnical report for the construction of the tank after the bid and that the Tank Contractor is confirming that the recommendations of that geotechnical report are suitable for tank construction and that the subgrade is prepared and installed per the Contractor's geotechnical report recommendations.
- b. Please confirm that if the after the bid geotechnical report recommendations differ from the recommendations provided at bid time, any change in pricing stemming from these differences will be handled with a change order.

Response: The geotechnical report associated with this project is for information purposes only (Refer to SAWS Special Conditions regarding the geotechnical report). Contractor must provide their own geotechnical services for the construction of this project in accordance with Specification Section 13205-5, Paragraph 2.01, F. Should more stringent requirements be found by the Contractor's geotechnical investigation/report, no change orders or additional charges will be made against the Owner. The Contractor shall be responsible for all changes and the associated costs. The Contractor must adhere to the following geotechnical requirements:

- 1) Minimum slab thickness of the tank must remain 6-inches.
- 2) Overexcavation must remain at a minimum of 9.25' as indicated in the geotechnical report.
- 3) And Other requirements as called out in the Contract Documents.

22. Question: Tank material. What is the material of the proposed tank, steel or concrete?

Response: The tank will be an AWWA D110, Type III, pre-cast, pre-stressed concrete tank.

23. Question: Specification Section 13205-3.09.A references AWWA D110-04, which is an outdated version of the Standard. The current version is AWWA D110-13. Can this section be revised to reference AWWA D110-13?

Response: The Specification Section 13205-3.09.A has been revised to reference AWWA D110-13. Refer to Item No. 60 in the Specification section below for modifications.

24. Question: Section 13205, 2.01B.7 specifies a value of 135pcf for the equivalent fluid pressure. This appears to be the value for the soil density. If so, what is the value for equivalent fluid pressure in psf?

Response: Specification Section 13205, Paragraph 2.01B.7, specifying the equivalent fluid pressure has been removed from the specifications. The proposed tank will not be buried, so backfill loads are not applicable. Refer to Item No. 60 in the Specification Section below for modifications.

25. Question: Specification Section 13205-2.01.C requires that the tank wall be reinforced vertically by deformed steel reinforcing rods and welded wire fabric. AWWA D110 specifies that walls of Type III tanks be reinforced vertically with nonprestressed reinforcing and does not require the use of both reinforcing rods and welded wire fabric. Preload has four decades of successful experience in using deformed steel reinforcing rods only and not in combination with welded wire fabric. Can this section be revised to allow the use of either deformed steel reinforcing rods or welded wire fabric?

Response: Specification Section 13205-2.01.C has been revised to allow the use of either deformed steel reinforcing rods or welded wire fabric. Refer to Item No. 60 in the Specification Section below for modifications.

26. Question: Specification Section 13205-2.08.C requires that sponge rubber filler conform to ASTM D1056, Type 2 A1 Class A Grade 4 with compression deflection limited to 25 percent at 13 to 17 psi. AWWA D110 specifies Grades 1 through 4. Type III tanks do not require the use of the stiffer Grade 4. Preload has a long history of successful experience in using Grade 1 with a compression deflection limited to 25 percent at 3 to 5 psi. Can this section be revised to allow the use of Grade 1 through 4?

Response: Specification Section 13205-2.08.C has been revised to allow the use of Grades 1 through 4 sponge rubber filler. Refer to Item No. 60 in the Specification Section below for modifications.

27. Question: Specification Section 13205-3.01.C requires that the excavation be examined to confirm the removal of all high plasticity clay materials. Given the excavation depth under the tank shown on the Drawings, it appears from Borings Nos. B-1 through B-5 of Raba Kistner Consultants' Geotechnical Report that the bottom of the excavation will be into fat clay (highly plastic). There appears to be a discrepancy between the requirement to confirm the removal of all highly plastic clay and presence of fat clay at the excavation depth shown on the Drawings. Can this section be revised to clear up this apparent discrepancy?

Response: The overexcavation subgrade should be examined by the geotechnical engineer or their representative prior to placing fill. The Geotechnical Report is for information purposes only. Contractor will be responsible for completing their own Geotechnical investigation per Specification Section 13205-5, Paragraph 2.01, F.

28. Question: Specification Section 13205-3.08.C requires that the tank floor and interior of the wall be disinfected by inundating with a 50 ppm solution of chlorine and water per AWWA C652, Method 3. AWWA C652 specifies Method 3 to entail filling the tank with the 50 ppm chlorine solution to approximately 5 percent of the total storage volume and holding for a period of 6 hours, not inundating the entire interior of the wall. Can confirmation be provided that the disinfection procedure should be in accordance with Method 3 as specified in AWWA C652?

Response: Disinfection procedures that are in accordance with AWWA 652 Method 3 are acceptable.

29. Question: Sheet T-1, Detail A, shows a chart of materials listing the vent body and head to be aluminum. However the call out above the chart states the vent must be SS. Please confirm the vent material and what grade of SS (304 or 316) if required.

Response: The mesh screen, screen strapping and all nuts and bolts shall be stainless steel. The remainder of the vent shall be per the table on Detail A, Sheet T-1. Refer to Item No. 66 in the Drawings Section below for modifications.

30. Question: Sheet T-2, Detail 2, states select fill to be based upon minimum depth of 9.25 feet for bidding purposes. Please confirm the horizontal limit of select fill past the tank footing for bidding purposes.

Response: Per the recommendation of the Geotechnical report: The select fill mat should extend throughout the entire tank footprint to the elevations discussed in Item No. 12 "and extend beyond the edge of the tank foundation a distance equal to the depth of the overexcavation." The Contractor and Tank Manufacturer shall be responsible for

retaining the services of a licensed geotechnical engineer and completing a geotechnical investigation for the design of the tank. At a minimum, the Contractor and Tank Manufacturer shall follow the recommendation for the select fill mat based on the Geotechnical Report. Should the depth of overexcavation required by the tank manufacturer exceed the information provided in the Geotechnical Report, the Contractor shall be responsible for costs associated due to the change.

31. Question: Please confirm if the centerline elevations of all tank wall penetrations may be determined by the tank contractor. All tank wall penetrations should be in the same general area in order to accommodate for prestressing. We recommend a centerline elevation of 905.00 for all wall penetrations. Please confirm this is acceptable.

Response: This elevation is acceptable. Sample taps that penetrate the sidewall of the tank must be placed such that operators can easily and reasonably access gauges and valves in accordance with SAWS standards and as approved by owner in submittal review. Elevation of penetrations are not given to allow each Tank Manufacturer the flexibility/capability to accommodate their best design method(s) for constructing the pre-cast, pre-stressed tank in accordance with their recommendation.

32. Question: Sheet T-2 indicates the overflow pipe shall be supported inside the tank by a combination of the floor and sidewall. We strongly recommend the overflow pipe be solely supported via the tank wall in order to allow radial movements of the tank wall. See attached detail for typical overflow configuration. Please confirm overflow may be solely supported via tank wall.

Response: Encased overflow is shown in a general configuration only in order to provide Tank Manufacturer guidance for their design for bidding purposes. Each Tank Manufacturer shall design the structure of the tank in accordance with SAWS standards and with their best recommended practices and procedures. Overflow pipe supported by the wall is acceptable. Design of the tank, tank appurtenances and associated piping shall be structurally capable to support all necessary loading under full and empty water level conditions inside the tank. Design of the tank shall also be in accordance with SAWS, AWWA and industry standards for a potable water tank.

33. Sheet T-2 indicates flowable fill with a 6" thick concrete cap connecting the tank footing to the precast concrete vault structure. We recommend not connecting any structures to the tank footing to avoid any potential damage that may occur from differential settlement between the two structures. Please confirm an expansion joint or durometer pad is required between the flowable fill/6" concrete cap and tank footing.

Response: Sheet T-2, Detail 2 has been revised to include an expansion joint between the tank footing and the flowable fill/6" concrete cap. Refer to Item No. 67 in the Drawings section below for modifications.

34. Question: Sheet T-3, We would recommend that flexible couplings such as a dresser coupling be installed on all under floor piping to allow for flexibility of the piping system in order to tolerate anticipated foundation settlements. The flexible couplings should be designed by the Engineer and located within 2' to 3' of the tank foundation. Please confirm that this is acceptable and required on this project.

Response: Refer to Civil Drawings (Sheet C-20) for location of flexible couplings in the yard. Should additional flexible couplings be required to accommodate the movement of the proposed tank they should be included in the tank manufacturers bid as part of the lump sum bid.

35. Question: Sheet T-3, Tank Overflow Structure Section, indicates the concrete vault structure is 9 feet tall. The outfall elevation is indicated as 887.00 and the top of the structure is shown at elevation 901.00 alluding to a height of 14 feet. Please confirm the dimensions of the concrete valve vault structure.

Response: Sheet T-4, Detail 1 has been revised to indicate a vault height of 14 feet. Refer to Item No. 68 in the Drawings section below for modifications.

36. Question: Sheet T-3, Chlorine and Fluoride Sample Tap Detail, please provide the centerline elevation of the pipe through the tank foundation.

Response: Refer to Response to Question 31 above.

37. Question: Sheet T-7, Detail A, please provide the centerline elevation of the 1" S.S. piping through the tank foundation.

Response: The 1-inch Outlet Pipe shall have a minimum of 3-feet of cover. Refer to Item No. 71 in the Drawings section below for modifications.

38. Question: Sheet T-1 (40 of 91) details select fill beneath the tank foundation and shows the select fill sloping from the edge of the footing outward from the tank foundation as the depth of the select fill increases. What is the minimum diameter at the bottom of the select fill layer and at what slope should this be installed up the bottom of the tank foundation?

Response: Refer to Response to Questions 13 and 30 above.

39. Question: Sheet T-2 (41 of 91) The encased overflow detailed is not a standard encasement practice. Please confirm that the Tank Manufacturer is allowed to design and apply our standard overflow encasement and that the weir cone can be formed in concrete encasement instead of a S.S weir cone as shown. Also, is it permissible to use DI overflow pipe since it is encased in concrete? Please see the attached overflow detail for reference.

Response: Ductile iron fitting is not acceptable. Contractor shall use steel. Refer to Response to Question 32 above.

40. Question: Sheet T-2 (41 of 91) The bottom elevation of the proposed overflow structure is approximately 14'+ below the tank finished floor elevation. The overflow structure should be moved away from the tank exterior footing a minimum of 15' to prevent undermining the tank subgrade.

Response: Contractor shall make allowances to install the overflow structure as shown in the contract documents. Refer to note 6 on sheet T-2.

41. Question: Sheet T-6 (45 of 91) The drain detail shows the 12" diameter piping stubbing up through the footing just outside the exterior tank wall. Please confirm that the drain pipe can be installed through the concrete encasement to 1'-0" past the exterior of the tank footing and then install the drain assembly as detailed. Comment: If the drain piping is stubbed up through the footing near the wall it will inhibit the wire wrapping process on the tank.

Response: The drain pipe shall be installed per the drawings. The above ground portion of the drain can be installed once the wire wrapping is complete.

42. Question: Section 2 on Sheet T-2 has an arrow pointed to the material below the tank floor with the text "Select fill to be based upon minimum depth of 9.25 feet for bidding purposes" The same fill material is described as "flowable fill" in the same section at a location between the overflow structure and tank footing. Please confirm the extent of flowable fill material.

Response: The flowable fill shall be installed from the bottom of the concrete cap to the bottom of the tank footing. An expansion joint shall be installed between the Ground Storage Tank footing and the flowable fill/6" concrete cap. Refer to Item No. 67 in the Drawings section below for modifications.

43. Question: Painting. While reviewing the 9900 – paint/coatings specifications for the New World Project, I see that some of our Devoe coatings have been specified. Is there any way we can submit additional products for consideration so that the International/Devoe material offering would be complete? I see that one of the specifications is that SAWS is requesting that all the paint/coatings be supplied by one manufacturer.

Response: Refer to SAWS General Conditions Article V 5.11 for information regarding equal materials.

44. Question: Lead based paint abatement. 02050-6 mentions potential lead based paint abatement. Standard procedure (per OSHA, EPA, TCEQ) is to torch cut through the existing lead based paint while wearing respiratory protection (per OSHA 1926.62). I'm sure that the existing tank to be removed does have LBP on it. For these water tower demolitions, SAWS has not required LBP abatement in the past.

Will it be required for this demolition?

Also, do you have any reason to believe that there is any asbestos on the existing 2 million gallon ground tank?

Response: A cutting torch can be used during demolition on surfaces coated with toxic preservatives if the work is completed in open air (1926.534(c)(2)). If indoor cutting of lead paint coated metal is required in enclosed spaces, procedures outline in 1926.354(c)(1) shall be followed. The contractor shall also follow the OSHA Lead standard 1926.62 for worker protection. Also, the Owner and Engineer are not aware of any asbestos that will be associated with the tank, except for possible underground asbestos containing pipe (AC Pipe). If AC Pipe is present, the contractor shall follow SAWS Specification Section 3000 Handling Asbestos Cement Pipe.

45. Question: Section 2050-1,1.01.b and 2050-6, 3.05.A states that the Owner shall retain salvage rights to all equipment & materials.

Does the Contractor retain the scrap iron from the tank demolition?

Response: As stated in the contract documents, SAWS has first rights of refusal for all equipment and materials including the demolished tank. SAWS will not salvage any of the scrap metal from the existing welded steel tank.

46. Question: We recommend providing flexible couplings for all underfloor piping to accommodate settlement of tank footing. Two flexible coupling after the butterfly valves are recommended.

Response: Refer to Response to Question 34 above.

47. Question: General Conditions, Article 5.8.1 requires that all materials that come in indirect contact with potable water must conform to ANSI/NSF 61. This requirement (NSF 61 Certification) is impractical for many of the components of the prestressed concrete ground storage tank, such as the (a) concrete and shotcrete, (b) interior stainless steel ladders, (c) wall man-ways, and (d) internal safety railings. TCEQ regulations (Chapter 290, Subchapter D, Rule §290.43 Water Storage) state that all newly installed coatings must conform to ANSI/NSF 61 and be certified. Can clarification on this article be provided that, in regards to the prestressed concrete ground storage tank, the only ANSI/NSF requirements are those contained in the TCEQ regulations?

Response: The intent of this General Condition is not to deviate from TCEQ regulations. Safety regulations in reference to the materials of construction for potable water tanks shall adhere to all local, state and federal regulations.

48. Question: This email is with regards to the steel pipe specification section 02510 for the above referred project.

Hallmark has been a fabricator and provider of piping to SAWS for the past several years. We procure all cylinder and fabricate the piping from these cylinders with lining and coating per project specification.

We are SPFA and ASME certified like several of our peers. We would like to request approval of Hallmark as a fabricator and supplier of steel piping for this project.

We were also recently approved for the Twin Oaks PS project (RO Building) area of work by SAWS for Zachary/Parsons JV. Jay Warren from our office can send you any additional information needed for approval of Hallmark as a fabricator of Steel and Stainless Steel piping on this and future projects.

Also, we would like to request the following. Along with the FBE lining, is Polyurethane lining acceptable. Typically most manufacturers provide Polyurethane coated and lined pipe. Polyurethane lining of 35-45mils will exceed the FBE thickness requirement and can be done at a single facility. FBE lining is provided only by a select group of lining/coating facilities in Texas. FBE lining also has restrictions on the spools lengths and configuration. Kindly approve Polyurethane lining as an alternate.

Response: Polyurethane lining is not acceptable in lieu of FBE. Qualifications for steel piping will be revised. Refer to Item Nos. 59 and 61 in the Specification section below for modifications.

49. Question: Pipe fabricators. Specification Section 02510 BURIED STEEL PIPE 1.05 QUALITY ASSURANCE section requires a single manufacturer source for pipe & fabrication with SPFA, Loyds Register or ISO9000 Certification with 5 yrs experience. Specification Section 15072 STEEL PIPE AND FITTINGS (ABOVE GROUND) 1.05 QUALITY ASSURANCE section requires a single manufacturer source for pipe & fabrication with SPFA, Loyds Register or ISO9000 Certification with 5 yrs experience of at least 10,000 linear feet. This limits the potential Steel Pipe Mfr sources to American Spiral Weld, NW Pipe, Ameron, and Hanson. Unfortunately due to the small scope of Steel – less than 400' of sizes 24" and below – and the heavy fabrication/specials nature of the scope the above pool of Manufacturers are unlikely to bid the project. SAWS frequently approves steel pipe fabricators not meeting these requirements (current SAWS Evans Rd project for instance)

Will other steel pipe fabricators be considered for this project?

Response: Refer to Response to Question 48 above.

50. Question: Tie-ins. Where will we tie-in the pipes from PZ 1060 to GST?

Response: The tie-in for PZ 1060 is located above grade at the abandoned high service

pumps next to the existing ground storage tank.

51. Question: Sheet G-3, Notes 31 & 32, state the 23" and 15" mesquite trees are to remain. However these trees are located with the tank winding track and limits of excavation and must be removed in order for the tank to be constructed. Please confirm these trees may be removed.

Response: Contractor and Tank Manufacturer are to try by all means necessary to keep the existing trees. If existing trees require removal, Contractor shall be responsible for all costs and permitting associated with the removal of trees.

52. Question: Tree removal. Two trees, labeled as 15" and 23" on drawing C-11, near the proposed new 3.5 MG GST obstruct construction of the tank according to the tank manufacturer's requirements. These trees will need to be removed prior to the tank construction or at least heavily pruned to provide the required space. Please confirm trees if trees can be removed by contractor.

Response: Refer to Response to Question 51 above.

53. Question: Tree removal. Two mesquite trees are located too close to the proposed GST. These current drawing is showing that trees won't be removed. However the Contractor thinks that these trees need to be removed.

Response: Refer to Response to Question 51 above.

B. SPECIFICATIONS

54. PART 1 – BIDDING AND CONTRACT DOCUMENTS

- a. Under the BIDDING AND CONTRACT REQUIREMENTS section, Part 1 – INVITATION FOR COMPETITIVE SEALED PROPOSALS:

Replace the first sentence in Paragraph 5 with the following:

Sealed proposals will be received by the Contract Administration Division, 2800 U.S. Hwy 281 North, Customer Center Building, Suite 171, San Antonio, Texas 78212, until **2:00 p.m., August 18, 2014.**

55. PRICE PROPOSAL

- a. Page 3 (PP-3) of the Price Proposal, in the second paragraph regarding the project completion date, change the words from "Three-Hundred and Sixty (360)" to "Four-Hundred and Fifty (450)"

- b. Page 3 (PP-3) of the Price Proposal, in the third paragraph regarding the project substantial completion milestones, change the words from “Two Hundred and Forty (240), Three Hundred (300) and Three Hundred & Thirty (330)” to “Three-Hundred and Thirty (330), Three-Hundred and Ninety (390) and Four-Hundred and Twenty (420)”

56. SUPPLEMENTAL CONDITIONS

- a. Under Article VIII of the Supplemental Conditions Section 8.6, Liquidated Damages for Failure to Complete on Time shall be amended as follows:

Add the following to the end of the paragraph:

“Liquidated Damages, for the purpose of this contract, will be assessed at \$9,200 per day.”

57. SECTION 01015

- c. Page 01015-6, Paragraph 3.04, B.1 remove the last four(4) bullets in their entirety and replace them with the following:
- “Tasks detailed under Item 2b below (including testing of item 2b) shall be completed by no later than Three-Hundred and Thirty (330) calendar days from NTP.
 - Tasks detailed under Item 2c below (including testing of item 2c) shall be completed by no later than Three-Hundred and Ninety (390) calendar days from NTP.
 - Tasks detailed under Item 2d below (including testing of item 2d) shall be completed by no later than Four-Hundred and Twenty (420) calendar days from NTP.
 - All tasks listed under Item 2 below must be completed no later than Four-Hundred and Fifty (450) calendar days from NTP.”
- d. Page 01015-7, Paragraph 3.04, B.2.b revise the number of days from “240 Days” to “330 Days”
- e. Page 01015-8, Paragraph 3.04, B.2.c revise the number of days from “330 Days” to “420 Days”
- f. Page 01015-8, Paragraph 3.04, B.2.d revise the number of days from “360 Days” to “450 Days”

58. SECTION 01150

- a. Page 01150-2, Paragraph 1.04, A.b.(iii), revise the word from “Design” and change to “Construction”.

- b. Page 01150-2, Paragraph 1.04, A.d.(i), revise the first word of the paragraph from “Design” to “Construction”.
- c. Page 01150-2, Paragraph 1.04, A.f.(i) (a), revise the word from “Design” to change to “Install”.
- d. Page 01150-3, Paragraph 1.04, A.1.g.(iii), add the following sentence to the end of the paragraph: “Upgrading the SCADA System does not include SCADA programming work. Refer to Price Item No. 4 for a description of the work for SCADA programming.”

59. SECTION 02510

- a. Remove Section 02510 in its entirety and replace with the attached Section 02510.

60. SECTION 13205

- a. Page 13205-3, Paragraph 1.02, revised the reference in the left column from “AWWA D110” to “AWWA D110-13”
- b. Page 13205-4, Paragraph 2.01, B.6. change the Seismic Design Parameters from
 - a. “ $S_s = 0.095g$ ” to “ $S_s = 0.079g$ ”
 - b. “ $S_1 = 0.052g$ ” to “ $S_1 = 0.031g$ ”
- c. Page 13205-4, Paragraph 2.01.B.7, delete this section in its entirety.
- d. Page 13205-5, Paragraph 2.01.C, revise the second sentence to read:
“It shall be considered as a cylindrical shell with partial edge restraint and shall be reinforced vertically by deformed steel reinforcing rods and/or welded wire fabric in accordance with AWWA D110.”
- e. Page 13205-7, Paragraph 2.08, C, revise the words from “Class A Grade 4 with compression deflection limited to 25 percent at 13 to 17 psi” and change to “Class A Grades 1 through 4 with compression deflection limited to 25 percent at 2 to 5 psi”.
- f. Page 13205-10, Paragraph 3.02, B, revise the words from “15 mil polyethylene moisture barrier” and change to “10 mil polyethylene moisture barrier”.
- g. Page 13205-14, Paragraph 3.09, A, revise the words from “AWWA D110-04” and change to “AWWA D110-13”.

61. SECTION 15072

- a. Remove Section 15072 in its entirety and replace with the attached Section 15072.

62. SECTION 17000

- a. Page 17000-5, Paragraph 1.05, I., change the following words from “The selected Process Control System Supplier (PCSS) shall be one of the following:” to “Recommended Process Control System Supplier (PCSS) providers are:”.
- b. Page 17000-5, Paragraph 1.05, I. remove line item 5 in its entirety.

C. DRAWINGS

63. DRAWING NO. G-2

- a. Remove all text from Note 12 and replace with the following, “N/A”

64. DRAWING NO. G-6

- a. On Sheet G-6, under Design Loads item No. VII, change the Seismic Site Class from “D” to “C”.
- b. On Sheet G-6, under Design Loads item No. VII, change the Seismic Design Parameter S_S from “8.1%g” to “7.9%g”.
- c. On Sheet G-6, under Design Loads item No. VII, change the Seismic Design Parameter S_1 from “3.0%g” to “3.1%g”.

65. DRAWING NOS. C-11, C-12, C-13, C-14, C-17, C-18, C-19, C-20 and C-21

- a. Add one fire hydrant and associated piping to the Contract Documents as shown in the attached Sheet Nos. C-11, C-12, C-13, C-14, C-17, C-18, C-19, C-20 and C-21. Show fire hydrants on all other affected sheets.

66. DRAWING NO. T-1

- a. Detail A – Dome Vent

Delete the “vent material must be stainless steel” callout from the detail.

In the materials text box delete the screen material of “304 SS” and replace with “316L”.

In the materials text box add a line to include the screen strapping as 304 SS.

67. DRAWING NO. T-2

- a. Section 2 – Delete this section in its entirety and replace with the attached Section 2.

68. DRAWING NO. T-3

- a. Section 1 – Tank Overflow Structure – Delete this section in its entirety and replace with the attached Section 1.

69. DRAWING NO. T-5

- a. Detail D – Interior Ladder – Revise the following callout:
“Interior ladders at hatches provide ladder safety post by Bilco Model No. 4 (or Equal).”

70. DRAWING NO. T-6

- a. On Sheet T-6, Detail A, revise the moisture barrier mil thickness from “15 mils” to “10 mils”.

71. DRAWING NO. T-7

- a. Detail A – 1-Inch Outlet Pipe – Delete this detail in its entirety and replace with the attached Detail A.

ACKNOWLEDGEMENT BY RESPONDENT

Each respondent is requested to acknowledge receipt of this Addendum No. 1 by his/her signature affixed hereto and to file same with and attached to his/her proposal.

The Undersigned acknowledges receipt of this Addendum No. 1 and the proposal submitted herewith is in accordance with the information and stipulation set forth.

Date

Signature of Respondent

END OF ADDENDUM



SECTION 02510

BURIED STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install NSF-61 certified fusion bonded epoxy lined and polyurethane coated steel pipe and fittings in accordance with AWWA C200, C213, C222, and the Contract Documents. Fusion bonded epoxy shall be compatible for fluoride and chlorine chemical application for potable water pipe. The work also includes supervision necessary to make the installation complete.
- B. This section also includes the furnishing, installation, and testing of pipe, fittings, specials, pipe supports, closure pieces, test plugs, night caps, bulkheads, restrained joints, and all required appurtenances as shown on the drawings and as required to make the entire piping system operable. The steel pipe for this project shall be fabricated by a single fabricator. Fittings and specials shall be fabricated by a single Fabricator.

1.02 RELATED WORK

- A. Section 01300 – Submittals
- B. Section 01400 – Quality Control
- C. Section 02217 – Excavating, Backfilling, and Compaction for Utilities
- D. Section 02223 – Trench and Excavation Safety Systems
- E. Section 02675 – Disinfection of Potable Water Facilities
- F. Section 09900 – Painting
- G. Section 13990 – Cathodic Protection
- H. Section 15002 – Field Testing of Piping Systems

1.03 REFERENCE STANDARDS

- A. American Water Works Association (AWWA):
 - 1. C200- Steel Water Pipe – 6 Inches and Larger
 - 2. C206- Field Welding of Steel Water Pipe
 - 3. C207- Steel Pipe Flanges for Waterworks Service- Sizes 4 In. thru 144 In.
 - 4. C208- Dimensions for Fabricated Steel Water Pipe Fittings
 - 5. C213- Fusion-Bonded Fusion Bonded Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
 - 6. C215- Extruded Polyolefin Coatings for the Exterior of Steel Water Pipelines
 - 7. C216- Heat-Shrinkable Cross-Linked Polyolefin Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

8. [C-222- Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings](#)
9. [C604- Installation of Buried Steel Water Pipe – 4 In. and Larger](#)
10. [M11 \(Manual\)- Steel Pipe - A Guide for Design and Installation](#)

B. American Welding Society (AWS):

1. [A2.4- Standard Symbols for Welding, Brazing, and Nondestructive Examination](#)
2. [A3.0- Standard Welding Terms and Definitions](#)
3. [B2.1, Specification for Welding Procedure and Performance Qualification](#)
4. [D1.1, Structural Welding Code – Steel](#)
5. [QC 1, Standard for AWS Certification of Welding Inspectors](#)

C. American Society for Testing and Materials (ASTM):

- a. [A20- Specification for General Requirements for Steel Plates for Pressure Vessels](#)
- b. [A53- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless](#)
- c. [A370- Test Methods and Definitions for Mechanical Testing of Steel Products](#)
- d. [A435- Specification for Straight-Beam Ultrasonic Examination of Steel Plates](#)
- e. [A516- Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service](#)
- f. [A1018- Specification for Steel, Sheet and Strip, Heavy Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength](#)
- g. [D16- Terminology for Paint, Related Coatings, Materials and Applications](#)
- h. [D522- Test Methods for Mandrel Bend Test of Attached Organic Coatings](#)
- i. [D2240- Test Method for Rubber Property 8212; Durometer Hardness](#)
- j. [D4541- Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers](#)
- k. [E165- Standard Practice for Liquid Penetrant Inspection Method](#)
- l. [E329- Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection](#)
- m. [E709- Standard Guide for Magnetic Particle Testing](#)
- n. [E1255- Standard Practice for Radioscopy](#)
- o. [E1444- Standard Practice for Magnetic Particle Testing](#)

D. Society for Protective Coatings (SSPC):

1. [SP-1- Solvent Cleaning](#)
2. [SP-10- Near-White Blast Cleaning](#)
3. [PA/Guide 3- A Guide to Safety in Paint Application](#)
4. [PA/Guide 17- A Guide for Selecting Urethane Painting Systems](#)

E. International Institute of Welding (IIW)

F. International Organization for Standardization (ISO)

G. NSF 61- Drinking Water System Components - Health Effects.

1.04 SUBMITTALS

A. Shop Drawings

1. Prior to the fabrication of the pipe, submit fabrication and laying drawings in accordance with AWWA Manual M11 to the ENGINEER for review. The pipe layout drawing shall include as a minimum following:
 - a. Base stationing and elevation convention as shown on Drawings.
 - b. Maximum Laying Lengths: Select lengths to accommodate installation operation.
 - c. Specific number, location, and direction of each pipe, joint, and fitting or special. Number each pipe in installation sequence.
 - d. Station and invert elevation at changes in grade or horizontal alignment.
 - e. Station and invert elevation to which bell end of each pipe will be laid.
 - f. Elements of curves and bends, both in horizontal and vertical alignment.
 - g. Location of mitered pipe sections, beveled ends for alignment conformance, butt straps, and deep bell lap joints for temperature stress control.
 - h. Location of closures, cutoff sections for length adjustment, temporary access manways, vents, and welds lead outlets for construction convenience.
 - (i) Provide for adjustment in pipe laying headings and to conform to indicate stationing.
 - (ii) Changes in pipe section location will require ENGINEER's written approval.
 - i. Location of bulkheads, both those shown and/or required for hydrostatic testing of pipeline.
 - j. Locations of valves, manholes, and other mechanical equipment.
 - k. Location and design of all thermal control joints.
2. Pipe outside diameter, wall thickness, location of welded seams, and working pressure rating.
3. Fabrication Information:
 - a. Design calculations for pipe, fittings and specials including opening reinforcement details of collars, wrappers, and crotch plates. The calculations shall show maximum design pressure, surge pressure, deflection, buckling, extreme loading condition; special physical loading such as supports or joint design and thermal expansion and/or contraction. Wall thickness calculations shall be prepared by the MANUFACTURER.
 - b. Details including dimensions and fabrication tolerances for both bell and spigot ends for rubber gasket joints.
 - c. Manufacturing tolerances.
 - d. Maximum angular deflection limitations of field joints.
 - e. Closure sections and cutoffs for field length adjustment.
 - f. Details of bulkheads, including method of attachment to the pipe and details for removal of test bulkheads and repair of lining.
 - g. Joint restraint length requirement for thrust forces. Restraint length calculations shall be prepared and sealed by a Professional ENGINEER licensed in the State where the project is located.
 - h. Stulling size, spacing, and layout.
4. Material data of pipe, fittings and rubber gasket.
5. Fusion Bonded Epoxy for interior joints and patches.

6. Limits of each reach of field welded joints, rubber gasket joints and concrete encasement.
7. Call out of weld sizes and dimensions of thrust ring collars, flanges, reinforcing collars, wrapper plates and crotch plates.
8. Submit joint details.
9. Submit details of lining and coating. Provide MANUFACTURER's coating product information, application recommendations, field touch-up procedure and thickness of coatings.
10. Material data of heat shrink sleeves and installation recommendations.
11. Submit drawings of butt straps, couplings, and flanges.
12. The CONTRACTOR's Proposed Field Welding Procedure in accordance with AWWA C206 and AWS D1.1.
13. Pipe MANUFACTURER's written Quality Assurance/Control Plan.
14. Temperature Stress Control Submittal.

B. Certifications:

1. Mill test certificates for steel plate and steel coil. The MANUFACTURER shall perform the tests described in AWWA C200, for all pipe, fittings, and specials. The certificates shall include chemical and physical test results for each heat of steel.
2. Lining Materials: Submit documentation that lining system used for all pipes and fittings is currently approved for potable water contact in accordance with NSF 61 and satisfies current applicable governmental health and safety requirements for use in potable water.
- 3.

C. Statements of Qualification:

1. Welders or Welding Operators:
 - a. Name of welder.
 - b. Welding procedures/positions for which welder is qualified to weld.
 - c. Assigned certification stamp number.
 - d. Certification date.
 - e. Current certification status.
- 2.

D. Submit Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR) for each welding process.

E. Field Hydrostatic Testing Plan: Submit at least 15 days prior to testing and include at least the following information:

1. Testing dates.
2. Piping system and sections to be tested.
3. Method of isolation.
4. Method of conveying water from source to system being tested.
5. Calculation of maximum allowable leakage for piping sections to be tested.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Pipe MANUFACTURER:

- a. All welded steel pipe, fittings and specials shall be the product of a MANUFACTURER(S) who has no less than five years of successful experience in manufacturing pipe of the particular type and size indicated. All pipes shall be new and not supplied from inventory.
 - b. Experience shall include successful fabrication to conform AWWA C200 standards within last 5-year period.
 - c.
2. Polyurethane Coating:
 - a. The coating MANUFACTURER shall have a minimum of five years of experience in the production of coating specified herein. The acceptable MANUFACTURERS for polyurethane coating are:
 - (i) 3M,
 - (ii) Carboline,
 - (iii) Sherwin-Williams and
 - (iv) Tnemec
 - (v)
 3. Fusion Bonded Epoxy Lining:
 - a. The lining MANUFACTURER shall have a minimum of five years of experience in the production of lining specified herein. The acceptable MANUFACTURERS for fusion bonded epoxy lining are:
 - (i) 3M
 - b. Applicator Qualifications
 - (i) Equipment shall be certified by the lining MANUFACTURER to meet the requirements for material mixing, temperature control, application rate, and ratio control for multi-part coatings.
 - (ii) Equipment not meeting the written requirements of coating MANUFACTURER shall be rejected for coating application until repairs or replacement of the equipment is made to the satisfaction of SAWS.
 - (iii) Personnel responsible for the application of the lining system shall provide certification of attendance at the lining MANUFACTURER's training class within the last 3 years. Lining application personnel shall be present during all lining application and shall have responsibility for controlling all aspects of the lining application.
 4. Welders and Welding Operators:
 - a. Shop Welders: In accordance with ASME BPVC SEC IX.
 - b. Field Welders: In accordance with AWS D1.1.

B. OWNER Testing and Inspection

1. Pipe will be subject to inspection by an independent testing laboratory, selected and retained by the OWNER. Representatives of the laboratory or the ENGINEER shall have access to the work whenever it is in preparation or progress, and the Pipe MANUFACTURER shall provide proper facilities for access and for inspection. Material, fabricated parts, and pipe, which are discovered to be defective, or which do not conform to the requirements of this specification shall be subject to rejection at any time prior to OWNER's final acceptance of the product.

C. Factory Testing

1. Hydrostatic Pressure Testing:

- a. Each joint of pipe shall be hydrostatically tested prior to application of lining or coating. The internal test pressure shall be that which results in a fiber stress equal to 75% of the minimum yield strength of the steel used. Each joint of pipe tested shall be completely watertight under maximum test pressure. As a part of testing equipment, the Pipe MANUFACTURER shall maintain a record of test data including reference number of pipe tested. The pipe shall be numbered in order that this information can be recorded.
 - b. Air test shall be made by applying air to the welds at 10 pounds per square inch pressure and checking for leaks around and through welds with a soap solution.
2. Elongation: For the tensile test specified in ASTM A370, 2-inch test specimens shall show elongations not less than 22 percent for each heat of steel.

D. MANUFACTURER's Technician For Pipe Installation

1. During the construction period, the Pipe MANUFACTURER shall furnish the services of a factory trained, qualified, job experienced technician to advise and instruct as necessary in pipe laying and pipe jointing. The technician shall assist and advise the CONTRACTOR in his pipe laying operations and shall instruct construction personnel in proper joint assembly and joint inspection procedures. The technician shall be on-site full time for the first week of pipe installation, and thereafter as needed by the CONTRACTOR or requested by the ENGINEER, or OWNER for installation assistance and inspection, at no additional cost to OWNER.
2. The Pipe MANUFACTURER shall provide services of the Coating MANUFACTURER's representative and a representative from the Heat Shrink Joint MANUFACTURER for a period of not less than one week at the beginning of actual pipe laying operations to advise CONTRACTOR and OWNER regarding installation, including but not limited to, handling and storage, cleaning and inspecting, coating repairs, field applied coating, heat shrink installation procedures and general construction methods and how they may affect the pipe coating. The MANUFACTURER's Representative shall be required to return if, in the opinion of the ENGINEER, the coating or the CONTRACTOR's construction methods do not comply with the specifications. Cost of MANUFACTURER's Representatives to return to the Site shall be at no additional cost to the OWNER.

1.06 DESIGN REQUIREMENTS

A. Design Criteria: All pipe, fittings and specials shall be designed for a combination of the following internal, external and surge pressures:

1. Internal Design Pressure: Sizes and design pressure shall be as shown below. Minimum design pressure shall be 150 psi.
2. External Load: Earth loads shall be as shown on the Drawings. External live load shall be at least equivalent to AASHTO HS-20 loading. External design earth load shall be calculated based on the trench condition as shown on the drawings. Earth load shall be calculated based on a unit weight of 120 pounds per cubic foot. External live load shall be Coopers E80 loading where the pipeline crosses railroad. Minimum cover shall be 5 foot.
3. Surge Pressure: Unless otherwise indicated, provide for 50% of design pressure for surge in addition to design pressure.
4. Restrained pipe shall be designed to withstand the thrust forces on the pipe. Thrust forces shall be calculated based on design pressure plus surge pressure.

5. Test Pressure: 1.5 times the design pressure at the lowest point in-the pipeline or design plus maximum surge pressure whichever is greater.
6. Thermal change: 30 degrees F cooling from installation to water temperature.
7. Modulus of Soil Reaction (E'): For compacted granular backfill material in pipe zone, use 1,500 psi. For flowable backfill material in pipe zone, use 3,000 psi.
8. Bedding Constant K: 0.1
9. Deflection Lag Factor DL = 1.2
10. Maximum allowed deflection: 3% of pipe diameter for polyurethane coated and fusion bonded epoxy lined steel pipe.
11. Steel shall meet the requirements of AWWA C200 and shall be of continuous casting. Steel shall be homogeneous and shall be suitable for field welding, and fully kilned. Steel shall have minimum yield strength of 42,000 psi.
12. The Stress due to design pressure shall be no greater than 50% of the minimum yield strength of the steel. The stress due to design plus surge pressure shall not exceed 75 percent of the yield strength. In no case the design stress shall not be greater than 21,000 psi, at design pressure.

B. Fittings and Specials:

1. The specials shall be of the diameter and wall thickness shown on the Drawings, and in accordance with these Contract Documents. Where not shown, design reinforcement in accordance with AWWA Manual M11, AWWA C200, and AWWA C208.
2. Design fittings, specials, associated joints and all field and shop welds with load capacities equal to or greater than those of connecting pipe segments.
3. Design and locate weld lead outlets as needed.
4. Design and locate flushing and sampling ports, as needs, for hydrostatic testing and disinfection.
5. All pipe and pipe fittings located at or near the proposed 3.5 MG GST shall be designed to account for tank settlement. Prior to fabrication, CONTRACTOR shall submit shop drawings showing the location and type of fittings near proximity of the 3.5 GST to ENGINEER for review.

C. Provision for Thrust

1. Thrust at bends, tees, or other fittings shall be resisted by welded joints. Thrust blocking is not allowed in pump station piping.
2. Restrained joints shall be used a sufficient distance from each side of the bend, tee, plug, or other fitting to resist thrust which develops at the design working pressure plus surge pressure of the pipe.
3. The length of pipe with restrained joints to resist thrust forces shall be determined by the Pipe MANUFACTURER in accordance with AWWA Manual M-11 and the following:
 - a. The Weight of earth shall be calculated as the weight of the projected soil prism above the pipe.
 - b. Soil Density = 110 pcf (maximum value to be used).
 - c. Coefficient of Friction = 0.25 (maximum value to be used).
 - d. The above values apply to unsaturated soil conditions. In locations where groundwater is encountered, the soil density shall be reduced to its buoyant weight for all backfill below the watertable, and the coefficient of friction shall be reduced to 0.15.

D. Stulling (Strutting):

1. Design stulling for pipe, specials, and fittings such that damage is avoided during handling, storage, and installation.
2. Design such that pipe deflection is prevented and to support backfill, plus backfilling and compaction equipment loads.

1.07 MARKING, DELIVERY, HANDLING, AND STORAGE

A. Pipe Marking:

1. Legibly mark installation sequence number on pipe, fittings, and specials in accordance with piping layout.
2. Special pipe sections and fittings shall be marked at each end with notation "TOP FIELD CENTERLINE".
3. The word "TOP" shall be painted or marked on outside top spigot of each pipe section.
4. Mark "TOP MATCH POINT" for compound bends per AWWA C208 so end rotations can be easily oriented in field.

B. Delivery:

1. Pipe, fittings and specials shall be carefully supported during shipment and storage.
2. Securely bulkhead or otherwise seal ends of pipe, specials, and fittings prior to loading at manufacturing Site.
3. Ship pipe on padded bunks with tie-down straps approximately over stulling.
4. Internally support with stulls each pipe length and fittings to maintain a true circular shape.
5. Pipe ends shall remain sealed until installation.
6. Damage to pipe, fittings, or specials, in shipment shall not be delivered to the project site unless such damaged pipe, fittings or specials is properly repaired.
7. Coordinate delivery of the pipe with the CONTRACTOR.

C. Handling:

1. Handle as a minimum at the 1/3 points by use of wide slings padded cradles, or other devices designed and constructed to prevent damage to the pipe coating. The use of chains, hooks or other equipment which might injure the pipe coating will not permitted.

D. Storage:

1. Support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.
2. Support on sand or earth berms free of rock exceeding 3 inches in diameter.
3. Store pipe at the MANUFACTURER's yard until CONTRACTOR is ready to accept the delivery at the site.
4. Deliver, handle, and store pipe, fittings and specials in accordance with the MANUFACTURER's recommendations to protect the coating system.
5. Protect pipe lining from drying by means of plastic and covers banded to the pipe ends.
6. Maintain covers over the pipe ends at all times until ready to be installed.

1.08 SEQUENCING AND SCHEDULING

A. Notify ENGINEER in writing of the following:

1. Pipe Manufacturing: Not less than 14 days prior to starting pipe, fittings and specials fabrication.
2. Not less than 5 days prior to start of each of the following:
 - a. Welding.
 - b. Coating application.
 - c. Lining application.
 - d. Shop hydrostatic testing.

PART 2 PRODUCTS

2.01 GENERAL

- A. Steel pipe, fittings, and specials shall be manufactured, tested, inspected, and marked to comply with AWWA C200 and additional requirements of these Contract Documents.
- B. In lieu of collar reinforcement, pipe, fittings, or specials with outlets may be fabricated in their entirety of steel plate having thickness equal to sum of pipe wall plus required reinforcement.
- C. Unless shown otherwise, the diameter shown shall be considered finished inside diameter after lining.
- D. Materials furnished shall be NSF 61 approved for use with potable water.

2.02 PIPE BARREL

- A. Steel: Provide steel coils for spiral welded steel pipe or steel plate for straight seam welded steel pipe per AWWA C200 and as follows:
 1. Minimum Yield Strength: 42,000 psi.
 2. Minimum Tensile Strength: 60,000 psi.
 3. Minimum Elongation in 2-inch Gauge Length: 22 percent.
 4. Pressure Vessel Quality as follows:
 - a. Coils: Continuous cast process, fully-killed, fine grained practice conforming to physical, manufacturing and testing requirements of ASTM A1018.
 - b. Plate:
 - (i) Fully-kilned, conforming to ASTM A20, fine grained practice conforming to physical, manufacturing and testing requirements of ASTM A516, Grade 70.
 - (ii) Steel Chemistry: Conform to ASTM A516, Grade 70. Steel plates that are 3/4 inch thick or greater shall be normalized.
 5. Wall Thickness:
 - a. The pipe wall thickness shall be in accordance with AWWA C200, except that all pipes shall have a minimum wall thickness of 1/4-inch with zero minus tolerance and an internal nominal diameter to wall thickness ratio not to exceed 200.

- b. Pipe which is to be placed in casing or tunnel shall have a nominal diameter to wall thickness ratio not to exceed 144 or minimum pipe wall thickness shall be 0.375 inches, whichever is greater.
6. Inside Diameter of the pipe shall be as shown on the plans or as specified in the contract documents

2.03 FITTINGS AND SPECIALS

A. Fabrication:

1. Shop fabricate fittings and specials. No field fabrication will be allowed.
2. Fabricate from materials or straight pipe in full conformance with requirements of these Contract Documents and dimensions of AWWA C208, unless otherwise indicated.
3. Design Pressure: All fittings and specials shall be designed to withstand internal pressure, both circumferential and longitudinal, and external loading conditions.

B. Elbows, Unless Otherwise Indicated:

1. Minimum Radius: 2.5 times pipe diameter.
2. The minimum thickness of plate for pipe from which specials are to be fabricated shall be the thickness of adjacent mainline pipe, the thickness shown on the Drawings or ¼-inch thickness, whichever is thicker.
3. Maximum Miter Angle: 11-1/4 degrees on each section resulting in a maximum deflection angle of 22.5 degrees per miter weld as recommended in AWWA C208.
4. Maximum total allowable angle for beveled joints shall be 3 degrees per pipe joint. Bevel shall be provided on the bell ends. Mitering of the spigot ends will not be permitted.
5. Complete joint penetration (CJP) welds on miter welds.

C. Outlets:

1. Outlets 12-inch and smaller shall be fabricated from ASTM A53, Type E or S, Grade B, standard weight steel pipe in the standard outside diameters. Unless otherwise shown, wall thickness and collar reinforcing shall be designed by the pipe MANUFACTURER as specified. Collars shall be manufactured with the same steel as specified for the mainline piping.
2. Fabricate collar or wrapper reinforcement using same steel as specified for main pipe barrel.
3. Where outlets for taps are threaded, furnish and install Type 304 stainless steel bushings for the outlet size indicated on the drawings.
4. The CONTRACTOR may use outlets for access for weld leads.

2.04 JOINTS

A. Rubber Gasket:

1. General:
 - a. For pipes smaller than 24 inches, use expanded bell and rolled groove spigot with rubber gasket. For pipes 24 inches and larger, use Carnegie shape rubber gasket joint.
 - b. In accordance with AWWA C200.

- c. Clearance between bell and spigot shall, when combined with gasket groove configuration and gasket itself, provide watertight joints under all pressure conditions.
2. Rubber Gasket Carnegie Spigot and Expanded Bell:
 - a. Standard Spigot Shapes in Accordance with AWWA manual M11.
 - b. Weld spigots to pipe cylinder using single fillet welded lap joint.
 - c. Bell:
 - (i) Form by expanding press or by moving axially over a die, in such a manner as to stretch steel plate beyond its elastic limit to form a truly round bell of suitable diameter and shape.
 - (ii) Do not roll bell ends.
 - (iii) Minimum Radius: 15 times wall thickness of pipe barrel on either side of bell slope.
 - (iv) Minimum Bell Depth: 3 inches.
 - (v) Expanded bells shall have no noticeable depressions or irregularities.

B. Field Welded:

1. Field welded joints shall be in accordance with AWWA C206.
2. Typical field welded joint in restrained sections shall be single fillet lap joint located inside pipe for pipe sizes 24-inch or larger. For pipe sizes smaller than 24-inch use single fillet lap joint located outside of pipe. Lap welded joints shall be in accordance with AWWA C200.
3. Butt Joint Welded: As needed for closures or other locations required for construction. Plain ends beveled as required by AWWA C200 and CONTRACTOR's field WPS.
4. Double welded lap joints and butt-strap joints shall be tapped and drilled for testing in accordance with AWWA C206.

C. Flanges:

1. Flanged joints shall be used on all pipes, fittings and specials on welded steel piping exposed in vaults and on buried pipe systems to connect valves and appurtenances.
2. Use slip-on or ring type flanges. Pipe flanges and welding of flanges to steel pipe shall conform to the requirements of AWWA C206 and AWWA C207.
3. Pressure rating of flanges shall be equal or greater than the adjacent pipe class.
4. Flange bolt circle shall match the bolt circle of the fittings or appurtenances which are to be connected.
5. Flange bolts, and nuts are specified in Section 15120 – Piping Specialties. Nuts and bolts shall be coated.
6. Gaskets: Full face for use with flat face flanges and ring type for use with raised face flanges. Gaskets shall be 1/8-inch thick, cloth-inserted rubber, Garlok 3000 or equal in accordance with SAWS Material Standard Specification for steel water pipe. Blind flange gasket shall cover entire inside surface of blind flange.
7. Additional flanges may be added by the CONTRACTOR to facilitate fabrication, handling, transportation and field assembly at no additional cost.
8. Coordinate the dimensions, hole drillings and type of flange face (flat or raised) of the flanges furnished with the companion flanges of valves, pumps and equipment to be connected to or installed in the piping.

D. Butt Strap Closure: Butt strap shall be the same thickness and material as the pipe wall, at least 10 inches wide, rolled to fit the outside cylinder diameter in two half sections, and should be centered over the plain ends of the pipe sections they are to join.

E. Mechanical Couplings: Sleeve type mechanical couplings and flange coupling adaptors are specified in Section 15120 – Piping Specialties.

2.05 THERMAL CONTROL JOINTS

A. Provide thermal control joints as specified in Paragraph 3.01 of this Section.

2.06 STULLING (STRUTTING)

A. Materials:

1. Shop-Lined Pipe: Wood stulls and wedges.
2. Unlined Pipe: Steel or wood.

B. Install stulling for pipe, specials, and fittings in accordance with reviewed submittal and as soon as practical after pipe is fabricated or, for shop-lined pipe, after lining has been applied.

C. Install stulling in manner that will not harm lining.

1. Maintain stulling in place until pipe is backfilled.
2. The stulling may be temporarily removed to perform interior welding of the pipe joints if welding is performed prior to backfilling.
3. If the stulling is temporarily removed, it shall be reinstalled prior to backfilling.
4. Stulling shall be reinstalled so that the pipe is not out-of-round from a true circle by more than 1 percent.

2.07 COATINGS

A. General:

1. Notify ENGINEER at least 5 days prior to application of coating products.
2. Holdback of coating from field-welded joints shall be as follows:
 - a. For lap welded joints and flexible couplings, 8 inches.
 - b. For butt weld and butt strap joints, 6 inches.
3. Furnish inspection devices that are calibrated and in good working condition for detection of holidays and measurement of coating film thickness and adhesion testing.

B. Exterior Polyurethane Coating:

1. Polyurethane Coating shall be factory applied and meet the requirements of AWWA C222. Use a Coating Standard ASTM D16 Type, V system which is a 100 percent solids, 2-component polyurethane (or 2-package polyisocyanate, polyol-cured urethane) coating. The components are mixed in 1:1 ratio at time of application based on the MANUFACTURER's product recommendation. The components shall have balanced viscosities in their liquid state and shall not require agitation during use. The cured coating shall have the following properties:
 - a. Conversion to Solids by Volume: 97 percent plus or minus 3 percent

- b. Temperature Resistance: Minus 40⁰ F and plus 130⁰ F.
- c. Minimum Adhesion: 1500 psi, when applied to steel pipe which has been blasted to comply with SSPC-SP10.
- d. Cure Time: For handling in 1 minute at 120⁰ F, and full cure within 7 days at 70⁰ F.
- e. Maximum Specific Gravities- Polyisocyanate resin, 1.20. Polyol resin, 1.15.
- f. Minimum Impact Resistance. 80 inch-pounds using 1-inch diameter steel ball.
- g. Minimum Tensile Strength- 2000 psi.
- h. Hardness: Minimum Durometer hardness 65 plus on the Shore D scale in accordance with ASTM D2240.
- i. Flexibility Resistance ASTM D522 using 1-inch mandrel. Allow coating to cure for 7 days. Perform testing on test coupons held for 15 minutes at temperature extremes specified above.
- j. Dry Film Thickness: 30 mils.

C. Exterior Polyurethane Coating for Specials, Joints, Fittings, or Repair of Steel Pipe

- 1. The shop applied and field applied coatings shall be in accordance with AWWA C222 Standard. The shop applied and field applied coating shall have the properties specified in paragraph 2.07.B. Mix and apply polyurethane coatings in accordance with the coating MANUFACTURER's recommendations.

D. Factory Applied Exterior Polyurethane Coatings

- 1. Surface Preparation
 - a. Remove deposits of oil, dirt, grease and other contaminants prior to application of coating.
 - b. Remove surface imperfections such as metal slivers, burrs, weld splatter, gouges or delamination in the metal by filing or grinding prior to abrasive surface preparation.
 - c. Wire wheel or blast exterior surfaces in accordance with SSPC-SP10; to a near white metal blast cleaning with an angular profile in bare steel.
- 2. Equipment: Two component, heated airless spray unit in accordance with coating MANUFACTURER's recommendation.
- 3. Temperature: Minimum 5⁰ F above dew point temperature. The temperature of the surface shall not be less than 60⁰ F during application.
- 4. Humidity: Heating of pipe surfaces may be required to meet requirements of Paragraph 2.07.D.3, if relative humidity exceeds 80 percent.
- 5. Do not thin or mix resins; use as received. Store resins at a temperature recommended by the coating MANUFACTURER.
- 6. Application: Apply directly to pipe to achieve a total (DFT) dry film thickness of 30 mils. Multiple pass, one coat application process is permitted provided maximum allowable recoat time specified by coating MANUFACTURER is not exceeded. Provide cutbacks in accordance with coating MANUFACTURER's recommendations as appropriate for the type of joint and heat shrink sleeve to be used. The cutback area shall be sand blasted in the shop to facilitate easier field surface preparation. The exterior bare steel area of the pipe shall be adequately protected during pipe handling and shipment.
- 7. Recoating: Recoat only when coating has cured less than maximum time specified by coating MANUFACTURER. When coatings has cured for more than recoat time, brush-blast or thoroughly sand the surface. Blow-off cleaning using clean, dry, high pressure compressed air.

8. Curing: Do not handle pipe until coating has been allowed to cure, per MANUFACTURER's recommendations.

E. Field Coating of Buried Pipe and Bolted Joints:

1. Heat-shrink Sleeves:
 - a. High recovery, Type II, heat-shrinkable cross-linked polyolefin in accordance with AWWA C216, unless otherwise indicated.
 - b. Sleeve Length: Extend minimum of 3 inches onto adjacent pipe coating.
 - c. As-Supplied Sleeve Thickness (prior to heat shrinking): 90 mils, minimum.
 - d. Filler: As recommended and supplied by the heat shrink sleeve MANUFACTURER.
 - e. Provide MANUFACTURER's recommended sleeve thickness, length, and size required for specific type of joint and pipe.
 - f. MANUFACTURER and Product: Canusa or Raychem.

2.08 LININGS

A. General:

1. Notify ENGINEER at least 5 days prior to application of lining products.
2. Holdback of lining from field-welded joints shall be as follows:
 - a. For lap-welded joints and flex couplings, 8 inches.
 - b. For butt-weld and butt-strap joints, 6 inches.

B. Shop-Applied Fusion Bonded Epoxy Lining:

1. Manually spray, automatically spray or apply centrifugally in conformance with AWWA C213. Minimum thickness shall be in accordance with AWWA C213.
2. Prepare surface as recommended by MANUFACTURER.
 - a. Pipe surfaces shall be abrasive blast cleaned in accordance with AWWA C213 and SSPCOSP 10/NACE No.2.
 - b. Surface Preparation for steel shall be blast cleaned with materials having an angular profile such as mineral abrasives, slag abrasives or steel grit in accordance with AWWA C213. For requirements of selecting and evaluating mineral and slag abrasives see SSPC-AB 1 and SSPC-AB 3.
3. Interior lining for buried potable water piping must be NSF 61 certified.
4. Interior lining for buried potable water piping must be corrosion resistant for fluoride and chlorine chemical application service.
5. Lining machine type that has been used successfully for similar work and acceptable to ENGINEER.
6. Maintain pipe in round condition during lining operation and thereafter by suitable bracing or strutting.
7. Provide polyethylene or other suitable bulkhead on ends of pipe and on special openings to prevent drying out of lining. Bulkheads shall be substantial enough to remain intact during shipping and storage until pipe is installed.
8. Pipe shall be left bare where field joints occur.
9. Ends of lining shall be left square and uniform. Feathered or uneven edges will not be permitted.

C. Field-Applied Fusion Bonded Epoxy Lining:

1. Shall be applied to pipe joints in accordance with AWWA C213, unless stated otherwise.
2. Field applied linings shall be applied by qualified coating MANUFACTURER.
3. Materials conforming to AWWA C213.
4. Minimum thickness shall be in accordance with AWWA C213.
5. Prepare surface as recommended by MANUFACTURER.
 - a. Pipe surfaces shall be abrasive blast cleaned in accordance with AWWA C213 and SSPC0SP 10/NACE No.2.
 - b. Surface Preparation for steel shall be blast cleaned with materials having an angular profile such as mineral abrasives, slag abrasives or steel grit in accordance with AWWA C213. For requirements of selecting and evaluating mineral and slag abrasives see SSPC-AB 1 and SSPC-AB 3.

2.09 PIPE LENGTH

- A. Maximum joint length shall not exceed 50 foot. Maximum joint length of steel pipe installed in casing shall not exceed 25 foot.
- B. All non-restrained pipe that is deflected or that has mitered joints in order to maintain alignment on horizontal or vertical curves shall have a minimum length of 8 feet, unless otherwise acceptable to the ENGINEER.

2.10 PIPELINE MARKING TAPE

- A. Pipeline marking tape shall be minimum 4 mil thick polyethylene which is impervious to alkalis, and chemicals and solvents which are likely in the soil. Tape shall be 12 inches wide. Imprinted lettering shall be one-inch tall, permanent black on a blue background, and shall read "WATER LINE BURIED BELOW" Tape shall be manufactured by Reef Industries (Terra Tape), or Allen (Markline).

2.11 CATHODIC PROTECTION

- A. Provide as shown and as specified in Section 13990, Cathodic Protection.

2.12 JOINT BONDING

- A. Provide joint bonding for non-welded steel pipe joints as specified in Section 13990, Cathodic Protection.

2.13 FACTORY TESTS

- A. The MANUFACTURER shall perform all tests as required by the applicable AWWA standards and as listed herein.
- B. Polyurethane Coating: The Polyurethane coating shall be tested in accordance with AWWA C222.
 1. Thickness: Test thickness of coating in accordance with SSPC PA 2.
 2. Test coating system applied to the pipe for holidays according to the procedures outlined in NACE SP 0188 using a high voltage spark tester (operating at 100 volts per mil), for the dry film thickness (DFT) specified of 30 mil.
 3. Adhesion Testing:
 - a. Polyurethane coatings

- b. Adhesion Testing:
 - (i) Polyurethane coatings shall have an adhesion to steel of 1,500 pounds per square inch, minimum.
 - (ii) Test polyurethane coating adhesion to steel substrates using pneumatic pull off equipment, such as HATE Model 108 or Delfesko Positest, in accordance with ASTM D4541 and AWWA C222.

C. Fusion Bonded Epoxy Lining: The fusion bonded epoxy lining shall be tested in accordance with AWWA C213.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Install steel pipe, fittings, specials and appurtenances as specified herein, as specified in AWWA M11, in accordance with the pipe MANUFACTURER's recommendations and as required for the proper functioning of the completed pipeline.
2. Lay pipe to the lines and grades as indicated in the Drawings.
3. Excavate, embed and backfill trenches in accordance with Section 02220-Excavating, Backfilling and Compaction for Utilities.
4. Joints and related work for field assembly of fittings and specials shall conform to requirements for straight pipe, unless otherwise shown.
5. Make minor field adjustments by pulling standard joints.
 - a. Maximum Allowable Angle: 75 percent of MANUFACTURER's recommended, or angle that results from 3/4-inch pull out from normal joint closure, whichever is less.
 - b. Maximum Allowable Gap: 1/8 inch between bell and spigot at weld location.
6. Horizontal deflections or fabricated angles shall fall on alignment, as shown.
7. Vertical deflections shall fall on alignment, and pipe angle point locations shall match those indicated on Drawings.
8. Pipe 30 Inches in Diameter and Larger:
 - a. Assure that maximum penetration of spigot end into bell end is achieved through use of shop-welded tabs on inside circumference of bell end.
 - b. Remove welded metal tabs prior to welding inside of joint.
9. Maintain stulling in place until pipe trench is backfilled to the surface.
 - a. Out-of-Round Pipe: Pipe which deviates from a true circle by more than 1 percent shall be laid with its larger diameter vertical, or by using struts on continuous head and sill timbers to correct the vertical diameter where acceptable to the ENGINEER. Struts shall be left in place until the joints at each end have been completed and embedment and backfill for the section have been placed to the top of the trench. Final inspection, repair, and checking of interior lining shall be performed after the struts have been removed.
 - b. Pipe Deflection: After completion of backfilling and before acceptance of the Work, all pipes 30 inches and larger in diameter shall be tested for excessive deflection by measuring the actual inside vertical diameter. Deflection measurements will be made by the CONTRACTOR and verified by the OWNER. Pipe diametric deflection shall not exceed 2.25 percent of the

nominal inside diameter measured in the vertical direction at any point in the pipe. Diametric deflection greater than 2.25 percent shall be corrected by the CONTRACTOR at no additional cost to the OWNER.

10. Grade Adaptors: Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the OWNER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adaptors or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75 percent of the maximum deflection recommended by the pipe MANUFACTURER or the amount that results in more than a 1/8-inch gap at the weld location, whichever is less. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint. In all cases the joint opening, before finishing with the protective mortar or fusion bonded epoxy lining inside the pipe, shall be the controlling factor.
11. Marking Tape: Continuously install marking tape along the pipe at a depth two feet above the top of pipe, unless otherwise shown on the drawings, in accordance with the recommendations and instructions of the marking tape MANUFACTURER.

B. Control of Temperature Stresses in Restrained Pipe:

1. Control temperature stresses in accordance with AWWA C206, the reviewed temperature stress control submittal, and these Specifications.
2. To control temperature stresses, the unbackfilled special temperature control joint areas of all pipe shall be shaded from the direct rays of the sun by the use of properly supported awnings, umbrellas, tarpaulins, or other suitable materials until the pipe is backfilled at least 1 foot over the top of the pipe. The Temperature Control Joint Area is defined as the entire length of pipe left exposed near a control joint after placing the pipe backfill between it and the other control joints in each direction. Shading materials at the joint area shall not rest directly on the pipe but shall be supported to allow air circulation around the pipe. Shading of the pipe joints need not be performed when the ambient air temperature is below 45 degrees F.
3. At intervals not exceeding 300 feet along welded reaches of the pipeline, at the first regular lap-welded field joint outside concrete encasements and structures, and where shown, the pipe shall be supplied with a special temperature control lap joint and laid with an initial lap in accordance with the Drawings. Where temperature control lap joints occur in a traveled roadway or other inconvenient location, the location of the joint may be adjusted, as acceptable to the ENGINEER.
4. Provide and install thermocouple temperature gauges to monitor the temperature of the steel pipe wall as it lies in the trench. All pipe temperature requirements specified herein shall be measured at the top inside of the steel cylinder using the thermocouple gauges specified herein. Specific temperature requirements for the pipeline steel cylinder shall be met prior to installation of the trench backfill, during and after placement of trench backfill, and during welding of the special temperature control joints. If atmospheric conditions do not allow the conditions to be met, supplemental cooling shall be provided by the CONTRACTOR. The following outlines the specific temperature control requirements.
 - a. Prior to and during placement of the trench backfill, the pipeline steel temperature shall be at or below 75⁰ F. The specific temperature shall be maintained for at least three hours after the placement of backfill. Provide supplemental cooling as required.

- b. Placement of backfill shall proceed in the direction of pipe laying from one special temperature control joint to the next. During placement of backfill, the lead end of the pipe section (toward the next special temperature control joint) shall be left unbackfilled or otherwise unrestrained such that the end of the pipe is free to move in response to expansion or contraction due to temperature changes. Backfill shall not be placed in a direction which would result in backfill placement proceeding in a direction toward previously or simultaneously placed backfill without the written permission of the ENGINEER. The direction of backfill placement will not be limited for placement at the short unbackfilled section immediately adjacent to the special temperature control joints.
- c. During period between backfill placement operations, any section of pipeline that is partially backfilled with pipe bedding zone material (less than one foot over the top of pipe) shall be shaded from the direct rays of the sun by the use of properly supported awning, umbrellas, tarpaulins, or other suitable materials until the pipe is backfilled at least 1 foot over the top of the pipe. Shading materials shall not rest directly on the pipe but shall be supported to allow air circulation around the pipe. Shading of the partially backfilled pipe need not be performed when the CONTRACTOR can demonstrate to the satisfaction of the OWNER's Field Representative, using thermocouple data, that shading is not necessary to meet the specified temperature requirements. The temperature of the partially backfilled pipe shall not be allowed to exceed 110⁰ F at any time. Provide supplemental cooling as required.
- d. Prior to welding the special temperature control joints, the pipeline extending 300 feet each direction from the joint shall be maintained at or below 75⁰ F. Additionally, the pipeline extending 300 feet each direction from the joint shall be backfilled with pipe zone material to at least one foot over the top of the pipe. At or below the specified temperature, the special temperature control joints can be welded. Begin and complete the weld during the coolest interval within a 24-hour day. Use the thermocouple data to demonstrate to the ENGINEER the coolest interval of the day.
- e. After welding any temperature control joint, the pipe temperature for 150 feet in each direction from the control joint shall be maintained below 110⁰ F for a minimum of 24 hours after the temperature control joint area has been backfilled to at least 1 foot over the top of the pipe. This requirement is in addition to the shading and backfill placement temperature requirements specified herein.

3.02 WELDING

- A. Conform to AWS D1.1, AWWA C206, approved welding procedures, and referenced welding codes. In case of conflict AWS D1.1 shall govern.
- B. Preheat and Interpass temperature requirements for unlisted base metals shall be determined according to AWS D1.1, Annex XI Guideline on Alternative Methods for Determining Preheat.
- C. Rejected weld defects shall be repaired or redone, and retested until sound weld metal has been deposited in accordance with appropriate welding codes.
- D. CONTRACTOR shall field weld joints for joint restraint for connecting existing pipe as shown on the restrained length submittal.

- E. Any changes in vertical or horizontal alignment from that provided in the drawings may necessitate a change in restrained joint lengths. CONTRACTOR shall contact ENGINEER any time a change in alignment is necessary.

3.03 RUBBER GASKET JOINT PIPE

- A. Each joint shall be checked by the CONTRACTOR, as recommended by the pipe MANUFACTURER, to determine that the pipe joint and the rubber gasket are installed properly.

3.04 EXTERIOR JOINT PROTECTION FOR POLYURETHANE COATED STEEL PIPE

- A. General: Buried pipe joints shall be field coated after pipe assembly in accordance with AWWA C216, using Heat Shrink Sleeves. Width of heat shrink sleeve shall be sufficient to overlay the polyurethane coating by a minimum of 3-inches. Overlapping of two or more heat shrink sleeves to achieve the necessary width will not be permitted.

B. Installation

1. Clean pipe surface and adjacent coating of all mud, oil, grease, rust, and other foreign contaminants with a wire brush in accordance with SSPC-SP2, Hand Tool Cleaning, or SSPC-SP3, Power Tool Cleaning. Remove oil or grease contamination by solvent wiping the pipe and adjacent coating in accordance with SSPC-SP1, Solvent cleaning. Clean the full circumference of the pipe and a minimum of 6 inches onto the existing coating.
2. Remove all loose or damaged pipe coating at joint and either repair the coating as specified herein or increase the length of the joint coating, where reasonable and practical.
3. Complete joint bonding of pipe joints before application of joint coating.
4. Joint bonds shall be low profile bonds and all gaps and crevices around the Joint bonds shall be filled with mastic sealant.
5. Store sleeves in shipping box until use is required. Keep dry and sheltered from exposure to direct sunlight. Store off the ground or concrete floors and maintain at temperature between 60° F and 100° F as recommended by the sleeve MANUFACTURER.
6. Metal surface shall be free of all dirt, dust, and flash rusting prior to sleeve application.
7. Preheat pipe uniformly to 140° F to 160° F or as recommended by the sleeve MANUFACTURER. Monitor pipe temperature using a surface temperature gauge, infrared thermometer, or color changing crayons. Protect preheated pipe from rain, snow, frost, or moisture with tenting or shields and do not permit the joint to cool.
8. Prime joint with specified primer and fill all cracks, crevices, and gaps with mastic filler in accordance with the MANUFACTURER's recommendations for the full circumference of the pipe.
9. Apply heat shrink sleeve when it is at a minimum temperature of 60°F and while maintaining the pipe temperature above the preheat temperature specified. Apply sleeve in accordance with the MANUFACTURER's instructions and center the sleeve over the joint to provide a minimum of 3-inches overlay onto the existing pipe coating.

10. Apply heat to the sleeve using either propane fire infrared heaters or wrap around heaters. Hold flame a minimum of 6-inches from the sleeve surface. Periodically roll the coating on the pipe surface. Heat from the center of the sleeve to the outer edge until properly seated, then- begin in the opposite direction. Monitor sleeve for color change, where appropriate, or with appropriate temperature gauges.
11. Completed joint sleeve shall be fully bonded to the pipe and existing coating surface, without voids, mastic beading shall be visible along the full circumference of the sleeve, and there shall be no wrinkling or excessive burns on the sleeves. Sleeves which do not meet these requirements shall be removed and the joint recoated as directed by the ENGINEER. Minor repairs may be repaired using heat shrink sleeve repair kits.
12. Allow the sleeve to cool before moving, handling, or backfilling. In hot climates, provide shading from direct sunlight. Water quenching will be allowed only when permitted by the sleeve MANUFACTURER.

3.05 REPAIR AND FIELD TOUCHUP OF POLYURETHANE COATING

- A. Apply repair or Touch Up material as recommended by Coating manufacturer for main line coating for repair and field touch-up of polyurethane coating.
- B. Repair Procedure - Holidays:
 1. Remove all traces of oil, grease, dust, dirt, etc.
 2. Roughen area to be patched by sanding with rough grade sandpaper (40 grit).
 3. Apply a 30 mil coat of repair material described above. Work repair material into scratched surface by brushing or rolling in accordance with MANUFACTURER's recommendations and technical data.
 4. Retest for Holiday after appropriate state of cure as directed by technical data.
- C. Repair Procedure - Field Cuts or Large Damage:
 1. Remove burrs from field cut ends or handling damage and smooth out edge of polyurethane coating.
 2. Remove all traces of oil, grease, dust, dirt, etc.
 3. Roughen area to be patched with rough grade sandpaper (40 grit). Feather edges and include overlap of 2 inches of roughened polyurethane in area to be patched.
 4. Apply a 30 mil coat of repair material described above, in accordance with MANUFACTURER's recommendations. Work repair material into scratched surface by, brushing. Feather edges of repair material into prepared surface. Cover at least 1 inch of roughed area surrounding damage, or adjacent to field cut.
 - a. Test repairs for Holidays per Paragraph 3.05.B. of this Section.

3.06 CONNECTIONS WITH EXISTING PIPES

- A. Connections to existing pipes shall be made using suitable joints and fittings for the conditions encountered. Each connection with an existing pipe shall be made at the time and under conditions which will least interfere with normal operation. Connections with buried existing flanges shall require removal of grout from the flanges. Remove concrete thrust block when encountered for connections to the existing pipes.

- B. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatering lines and excavations without damage to adjacent property.
- C. Existing valves will leak when in closed position. CONTRACTOR shall provide whatever means and equipment is necessary to control water during construction.

3.07 CATHODIC PROTECTION

- A. Apply to pipe as shown and as specified in Section 13990, Cathodic Protection.

3.08 FIELD QUALITY CONTROL

A. Field Welding:

1. All welds (100 percent inspection) shall be VT inspected by CONTRACTOR's CWI and marked to indicate acceptance or rejection.
2. The CONTRACTOR will be required to fully uncover a maximum 10 joints, selected at random by the ENGINEER or the OWNER to visually inspect and test the joints after welding.
3. Any damage must be repaired.
4. CONTRACTOR to perform in the presence of OWNER or an independent testing laboratory dye penetrant tests in accordance with ASTM E165, or magnetic particle test in accordance with AWWA C206 and set forth in AWS D1.1.
5. Welds that are defective shall be repaired or replaced whichever is deemed necessary by the ENGINEER, at the CONTRACTOR's expense.
6. If the CONTRACTOR disagrees with the ENGINEER's interpretation of welding test, test sections may be cut from the joint for physical testing.
7. The procedure of repairing the joint shall be acceptable to the ENGINEER before proceeding.
8. Test butt-strap or double-welded lap joint welds by pressurizing connection between the two fillet welds in accordance with AWWA C206.
 - a. Apply air or other ENGINEER-accepted gas into connection between the two fillet welds.
 - b. Paint welds with soap solution.
 - c. Mark leaks indicated by escaping gas bubbles.
 - d. Close threaded openings with flush pipe plugs or by welding them.
9. Submit test results to ENGINEER.

- B. Testing of Polyurethane Coating: The entire surface area of the pipe exterior shall be inspected using a full loop high voltage holiday tester. Perform testing in accordance with National Association of Corrosion Engineering (NACE) Standard RP0274-98-High Voltage Electrical Inspection of Pipeline Coatings.

- C. Field Testing: All piping systems shall be pressure tested as specified in Section 15002-Field Testing of Piping Systems. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum design working pressure. The CONTRACTOR shall furnish all test equipment, labor, materials, and devices at no extra cost to the OWNER.

3.09 DISINFECTION

- A. Disinfection of steel piping shall be in accordance with Section 02675 - Disinfection of Potable Water Facilities.

END OF SECTION



SECTION 15072

STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to install NSF-61 certified fusion bonded epoxy lined steel pipe and fittings for the above grade yard piping/chemical application point in accordance with AWWA C200, C207, C208, C213, and the Contract Documents. Fusion bonded epoxy shall be compatible for fluoride and chlorine chemical application for potable water pipe. Steel pipe shall have flanged or welded joints complete in place in accordance with AWWA standards. The work also includes supervision necessary to make the installation complete.
- B. This section also includes the furnishing, installation, and testing of pipe, fittings, couplings, specials, pipe supports, closure pieces, test plugs, night caps, bulkheads, restrained joints, and all required appurtenances as shown on the drawings as required to make the entire piping system operable and as required for proper connection to existing piping. The steel pipe for this project shall be fabricated by a single fabricator. Fittings and specials shall be fabricated by a single Fabricator. The exterior pipe coating shall be a UV resistant fluoropolymer. Refer to Section 09900 – Painting for information on pipe coating.

1.02 RELATED WORK

- A. Section 01300 – Submittals
- B. Section 01400 – Quality Control
- C. Section 02675 – Disinfection of Potable Water Facilities
- D. Section 09900 – Painting
- E. Section 15001 – Plant Piping - General
- F. Section 15002 – Field Testing of Piping Systems
- G. Section 15140 – Supports and Hangers

1.03 REFERENCE STANDARDS

- A. American Water Works Association (AWWA)
 - 1. C200- Steel Water Pipe – 6 Inches and Larger
 - 2. C206- Field Welding of Steel Water Pipe Joints
 - 3. C207- Steel Pipe Flanges for Waterworks Service- Sizes 4 In. thru 144 In.
 - 4. C208- Dimensions for Fabricated Steel Water Pipe Fittings
 - 5. C213- Fusion-Bonded Coating Systems for the Interior and Exterior of Steel Water Pipelines
 - 6. C222- Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings
 - 7. C604- Installation of Steel Water Pipe – 4 in. and Larger

8. M11 (Manual)- Steel Pipe - A Guide for Design and Installation

B. American Welding Society (AWS)

1. A2.4- Standard Symbols for Welding, Brazing, and Nondestructive Examination
2. A3.0- Standard Welding Terms and Definitions
3. B2.1- Specification for Welding Procedure and Performance Qualification
4. D1.1- Structural Welding Code – Steel
5. QC 1- Standard for AWS Certification of Welding Inspectors

C. American Society for Testing and Materials (ASTM)

1. A20- Specification for General Requirements for Steel Plates for Pressure Vessels
2. A53- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. A370- Test Methods and Definitions for Mechanical Testing of Steel Products
4. A435- Specification for Straight-Beam Ultrasonic Examination of Steel Plates
5. A516- Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
6. A1018- Specification for Steel, Sheet and Strip, Heavy Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
7. D16- Terminology for Paint, Related Coatings, Materials and Applications
8. D522- Test Methods for Mandrel Bend Test of Attached Organic Coatings
9. D2240- Test Method for Rubber Property 8212; Durometer Hardness
10. D4541- Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
11. E165- Standard Practice for Liquid Penetrant Inspection Method
12. E329- Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection
13. E709- Standard Guide for Magnetic Particle Testing
14. E1255- Standard Practice for Radioscopy
15. E1444- Standard Practice for Magnetic Particle Testing

D. Steel Structures Painting Council (SSPC)

1. SP-1- Solvent Cleaning
2. SP-10- Near-White Blast Cleaning
3. PA/Guide 3- A Guide to Safety in Paint Application
4. PA/Guide 17- A Guide for Selecting Urethane Painting Systems

E. International Institute of Welding (IIW)

F. International Organization for Standardization (ISO)

G. NSF 61- Drinking Water System Components - Health Effects.

1.04 SUBMITTALS

A. Shop Drawings

1. Prior to the fabrication of the pipe, submit the following in accordance with AWWA manual M-11 to the ENGINEER for review.
 - a. The pipe layout drawing shall include as a minimum (see Specification 02510-3) the following:
 - (i) Locations and type of all fittings, joints, valves, supports, anchorage, restraints, and couplings.

- (ii) Location of bulkheads, both those shown and/or required for hydrostatic testing of pipeline.
 - (iii) Pipe outside diameter, wall thickness, location of welded seams, and working pressure rating.
 - b. Fabrication Information shall include:
 - (i) Design calculations for pipe, fittings and specials including opening reinforcement details of collars, wrappers, and crotch plates. The calculations shall show maximum design pressure, surge pressure, deflection, buckling, extreme loading condition; special physical loading such as supports or joint design and thermal expansion and/or contraction. Minimum wall thickness for all steel pipe shall be 0.25-inches; Refer to Paragraph 2.01 below.
 - (ii) Manufacturing tolerances.
 - (iii) Details of bulkheads, including method of attachment to the pipe and details for removal of test bulkheads and repair of lining.
 - (iv) Stulling size, spacing, and layout.
 - c. MANUFACTURER's product data for:
 - (i) Pipe,
 - (ii) Fittings,
 - (iii) Rubber gasket,
 - (iv) And fusion bonded epoxy.
 - d. Call out of weld sizes and dimensions of thrust ring collars, flanges, reinforcing collars, wrapper plates and crotch plates.
 - e. Submit details of lining and coating to include:
 - (i) MANUFACTURER's coating product information.
 - (ii) Application recommendations.
 - (iii) Field touch-up procedure.
 - (iv) Thickness of coatings.
 - f. Submit drawings of couplings, and flanges.
- 2. The CONTRACTOR's Proposed Field Welding Procedure in accordance with AWWA C206 and AWS D1.1.
 - 3. Pipe MANUFACTURER's written Quality Assurance/Control Plan.

B. Certifications

- 1. Mill test certificates for steel plate and steel coil.
- 2. The MANUFACTURER shall perform the tests described in AWWA C200, for all pipe, fittings, and specials. The certificates shall include chemical and physical test results for each heat of steel.
- 3. Lining Materials: Submit documentation that lining system used for all pipes and fittings is currently approved for potable water contact in accordance with NSF 61 and satisfies current applicable governmental health and safety requirements for use in potable water.

C. Statements of Qualification

- 1. Welders or Welding Operators:
 - a. Name of welder.
 - b. Welding procedures/positions for which welder is qualified to weld.
 - c. Assigned certification stamp number.
 - d. Certification date.
 - e. Current certification status.

- D. Submit Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR) for each welding process.
- E. Field Hydrostatic Testing Plan: Submit at least 15 days prior to testing and include at least the following information:
 - 1. Testing dates.
 - 2. Piping system and sections to be tested.
 - 3. Method of isolation.
 - 4. Method of conveying water from source to system being tested.
 - 5. Calculation of maximum allowable leakage for piping sections to be tested.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Pipe MANUFACTURER

- a. All welded steel pipe, fittings and specials shall be the product of a MANUFACTURER(S) who has no less than five years of successful experience in manufacturing pipe of the particular type and size indicated. All pipes shall be new and not supplied from inventory.

2. Fusion Bonded Epoxy Lining

- a. The lining MANUFACTURER shall have a minimum of five years of experience in the production of lining specified herein. The acceptable MANUFACTURERS for fusion bonded epoxy lining are:

(i) 3M

3. Welders and Welding Operators

- a. Shop Welders: In accordance with ASME BPVC SEC IX and certified with 4F and 5G certification.
- b. Field Welders: In accordance with AWS D1.1.

B. OWNER Testing and Inspection

- 1. Pipe will be subject to inspection by an independent testing laboratory, selected and retained by the OWNER. Representatives of the laboratory or the ENGINEER shall have access to the work whenever it is in preparation or progress, and the Pipe MANUFACTURER shall provide proper facilities for access and for inspection. Material, fabricated parts, and pipe, which are discovered to be defective, or which do not conform to the requirements of this specification shall be subject to rejection at any time prior to OWNER's final acceptance of the product.

C. Factory Testing

- 1. Fusion Bonded Epoxy Lining: The fusion bonded epoxy lining shall be tested in accordance with AWWA C213.
- 2. Hydrostatic Pressure Testing
 - a. Each joint of pipe shall be hydrostatically tested prior to application of lining or coating. The internal test pressure shall be that which results in a fiber stress equal to 75% of the minimum yield strength of the steel used. Each joint of pipe tested shall be completely watertight under maximum test pressure. As a part of testing equipment, the Pipe MANUFACTURER shall maintain a record of test data including reference number of pipe tested. The pipe shall be numbered in order that this information can be recorded.

- b. Air test shall be made by applying air to the welds at 10 pounds per square inch pressure and checking for leaks around and through welds with a soap solution.
3. Elongation: For the tensile test specified in ASTM A370, 2-inch test specimens shall show elongations not less than 22 percent for each heat of steel.

1.06 DESIGN REQUIREMENTS

- A. Design Criteria: All pipe, fittings and specials shall be designed for a combination of the following internal, external and surge pressures:
 1. Internal Design Pressure:
 - a. Design pressure shall be 150 psi.
 2. Surge Pressure: Unless otherwise indicated, provide for 50% of design pressure for surge in addition to design pressure.
 3. Restrained pipe shall be designed to withstand the thrust forces on the pipe. Thrust forces shall be calculated based on design pressure plus surge pressure.
 4. Test Pressure: 1.5 times the design pressure or design plus maximum surge pressure whichever is greater.
 5. Thermal change: 60 degrees F.
 6. Steel shall meet the requirements of AWWA C200 and shall be of continuous casting. Steel shall be homogeneous and shall be suitable for field welding, and fully kilned. Steel shall have minimum yield strength of 42,000 psi.
 7. The Stress due to design pressure shall be no greater than 50% of the minimum yield strength of the steel. The stress due to design plus surge pressure shall not exceed 75 percent of the yield strength. In no case the design stress shall be greater than 21,000 psi, at design pressure.
- B. Fittings and Specials
 1. The specials shall be of the diameter and wall thickness shown on the Drawings, and in accordance with these Contract Documents. Where not shown, design reinforcement in accordance with AWWA Manual M11, AWWA C200, and AWWA C208.
 2. Design fittings, specials, associated joints and all field and shop welds with load capacities equal to or greater than those of connecting pipe segments.
- C. Stulling (Strutting): Design stulling for pipe, specials, and fittings such that damage is avoided during handling, storage, and installation.

1.07 MARKING, DELIVERY, HANDLING, AND STORAGE

- A. Pipe Marking
 1. Legibly mark installation sequence number on pipe, fittings, and specials in accordance with piping layout.
 2. Special pipe sections and fittings shall be marked at each end with notation "TOP FIELD CENTERLINE".
- B. Delivery
 1. Pipe, fittings and specials shall be carefully supported during shipment and storage.
 2. Securely bulkhead or otherwise seal ends of pipe, specials, and fittings prior to loading at manufacturing Site.
 3. Ship pipe on padded bunks with tie-down straps approximately over stulling.

4. Internally support with stulls each pipe length and fittings to maintain a true circular shape.
5. Pipe ends shall remain sealed until installation.
6. Damage to pipe, fittings, or specials, in shipment shall not be delivered to the project site unless such damaged pipe, fittings or specials is properly repaired.
7. Coordinate delivery of the pipe with the CONTRACTOR.

C. Handling

1. Handle as a minimum at the 1/3 points by use of wide slings padded cradles, or other devices designed and constructed to prevent damage to the pipe coating. The use of chains, hooks or other equipment which might injure the pipe coating will not be permitted.

D. Storage

1. Support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.
2. Support on sand or earth berms free of rock exceeding 3 inches in diameter.
3. Store pipe at the MANUFACTURER's yard until CONTRACTOR is ready to accept the delivery at the site.
4. Deliver, handle, and store pipe, fittings and specials in accordance with the MANUFACTURER's recommendations to protect the coating system.
5. Protect pipe lining from drying by means of plastic and covers banded to the pipe ends.
6. Maintain covers over the pipe ends at all times until ready to be installed.

1.08 SEQUENCING AND SCHEDULING

A. Notify ENGINEER In Writing Of The Following

1. Not less than 5 days prior to start of each of the following:
 - a. Welding.

PART 2 PRODUCTS

2.01 WELDED STEEL PIPE 6" AND LARGER

A. Steel pipe greater than 6-inches shall conform to AWWA C200. Steel plate used in the manufacture and fabrication of steel pipe shall meet the requirements of AWWA C200 and AWWA M-11 except as modified herein or as required by the engineer for special circumstances.

1. Pipe shall be bedded and backfilled per the Plan details. Design calculations which require a modulus of soil reaction (E') shall assume an E' of 1500 psi for embedment shown on the drawings.
2. Pipe is to be furnished principally in 50-foot net laying lengths with shorter lengths, field trim pieces and closure pieces as required by Plan and profile for location of elbows, tees, reducers and other in-line fittings or as required for construction. The pipe fabricator shall prepare a pipe laying schedule showing the location of each piece by mark number with station and invert elevation at each bell end.
3. The inside diameter of the pipe shall be as shown on the plans or as specified in the contract documents.

B. Fittings and Specials

1. Fabrications
 - a. Shop fabricate fittings and specials. No field fabrication will be allowed.

- b. Fabricate from materials or straight pipe in full conformance with requirements of these Contract Documents and dimensions of AWWA C208, unless otherwise indicated.
 - c. Design Pressure: All fittings and specials shall be designed to withstand internal pressure, both circumferential and longitudinal, and external loading conditions.
 - d. Elbows, Bends, and Reducers
 - (i) Minimum Radius: Unless otherwise shown on Drawings minimum radius shall be as per AWWA C208.
 - (ii) The minimum thickness of plate for pipe from which specials are to be fabricated shall be the thickness of adjacent mainline pipe, the thickness shown on the Drawings, or the following, or ¼ inch whichever is thicker.
 - (iii) Maximum Miter Angle: 11-1/4 degrees on each section resulting in a maximum deflection angle of 22.5 degrees per miter weld as recommended in AWWA C208.
 - (iv) Maximum total allowable angle for beveled joints shall be 3 degrees per pipe joint. Bevel shall be provided on the bell ends. Mitering of the spigot ends will not be permitted.
 - (v) Complete joint penetration (CJP) welds on miter welds.
 - e. Outlets
 - (i) Outlets 12-inch and smaller shall be fabricated from ASTM A53, Type E or S, Grade B, standard weight steel pipe in the standard outside diameters. Unless otherwise shown, wall thickness and collar reinforcing shall be designed by the pipe MANUFACTURER as specified. Collars shall be manufactured with the same steel as specified for the mainline piping.
 - (ii) Fabricate collar or wrapper reinforcement using same steel as specified for main pipe barrel.
 - (iii) Where outlets for taps are threaded, furnish and install Type 304 stainless steel bushings for the outlet size indicated on the drawings.
 - (iv) The CONTRACTOR may use outlets for access for weld leads.
2. Flanged Joints
- a. Flanged joints shall be used on all pipes, fittings and specials on welded steel piping exposed, in vaults, in plants and on buried pipe systems to connect valves and appurtenances.
 - b. Use slip-on or ring type flanges. Pipe flanges and welding of flanges to steel pipe shall conform to the requirements of AWWA C206 and AWWA C207.
 - c. Pressure rating of flanges shall be equal or greater than the adjacent pipe class.
 - d. Flange bolt circle shall match the bolt circle of the fittings or appurtenances which are to be connected.
 - e. Flange bolts and nuts shall be carbon steel and are specified in Section 15120- Piping Specialties. Unless otherwise noted, color and coating type of nuts and bolts for flanges shall match the flange to which it is connected in accordance with Section 09900 - Painting.
 - f. Gaskets: Full face for use with flat face flanges and ring type for use with raised face flanges. Gaskets shall be 1/8-inch thick, cloth-inserted rubber, Garlok 3000 or equal in accordance with SAWS Material Standard Specification for steel water pipe. Blind flange gasket shall cover entire inside surface of blind flange.
 - g. Additional flanges may be added by the CONTRACTOR to facilitate fabrication, handling, transportation and field assembly at no additional cost.

- h. Coordinate the dimensions, hole drillings and type of flange face (flat or raised) of the flanges furnished with the companion flanges of valves, pumps and equipment to be connected to or installed in the piping.
 - i. Field Welded Joints
 - (i) Field welded joints shall be in accordance with AWWA C206.
 - (ii) Typical field welded joint in restrained sections shall be double fillet lap joint for pipe sizes 24-inch or larger. For pipe sizes smaller than 24-inch use single fillet lap joint. Lap welded joints shall be in accordance with AWWA C200.
 - (iii) Butt Joint Welded: As needed for closures or other locations required for construction. Plain ends beveled as required by AWWA C200 and CONTRACTOR's field WPS.
 - (iv) Double welded lap joints and butt-strap joints shall be tapped and drilled for testing in accordance with AWWA C206.
 - (v) After welding, the joints shall be prepared, primed, and coated/lined in accordance with M and N. 4. that follow.
- C. Mechanical Couplings: Sleeve type mechanical couplings are specified in Section 15120 – Piping Specialties.
- D. Coatings
 - 1. Exterior surface of pipe and fittings in exposed locations shall be cleaned by abrasive grit blasting, and applying prime coat in the shop. Apply finish coat in the field. Prior to adding the prime coating, the exterior surface of pipe shall be prepared per MANUFACTURER's recommendation. Prime coat and finished painting shall be as specified in Section 09900-Painting for service conditions specified. Color for water pipe shall be Pantone #284C or as directed by OWNER. CONTRACTOR shall coordinate with OWNER prior to selecting color.
 - 2. Shop coat machined surfaces with a rust preventive compound.
- E. Linings
 - 1. Notify ENGINEER at least 5 days prior to application of lining products.
 - 2. Shop-Applied Fusion bonded epoxy Lining (Above Grade Yard Piping)
 - a. Manually spray, automatically spray or apply centrifugally in conformance with AWWA C213. Minimum thickness shall be in accordance with AWWA C213.
 - b. Prepare surface as recommended by MANUFACTURER.
 - (i) Pipe surfaces shall be abrasive blast cleaned in accordance with AWWA C222 and SSPC0SP 10/NACE No.2.
 - (ii) Surface Preparation for steel shall be blast cleaned with materials having an angular profile such as mineral abrasives, slag abrasives or steel grit in accordance with AWWA C222. For requirements of selecting and evaluating mineral and slag abrasives see SSPC-AB 1 and SSPC-AB 3.
 - c. Interior lining for buried potable water piping must be NSF 61 certified.
 - d. Interior lining for buried potable water piping must be compatible for water service with the chemical application of fluoride and chlorine.
 - e. Provide polyethylene or other suitable bulkhead on ends of pipe and on special openings to prevent damage to the lining. Bulkheads shall be substantial enough to remain intact during shipping and storage until pipe is installed.
 - f. Pipe shall be left bare where field joints occur.
 - g. Ends of lining shall be left square and uniform. Feathered or uneven edges will not be permitted.

3. Field-Applied Fusion bonded epoxy Lining
 - a. Prepare surface as recommended by MANUFACTURER.
 - (i) Pipe surfaces shall be abrasive blast cleaned in accordance with AWWA C213 and SSPC0SP 10/NACE No.2.
 - (ii) Surface Preparation for steel shall be blast cleaned with materials having an angular profile such as mineral abrasives, slag abrasives or steel grit in accordance with AWWA C213. For requirements of selecting and evaluating mineral and slag abrasives see SSPC-AB 1 and SSPC-AB 3.
 - b. Shall be applied to welded pipe joints in accordance with AWWA C213, unless stated otherwise.
 - c. Field applied linings shall be applied by qualified coating MANUFACTURER.
 - d. Materials shall conform to AWWA C213.
 - e. Minimum thickness shall be in accordance with AWWA C213.

2.02 STEEL PIPE (GALVANIZED OR STEEL) SMALLER THAN 6"

- A. Pipe shall be seamless steel pipe, Grade A, Type S, Schedule 40 and shall conform to ASTM Designation A53. Galvanized pipe shall be hot-dipped galvanized after fabrication.
- B. Joints for pipe 2-inch or less shall be threaded joints. Threaded joints shall be made up with good quality thread compound and applied to the male thread only. After having been set up, a joint shall not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be air tight. A sufficient number of unions shall be provided to allow for convenient removal of piping.
- C. Fittings for steel pipe 2-inch or less shall be malleable iron, 150 lb. service rating, and shall be hot-dipped galvanized.
- D. Where flanged connections are indicated or otherwise required on pipe 2-inch or less for connection to flanged valves, fittings, and appurtenances, they shall be made up using companion type flanges. Where flanged fittings are indicated or otherwise required, they shall be made up using threaded steel nipples and steel companion type flanges. Companion flanges shall be steel, 150 lb. ANSI Standard flat face flanges of the threaded type. Flanges shall be spot faced on the back around each bolt hole. Flanges shall also be hot- dipped galvanized.
- E. Steel pipe greater than 2-inch size for water or wastewater service shall have threaded, flanged or welded joints. Air piping greater than 2-inch size shall have welded joints, except where flanges are required for valves or other appurtenances. Threaded joints, fittings, and flanges shall be as specified in this section. Welded pipe joints shall have beveled ends for welding. Fittings shall be steel, butt weld type, standard wall, conforming to ANSI B16. 9 and ASTM A234, Grade WPB.

2.03 BLACK STEEL PIPE

- A. Pipe shall be black steel, designated BS on the drawings, seamless, Type S, Grade B, Schedule 80, pipe in conformance with ASTM Designation A53 and ANSI B36.10.
- B. Fittings shall be seamless, Grade B, welding type in conformance with ANSI B16.9 and ANSI B36.10 and ASTM A234.

2.04 FITTINGS

A. Threaded:

1. Malleable iron per FS WW-P-521, Type 1, for use with black steel pipe or Type 2 for use with galvanized steel pipe.
2. Forged Steel for use with extra heavy weight pipe per ANSI B16. 11.

B. Welded:

1. Socket shall be welded, forged steel per ANSI B16.11.
2. Butt weld shall be welded, steel per ANSI B16.9.
3. Wrought carbon steel fittings of seamless or welded construction shall conform to requirements of ASTM A234.
4. Fabricated steel fittings shall be of same material as pipe and shall comply with the requirements of AWWA C208 and AWWA M-11.

- C. All pipe and pipe fittings located at or near the proposed 3.5 MG GST shall be designed to account for tank settlement. Prior to fabrication, Contractor shall submit shop drawings showing the location and type of fittings near proximity of the 3.5 GST to Engineer for review.

2.05 UNIONS

- A. Threaded: Malleable iron per FS WW-U-531, Class 1, Type A, for use with black steel pipe and Type B for use with galvanized pipe.

- B. Flanged: Use flanges as specified in Paragraph 2.01.I.

2.06 STULLING (STRUTTING)

A. Materials:

1. Shop-Lined Pipe: Wood stulls and wedges.
2. Unlined Pipe: Steel or wood.

- B. Install stulling for pipe, specials, and fittings in accordance with reviewed submittal and as soon as practical after pipe is fabricated or, for shop-lined pipe, after lining has been applied.

- C. Install stulling in manner that will not harm lining.

- D. Remove stulling after pipe is installed and supported with pipe supports.

2.07 FACTORY TESTS

- A. The MANUFACTURER shall perform all tests as required by the applicable AWWA standards and as listed herein.

- B. Fluoropolymer Coating: The Fluoropolymer coating shall be tested in accordance with Table 1 of Section 4 and Table 2 of Section 5 of AWWA C222.

1. Cathodic Disbondment.
2. Flexibility.
3. Impact Resistance.
4. Abrasion Resistance.
5. Chemical Resistance.

6. Dielectric Strength.
 7. Water Absorption.
 8. Hardness.
 9. Cure Test.
 10. Coating Appearance (Visual).
 11. Dry Film Thickness.
 12. Electrical Continuity.
 13. Pull-Off Adhesion:
 - a. Fluoropolymer coatings shall have an adhesion to steel of 1,500 pounds per square inch, minimum.
- C. Fusion bonded epoxy Lining: The fusion bonded epoxy lining shall be tested in accordance with AWWA C213.

PART 3 EXECUTION

3.01 GENERAL

- A. Steel pipe shall be installed as specified in Section 15001-Plant Piping – General, true to alignment, and rigidly supported anchors shall be provided where indicated. After installation, the piping shall be tested as specified in Section 15002 – Field Testing of Piping Systems. If any joint or pipe proves to be defective, it shall be repaired to the satisfaction of the ENGINEER.
- B. All threads shall be clean, machine cut, and all pipes shall be reamed before erection. Each length of pipe as erected shall be up-ended and rapped to dislodge dirt and scale.
- C. Screwed joints shall be made up with good quality thread compound and applied to the male thread only. After having been set up, a joint must not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be air tight.
- D. All piping shall have a sufficient number of unions to allow convenient removal of piping. Unions shall be compatible with pipe.
- E. When cutting of pipe is required, the cutting shall be done by machine in a neat workmanlike manner without damage to the pipe. Cut ends shall be smooth and at right angles to the axis of the pipe.
- F. All field welding shall be in accordance with the American Welding Society Standards and shall comply with AWWA C206. The strength of the field weld shall develop the strength of the pipe.

3.02 INSTALLATION

- A. Piping Exposed, 3-inch and Smaller
 1. Piping Layout:
 - a. Use Drawings as guide, field route lines, and give special attention to appearance of completed installation.
 - b. Make provisions for expansion and contraction during normal operations.
 - c. Do not obstruct openings or passage ways.
 - d. Keep free of contact with building construction or installed items.

- e. Provide unions to permit removal of equipment, pumps, and valves.
- f. Provide dielectric unions for connection to copper piping and as specified in Section 15001.
- 2. Cutting. Cut pipe from measurement taken at the site, using drawings as guide.
- 3. Water Piping. Arrange so system can be completely drained.
- 4. Air Piping. Grade to points of drainage collection.

B. Piping, Exposed, Greater than 3-inches

- 1. Piping Layout
 - a. Install as shown on the Drawings and per fabricator's shop drawings.
 - b. In placing the pipe, hold pipe by one or more padded slings. Handle in a manner that will prevent damage to the pipe or the protective coating. Support pipe adequately while being fitted and joined with adjoining pipe section.
 - c. After each section of pipe has been set into position, attach to the adjoining section as specified or shown on the Drawings.
- 2. Provide drains and high point vents to facilitate pressure testing.
- 3. Install valves with operator positioned to permit access for operation.

3.03 PIPE SUPPORTS

- A. Although some supports are indicated on the Drawings no attempt has been made to indicate all required pipe supports. Design, furnish and install pipe supports as defined in Section 15140 - Supports and Hangers.
- B. Provide supports as required to support piping such that its weight is not supported by the pumps or equipment and to limit pipe deflection.

3.04 CLEANING

- A. Keep inside of all pipe, fittings, and valves clean and free from dirt and debris.
- B. Thoroughly clean piping as specified in Section 15001.

3.05 WELDING

- A. Conform to AWS D1.1, AWWA C206, approved welding procedures, and referenced welding codes. In case of conflict AWS D1.1 shall govern.
- B. Preheat and Interpass temperature requirements for unlisted base metals shall be determined according to AWS D1.1, Annex XI Guideline on Alternative Methods for Determining Preheat.
- C. Rejected weld defects shall be repaired or redone, and retested until sound weld metal has been deposited in accordance with appropriate welding codes.
- D. CONTRACTOR shall field weld joints for joint restraint for connecting existing pipe as shown on the Drawings.

3.06 REPAIR AND FIELD TOUCHUP OF FLUORPOLYMER COATING

- A. Apply repair or Touch Up material as recommended by Coating manufacturer for main line coating for repair and field touch-up of fluoropolymer coating.
- B. Repair Procedure – Holidays:

1. Remove all traces of oil, grease, dust, dirt, etc.
2. Roughen area to be patched by sanding with rough grade sandpaper (40 grit).
3. Apply a 30 mil coat of repair material described above. Work repair material into scratched surface by brushing or rolling in accordance with MANUFACTURER's recommendations.
4. Retest for Holiday.

C. Repair Procedure – Field Cuts or Large Damage:

1. Remove burrs from field cut ends or handling damage and smooth out edge of fluoropolymer coating.
2. Remove all traces of oil, grease, dust, dirt, etc.
3. Roughen area to be patched with rough grade sandpaper (40 grit). Feather edges and include overlap of 2 inches of roughened fluoropolymer in area to be patched.
4. Apply a 30 mil coat of repair material described above, in accordance with MANUFACTURER's recommendations. Work repair material into scratched surface by brushing. Feather edges of repair material into prepared surface. Cover at least 1 inch of roughened area surrounding damage, or adjacent to field cut.
5. Test repairs for Holidays per Paragraph 3.06.B. of this Section.

3.07 CONNECTIONS WITH EXISTING PIPES

- A. Connections to existing pipes shall be made using suitable joints and fittings for the conditions encountered. Each connection with an existing pipe shall be made at the time and under conditions which will least interfere with normal operation. Connections with buried existing flanges shall require removal of grout from the flanges. Remove concrete thrust block when encountered for connections to the existing pipes.
- B. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatering lines and excavations without damage to adjacent property.
- C. Existing valves will leak when in closed position. CONTRACTOR shall provide whatever means and equipment is necessary to control water during construction.
- D. CONTRACTOR shall be responsible for coordinating with Pipe and Lining MANUFACTURER to install a pipe lining system that properly transitions from an existing pipe lining to the new epoxy lining. The transition from existing liner to new liner shall be designed/installed such that water flow does not damage the new epoxy lining. CONTRACTOR submit the proposed lining transition/connection to ENGINEER for review prior to fabrication of pipe. Modifications for tying in the existing pipe lining to the proposed lining with transition shall be made at no additional cost to the OWNER.

3.08 FIELD QUALITY CONTROL

A. Field Welding

1. All welds (100 percent inspection) shall be visually inspected by CONTRACTOR's CWI and marked to indicate acceptance or rejection.
2. The CONTRACTOR will be required to visually inspect and test the joints, selected at random by the ENGINEER or the OWNER after welding.
3. Any damage must be repaired.
4. CONTRACTOR to perform in the presence of OWNER or an independent testing laboratory dye penetrant tests in accordance with ASTM E165, or magnetic particle test in accordance with AWWA C206 and set forth in AWS D1.1.

5. Welds that are defective shall be repaired or replaced whichever is deemed necessary by the ENGINEER, at the CONTRACTOR's expense.
 6. If the CONTRACTOR disagrees with the ENGINEER's interpretation of welding test, test sections may be cut from the joint for physical testing.
 7. The procedure of repairing the joint shall be acceptable to the ENGINEER before proceeding.
 8. Test butt-strap or double-welded lap joint welds by pressurizing connection between the two fillet welds in accordance with AWWA C206.
 - a. Apply air or other ENGINEER-accepted gas into connection between the two fillet welds.
 - b. Paint welds with soap solution.
 - c. Mark leaks indicated by escaping gas bubbles.
 - d. Close threaded openings with flush pipe plugs or by welding them.
 9. Submit test results to ENGINEER.
- B. Testing of Fluoropolymer Coating: The entire surface area of the pipe exterior shall be inspected using a full loop high voltage holiday tester. Perform testing in accordance with National Association of Corrosion Engineering (NACE) Standard RP0274-98-High Voltage Electrical Inspection of Pipeline Coatings.
- C. Field Testing: All piping systems shall be pressure tested as specified in Section 15002-Field Testing of Piping Systems. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum design working pressure. The CONTRACTOR shall furnish all test equipment, labor, materials, and devices at no extra cost to the OWNER.
- 3.09 DISINFECTION
- A. Disinfection of steel piping shall be in accordance with Section 02675 - Disinfection of Potable Water Facilities.

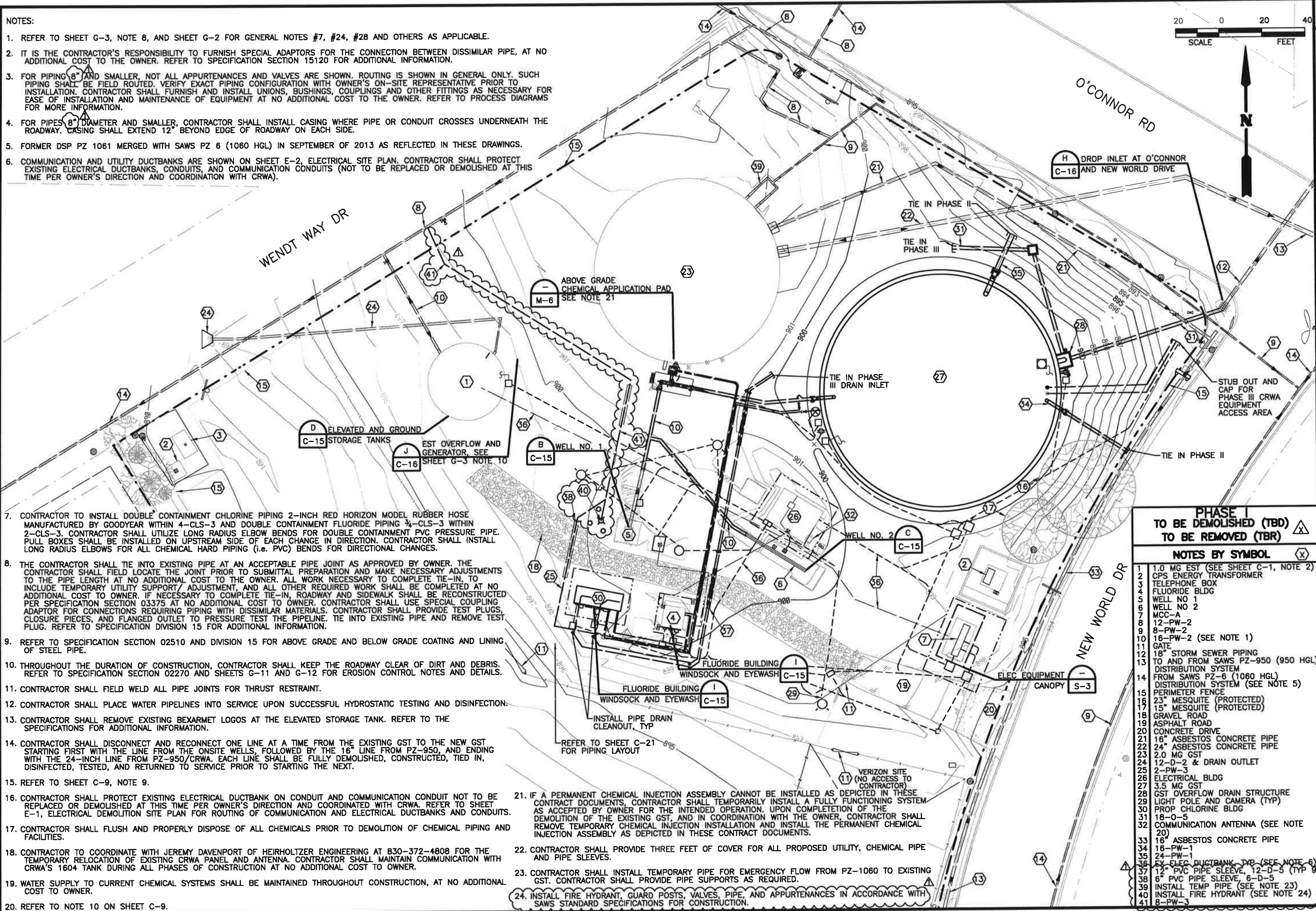
END OF SECTION

NOTES:

- REFER TO SHEET G-3, NOTE 8, AND SHEET G-2 FOR GENERAL NOTES #7, #24, #28 AND OTHERS AS APPLICABLE.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO FURNISH SPECIAL ADAPTORS FOR THE CONNECTION BETWEEN DISSIMILAR PIPE, AT NO ADDITIONAL COST TO THE OWNER. REFER TO SPECIFICATION SECTION 15120 FOR ADDITIONAL INFORMATION.
- FOR PIPING 8" AND SMALLER, NOT ALL APPURTENANCES AND VALVES ARE SHOWN. ROUTING IS SHOWN IN GENERAL ONLY. SUCH PIPING SHALL BE FIELD ROUTED. VERIFY EXACT PIPING CONFIGURATION WITH OWNER'S ON-SITE REPRESENTATIVE PRIOR TO INSTALLATION. CONTRACTOR SHALL FURNISH AND INSTALL UNIONS, BUSHINGS, COUPLINGS AND OTHER FITTINGS AS NECESSARY FOR EASE OF INSTALLATION AND MAINTENANCE OF EQUIPMENT AT NO ADDITIONAL COST TO THE OWNER. REFER TO PROCESS DIAGRAMS FOR MORE INFORMATION.
- FOR PIPES 8" DIAMETER AND SMALLER, CONTRACTOR SHALL INSTALL CASING WHERE PIPE OR CONDUIT CROSSES UNDERNEATH THE ROADWAY. CASING SHALL EXTEND 12' BEYOND EDGE OF ROADWAY ON EACH SIDE.
- FORMER DSP PZ 1061 MERGED WITH SAWS PZ 6 (1060 HGL) IN SEPTEMBER OF 2013 AS REFLECTED IN THESE DRAWINGS.
- COMMUNICATION AND UTILITY DUCTBANKS ARE SHOWN ON SHEET E-2, ELECTRICAL SITE PLAN. CONTRACTOR SHALL PROTECT EXISTING ELECTRICAL DUCTBANKS, CONDUITS, AND COMMUNICATION CONDUITS (NOT TO BE REPLACED OR DEMOLISHED AT THIS TIME PER OWNER'S DIRECTION AND COORDINATION WITH CRWA).

- CONTRACTOR TO INSTALL DOUBLE CONTAINMENT CHLORINE PIPING 2-INCH RED HORIZON MODEL RUBBER HOSE MANUFACTURED BY GOODYEAR WITHIN 4'-CLS-3 AND DOUBLE CONTAINMENT FLUORIDE PIPING 3/4'-CLS-3 WITHIN 2'-CLS-3. CONTRACTOR SHALL UTILIZE LONG RADIUS ELBOW BENDS FOR DOUBLE CONTAINMENT PVC PRESSURE PIPE. PULL BOXES SHALL BE INSTALLED ON UPSTREAM SIDE OF EACH CHANGE IN DIRECTION. CONTRACTOR SHALL INSTALL LONG RADIUS ELBOWS FOR ALL CHEMICAL HARD PIPING (i.e. PVC) BENDS FOR DIRECTIONAL CHANGES.
- THE CONTRACTOR SHALL TIE INTO EXISTING PIPE AT AN ACCEPTABLE PIPE JOINT AS APPROVED BY OWNER. THE CONTRACTOR SHALL FIELD LOCATE THE JOINT PRIOR TO SUBMITTAL PREPARATION AND MAKE NECESSARY ADJUSTMENTS TO THE PIPE LENGTH AT NO ADDITIONAL COST TO THE OWNER. ALL WORK NECESSARY TO COMPLETE TIE-IN, TO INCLUDE TEMPORARY UTILITY SUPPORT/ ADJUSTMENT, AND ALL OTHER REQUIRED WORK SHALL BE COMPLETED AT NO ADDITIONAL COST TO OWNER. IF NECESSARY TO COMPLETE TIE-IN, ROADWAY AND SIDEWALK SHALL BE RECONSTRUCTED PER SPECIFICATION SECTION 03375 AT NO ADDITIONAL COST TO OWNER. CONTRACTOR SHALL USE SPECIAL COUPLING ADAPTOR FOR CONNECTIONS REQUIRING PIPING WITH DISSIMILAR MATERIALS. CONTRACTOR SHALL PROVIDE TEST PLUGS, CLOSURE PIECES, AND FLANGED OUTLET TO PRESSURE TEST THE PIPELINE. TIE INTO EXISTING PIPE AND REMOVE TEST PLUG. REFER TO SPECIFICATION DIVISION 15 FOR ADDITIONAL INFORMATION.
- REFER TO SPECIFICATION SECTION 02510 AND DIVISION 15 FOR ABOVE GRADE AND BELOW GRADE COATING AND LINING OF STEEL PIPE.
- THROUGHOUT THE DURATION OF CONSTRUCTION, CONTRACTOR SHALL KEEP THE ROADWAY CLEAR OF DIRT AND DEBRIS. REFER TO SPECIFICATION SECTION 02270 AND SHEETS G-11 AND G-12 FOR EROSION CONTROL NOTES AND DETAILS.
- CONTRACTOR SHALL FIELD WELD ALL PIPE JOINTS FOR THRUST RESTRAINT.
- CONTRACTOR SHALL PLACE WATER PIPELINES INTO SERVICE UPON SUCCESSFUL HYDROSTATIC TESTING AND DISINFECTION.
- CONTRACTOR SHALL REMOVE EXISTING BEXAMET LOGOS AT THE ELEVATED STORAGE TANK. REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- CONTRACTOR SHALL DISCONNECT AND RECONNECT ONE LINE AT A TIME FROM THE EXISTING GST TO THE NEW GST STARTING FIRST WITH THE LINE FROM THE ONSITE WELLS, FOLLOWED BY THE 16" LINE FROM PZ-950, AND ENDING WITH THE 24-INCH LINE FROM PZ-950/CRWA. EACH LINE SHALL BE FULLY DEMOLISHED, CONSTRUCTED, TIED IN, DISINFECTED, TESTED, AND RETURNED TO SERVICE PRIOR TO STARTING THE NEXT.
- REFER TO SHEET C-9, NOTE 9.
- CONTRACTOR SHALL PROTECT EXISTING ELECTRICAL DUCTBANK ON CONDUIT AND COMMUNICATION CONDUIT NOT TO BE REPLACED OR DEMOLISHED AT THIS TIME PER OWNER'S DIRECTION AND COORDINATED WITH CRWA. REFER TO SHEET E-1, ELECTRICAL DEMOLITION SITE PLAN FOR ROUTING OF COMMUNICATION AND ELECTRICAL DUCTBANKS AND CONDUITS.
- CONTRACTOR SHALL FLUSH AND PROPERLY DISPOSE OF ALL CHEMICALS PRIOR TO DEMOLITION OF CHEMICAL PIPING AND FACILITIES.
- CONTRACTOR TO COORDINATE WITH JEREMY DAVENPORT OF HEIRHOLTZER ENGINEERING AT 830-372-4808 FOR THE TEMPORARY RELOCATION OF EXISTING CRWA PANEL AND ANTENNA. CONTRACTOR SHALL MAINTAIN COMMUNICATION WITH CRWA'S 1604 TANK DURING ALL PHASES OF CONSTRUCTION AT NO ADDITIONAL COST TO OWNER.
- WATER SUPPLY TO CURRENT CHEMICAL SYSTEMS SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION, AT NO ADDITIONAL COST TO OWNER.
- REFER TO NOTE 10 ON SHEET C-9.

- IF A PERMANENT CHEMICAL INJECTION ASSEMBLY CANNOT BE INSTALLED AS DEPICTED IN THESE CONTRACT DOCUMENTS, CONTRACTOR SHALL TEMPORARILY INSTALL A FULLY FUNCTIONING SYSTEM AS ACCEPTED BY OWNER FOR THE INTENDED OPERATION. UPON COMPLETION OF THE DEMOLITION OF THE EXISTING GST, AND IN COORDINATION WITH THE OWNER, CONTRACTOR SHALL REMOVE TEMPORARY CHEMICAL INJECTION INSTALLATION AND INSTALL THE PERMANENT CHEMICAL INJECTION ASSEMBLY AS DEPICTED IN THESE CONTRACT DOCUMENTS.
- CONTRACTOR SHALL PROVIDE THREE FEET OF COVER FOR ALL PROPOSED UTILITY, CHEMICAL PIPE AND PIPE SLEEVES.
- CONTRACTOR SHALL INSTALL TEMPORARY PIPE FOR EMERGENCY FLOW FROM PZ-1060 TO EXISTING GST. CONTRACTOR SHALL PROVIDE PIPE SUPPORTS AS REQUIRED.
- INSTALL FIRE HYDRANT, GUARD POSTS, VALVES, PIPE, AND APPURTENANCES IN ACCORDANCE WITH SAWS STANDARD SPECIFICATIONS FOR CONSTRUCTION.



**PHASE I
TO BE DEMOLISHED (TBD)
TO BE REMOVED (TBR)**

NOTES BY SYMBOL

- 1.0 MG EST (SEE SHEET C-1, NOTE 2)
- CPS ENERGY TRANSFORMER
- TELEPHONE BOX
- FLUORIDE BLDG
- WELL NO 1
- WELL NO 2
- MCC-A
- 12-PW-2
- 8-PW-2
- 16-PW-2 (SEE NOTE 1)
- GATE
- 18" STORM SEWER PIPING TO AND FROM SAWS PZ-950 (950 HGL)
- DISTRIBUTION SYSTEM FROM SAWS PZ-6 (1060 HGL)
- DISTRIBUTION SYSTEM (SEE NOTE 5)
- PERIMETER FENCE
- 23" MESQUITE (PROTECTED)
- 15" MESQUITE (PROTECTED)
- GRAVEL ROAD
- ASPHALT ROAD
- CONCRETE DRIVE
- 16" ASBESTOS CONCRETE PIPE
- 24" ASBESTOS CONCRETE PIPE
- 2.0 MG GST
- 12-D-2 & DRAIN OUTLET
- 2-PW-3
- ELECTRICAL BLDG
- 3.5 MG GST
- GST OVERFLOW DRAIN STRUCTURE
- LIGHT POLE AND CAMERA (TYP)
- PROP CHLORINE BLDG
- 18-0-5
- COMMUNICATION ANTENNA (SEE NOTE 20)
- 16" ASBESTOS CONCRETE PIPE
- 16-PW-1
- 24-PW-1
- EX-FLEC DUCTBANK TYP (SEE NOTE 6)
- 12" PVC PIPE SLEEVE, 12-D-5 (TYP 9)
- 6" PVC PIPE SLEEVE, 6-D-5
- INSTALL TEMP PIPE (SEE NOTE 23)
- INSTALL FIRE HYDRANT (SEE NOTE 24)
- 8-PW-3

NO.	ADDED	REVISION	DATE	BY
1	ADDED FIRE HYDRANT			

BAR IS ONE INCH ON ORIGINAL DRAWING. F IN THIS SHEET ADJUST SCALE.

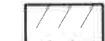
VERIFY SCALE

Date:	JULY 2014
Designed:	JAM
Drawn:	GWM
Reviewed:	JM
CP&Y Proj. No.:	SAWS13348

NOTES:

1. REFER TO SHEET C-11 FOR NOTES.

LEGEND

 TO BE DEMOLISHED



SAWS JOB NO.
12-6114

CP&Y
300 E. SOUTHERA BLVD.
SAN ANTONIO, TX 78258
TYPE REGISTRATION #E-1741

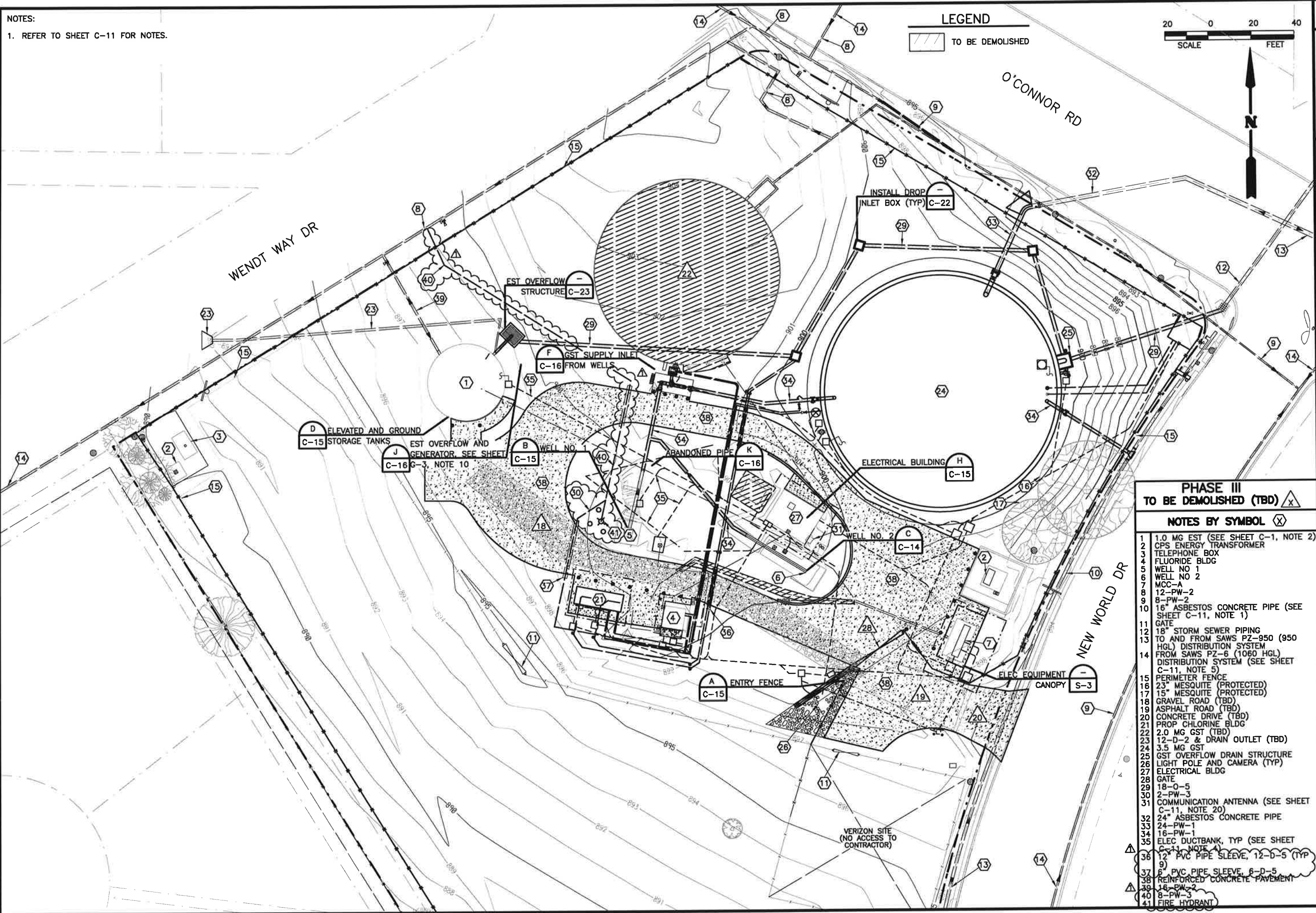
SA
SAN ANTONIO
WATER SYSTEM



NO.	ADDED FIRE HYDRANT	REVISION	DATE	BY
1				

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT PRINTED ON THIS SHEET, ADJUST SCALE

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**PHASE III
TO BE DEMOLISHED (TBD)**

NOTES BY SYMBOL

- 1 1.0 MG EST (SEE SHEET C-1, NOTE 2)
- 2 OPS ENERGY TRANSFORMER
- 3 TELEPHONE BOX
- 4 FLUORIDE BLDG
- 5 WELL NO 1
- 6 WELL NO 2
- 7 MCC-A
- 8 12-PW-2
- 9 8-PW-2
- 10 16" ASBESTOS CONCRETE PIPE (SEE SHEET C-11, NOTE 1)
- 11 GATE
- 12 18" STORM SEWER PIPING TO AND FROM SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM FROM SAWS PZ-6 (1060 HGL) DISTRIBUTION SYSTEM (SEE SHEET C-11, NOTE 5)
- 13 PERIMETER FENCE
- 14 23" MESQUITE (PROTECTED)
- 15 15" MESQUITE (PROTECTED)
- 16 GRAVEL ROAD (TBD)
- 17 ASPHALT ROAD (TBD)
- 18 CONCRETE DRIVE (TBD)
- 19 PROP CHLORINE BLDG
- 20 2.0 MG GST (TBD)
- 21 12-D-2 & DRAIN OUTLET (TBD)
- 22 3.5 MG GST
- 23 GST OVERFLOW DRAIN STRUCTURE
- 24 LIGHT POLE AND CAMERA (TYP)
- 25 ELECTRICAL BLDG
- 26 GATE
- 27 18-0-5
- 28 2-PW-3
- 29 COMMUNICATION ANTENNA (SEE SHEET C-11, NOTE 20)
- 30 24" ASBESTOS CONCRETE PIPE
- 31 24-PW-1
- 32 16-PW-1
- 33 ELEC DUCTBANK, TYP (SEE SHEET C-11, NOTE 4)
- 34 12" PVC PIPE SLEEVE, 12-D-5 (TYP 9)
- 35 6" PVC PIPE SLEEVE, 6-D-5
- 36 REINFORCED CONCRETE PAVEMENT
- 37 16-PW-2
- 38 8-PW-3
- 39 FIRE HYDRANT

SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK
& PUMP STATION IMPROVEMENTS


DEMOLITION & CONSTRUCTION
SEQUENCING PHASE III

Date:	JULY 2014
Designed:	JAM
Drawn:	GWM
Reviewed:	JM
CP&Y Proj. No.	SAWS13348

NOTES:

1. REFER TO GENERAL NOTE #7, #24, #28 AND OTHERS AS APPLICABLE.
2. CONTRACTOR SHALL CONNECT EXISTING 8-PW-2 TO EXISTING 12-PW-2 TO MAINTAIN CONTINUOUS SERVICE TO PZ-1060. REFER TO SHEET C-11, NOTES AND OTHERS AS APPLICABLE.

LEGEND

 TO BE DEMOLISHED



SAWS JOB NO.
12-6114

CP&Y
300 E. SOUTHERN BLVD.
SAN ANTONIO, TX 78258
TYPE REGISTRATION #F-1741

CP&Y
SAN ANTONIO
WATER SYSTEM



NO.	ADDED	REVISION	DATE	BY	DATE
1	ADDED FIRE HYDRANT				

VERIFY SCALE
SCALE: 1" = 40'-0"

DATE: 08-12-14
DRAWN BY: JMM
CHECKED BY: JMM
DATE: 08-12-14

**PHASE IV
TO BE DEMOLISHED (TBD)**

NOTES BY SYMBOL

- 1.0 MG EST (SEE SHEET C-1, NOTE 2)
- CPS ENERGY TRANSFORMER
- TELEPHONE BOX
- FLUORIDE BLDG
- WELL NO 1
- WELL NO 2
- MCC-A
- 12-PW-2
- 8-PW-2
- 16" ASBESTOS CONCRETE PIPE (SEE SHEET C-1, NOTE 1)
- GATE
- 18" STORM SEWER PIPING TO AND FROM SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- FROM SAWS PZ-6 (1060 HGL) DISTRIBUTION SYSTEM (SEE SHEET C-11, NOTE 5)
- PERIMETER FENCE
- 23" MESQUITE (PROTECTED)
- 15" MESQUITE (PROTECTED)
- GST OVERFLOW DRAIN STRUCTURE
- LIGHT POLE AND CAMERA (TYP)
- ELECTRICAL BLDG
- CHLORINE BLDG
- REINFORCED CONCRETE PAVEMENT
- 12-D-2 (TBD) & DRAIN OUTLET (TBD)
- 3.5 MG GST
- 18-0-5
- 2-PW-3
- COMMUNICATION ANTENNA (SEE SHEET C-11, NOTE 20)
- 24-PW-1
- 16-PW-1
- 24" ASBESTOS CONCRETE PIPE
- EX ELEC DUCTBANK, TYP (SEE SHEET C-11, NOTE 4)
- 12" PVC PIPE SLEEVE, 12-D-5 (TYP OF 9)
- 6" PVC PIPE SLEEVE, 6-D-5
- 8-PW-2 (TBD) DEMOLISH TEMPORARY PIPE
- 16-PW-2
- 8-PW-3
- FIRE HYDRANT

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**SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK
& PUMP STATION IMPROVEMENTS**

DEMOLITION & CONSTRUCTION
SEQUENCING PHASE IV

Date:	JULY 2014
Designed:	JAM
Drawn:	GWM
Reviewed:	JM
CP&Y Proj. No.	SAWS13348

SHEET
C-14
SHEET 28 OF 91

NO.	REVISION	DATE	BY	GWM
1	ADDED FIRE HYDRANT	06/12/14		

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BAR IS ONE INCH ON ORIGINAL DRAWING. THIS SCALE IS FOR THE SHEET. ADJUST SCALE AS NECESSARY.

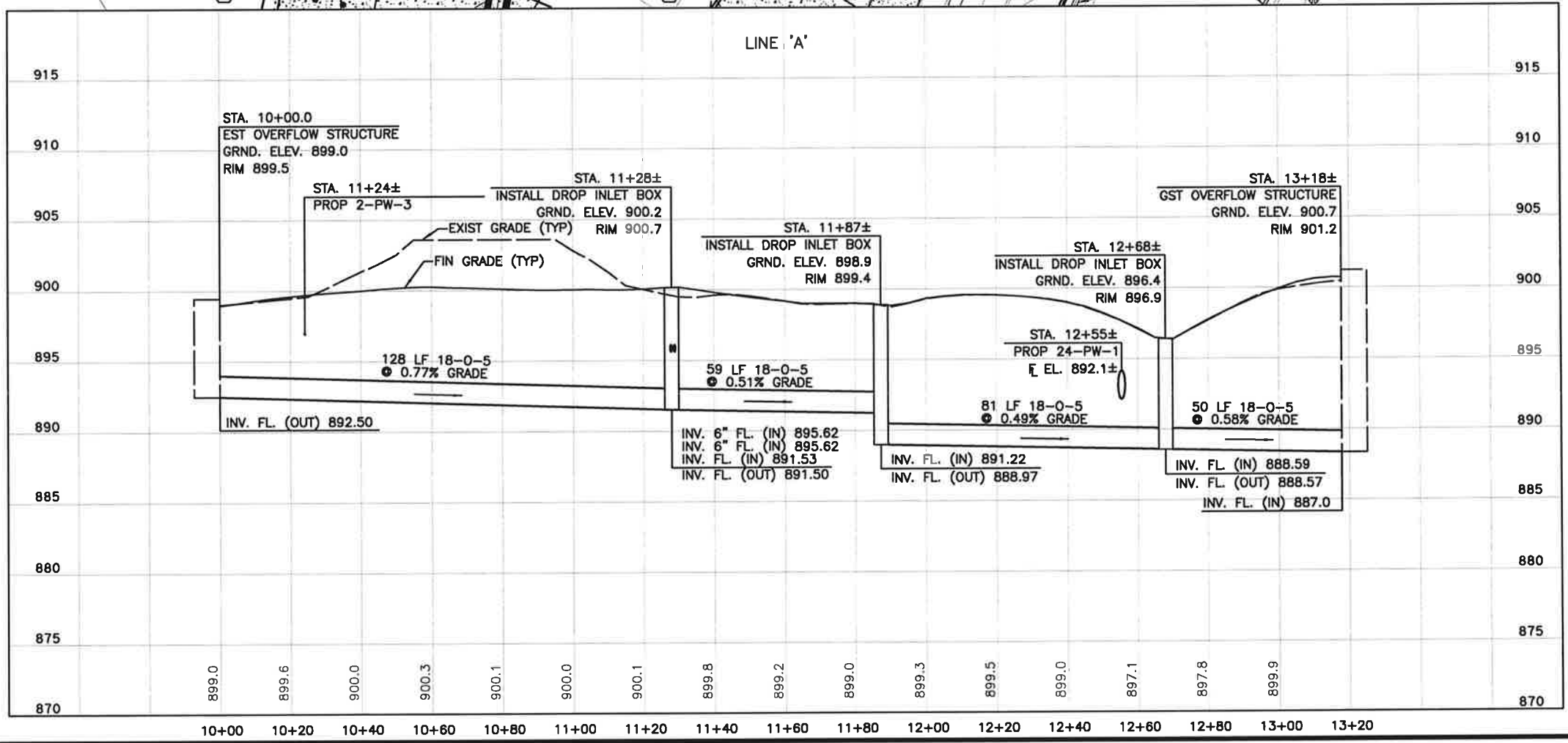
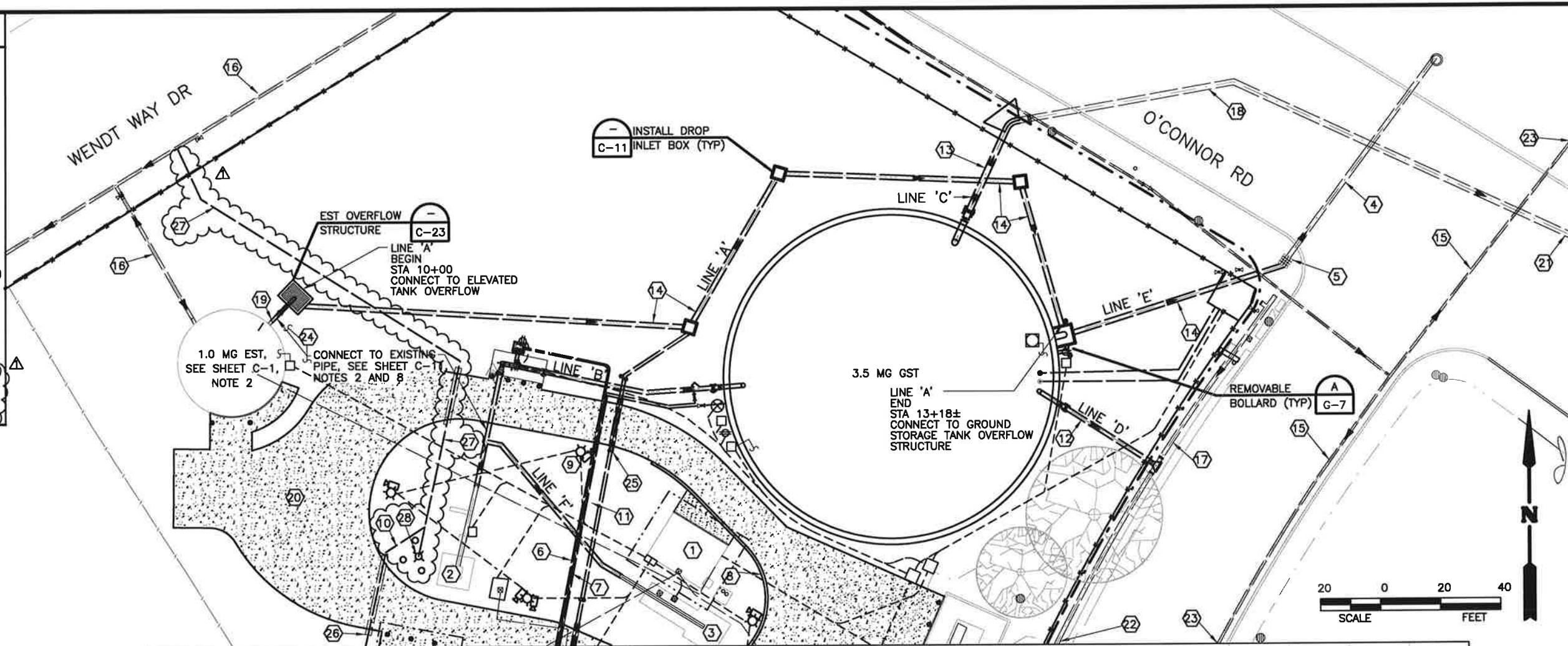
SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK
& PUMP STATION IMPROVEMENTS
PROPOSED YARD PIPING PLAN & PROFILE I

Date: JULY 2014
Designed: JAM
Drawn: GWM
Reviewed: JIM
CP&Y Proj. No. SAWS13348

NOTES BY SYMBOL

- 1 ELECTRICAL BUILDING
- 2 WELL NO 1
- 3 WELL NO 2
- 4 18" STORM SEWER PIPING
- 5 DROP INLET
- 6 4-CLS-3 (SEE SHEET C-11, NOTES 7)
- 7 2-FL-3 (SEE SHEET C-11, NOTES 7)
- 8 CURB
- 9 LIGHT POLE AND CAMERA (TYP)
- 10 2-PW-3 (SEE SHEET C-11, NOTE 2)
- 11 SAMPLE TAP TO CHEM BLDGS
- 12 16-PW-1 (SEE SHEET C-11, NOTE 2)
- 13 24-PW-1 (SEE SHEET C-11, NOTE 2)
- 14 18-0-5
- 15 EX 8-PW-2
- 16 EX 12-PW-2
- 17 EX 16" ASBESTOS CONCRETE PIPE
- 18 EX 24" ASBESTOS CONCRETE PIPE
- 19 EX 12-0-2
- 20 REINFORCED CONCRETE PAVEMENT TO AND FROM SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 21 TO SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 22 FROM SAWS PZ-6 (1060 HGL) DISTRIBUTION SYSTEM (SEE SHEET C-11, NOTE 5)
- 23 GENERATOR AND PROPANE TANK (SEE SHEET C-3, NOTE 10)
- 24 12" PVC PIPE SLEEVE, 12-D-5 (TYP 9)
- 25 6" PVC PIPE SLEEVE, 6-D-5
- 26 8-PW-3 (SEE SHEET C-11, NOTE 2)
- 27 FIRE HYDRANT (SEE SHEET C-1, NOTE 24)

NOTES:
1. REFER TO SHEET C-11 NOTES.



NO.	DESCRIPTION	DATE
1	ADDED FIRE HYDRANT	
	REVISION	
	BY	
	DATE	

VERIFY SCALE
SCALE: AS SHOWN
BAR IS ONE INCH ON ORIGINAL DRAWING. ADJUST SCALE TO THIS SHEET.

SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK
& PUMP STATION IMPROVEMENTS
PROPOSED YARD PIPING PLAN & PROFILE II

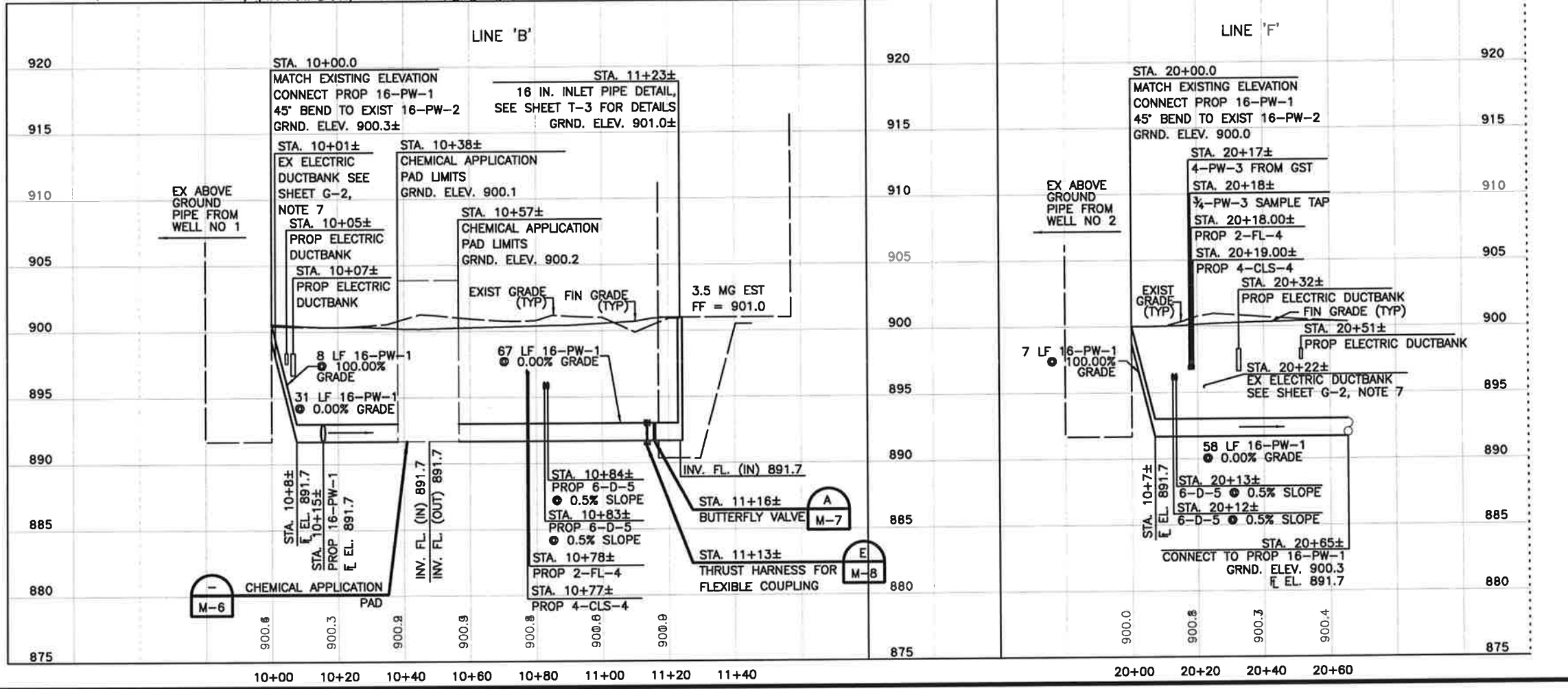
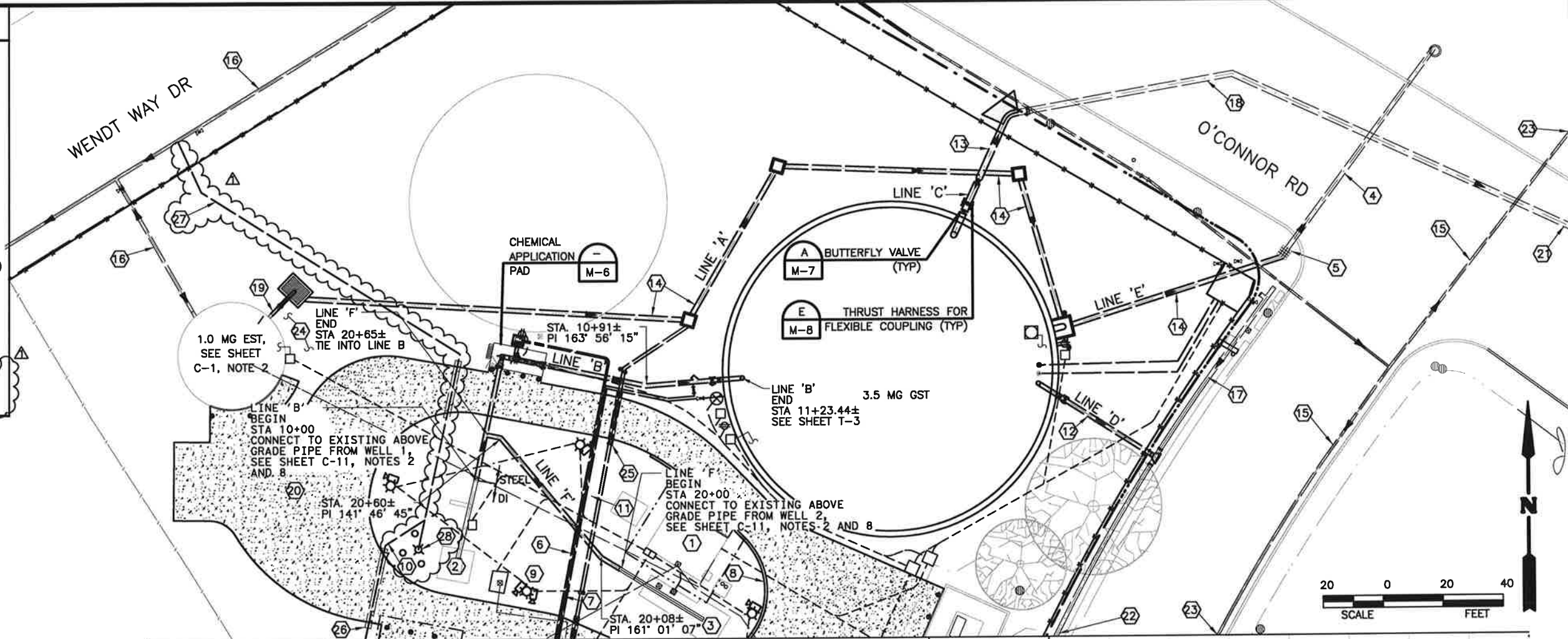
Date:	JULY 2014
Designed:	JAM
Drawn:	GWM
Reviewed:	JM
CP&Y Proj. No.	SAWS13348

NOTES BY SYMBOL (X)

- 1 ELECTRICAL BUILDING
- 2 WELL NO 1
- 3 WELL NO 2
- 4 18" STORM SEWER PIPING
- 5 DROP INLET
- 6 4-CLS-4 (SEE SHEET C-11, NOTES 7)
- 7 2-FL-4 (SEE SHEET C-11, NOTES 7)
- 8 CURB
- 9 LIGHT POLE AND CAMERA
- 10 2-PW-3 (SEE SHEET C-11, NOTE 2)
- 11 SAMPLE TAP TO CHEM BLDGS
- 12 16-PW-1 (SEE SHEET C-11, NOTE 2)
- 13 24-PW-1 (SEE SHEET C-11, NOTE 2)
- 14 18-0-5
- 15 EX 8-PW-2
- 16 EX 12-PW-2
- 17 EX 16" ASBESTOS CONCRETE PIPE
- 18 EX 24" ASBESTOS CONCRETE PIPE
- 19 EX 12-0-2
- 20 REINFORCED CONCRETE PAVEMENT
- 21 TO AND FROM SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 22 TO SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 23 FROM SAWS PZ-6 (1060 HGL) DISTRIBUTION SYSTEM (SEE SHEET C-11, NOTE 5)
- 24 GENERATOR AND PROPANE TANK (SEE SHEET G-3, NOTE 10)
- 25 12" PVC PIPE SLEEVE, 12-D-5 (TYP 9)
- 26 6" PVC PIPE SLEEVE, 6-D-5
- 27 8-PW-3 (SEE SHEET C-11, NOTE 2)
- 28 FIRE HYDRANT (SEE SHEET C-11, NOTE 2)

NOTES:

1. REFER TO SHEET C-11 FOR NOTES.



NO.	REVISION	DATE	BY	DATE
1	ADDED FIRE HYDRANT	GWM	08/12/14	

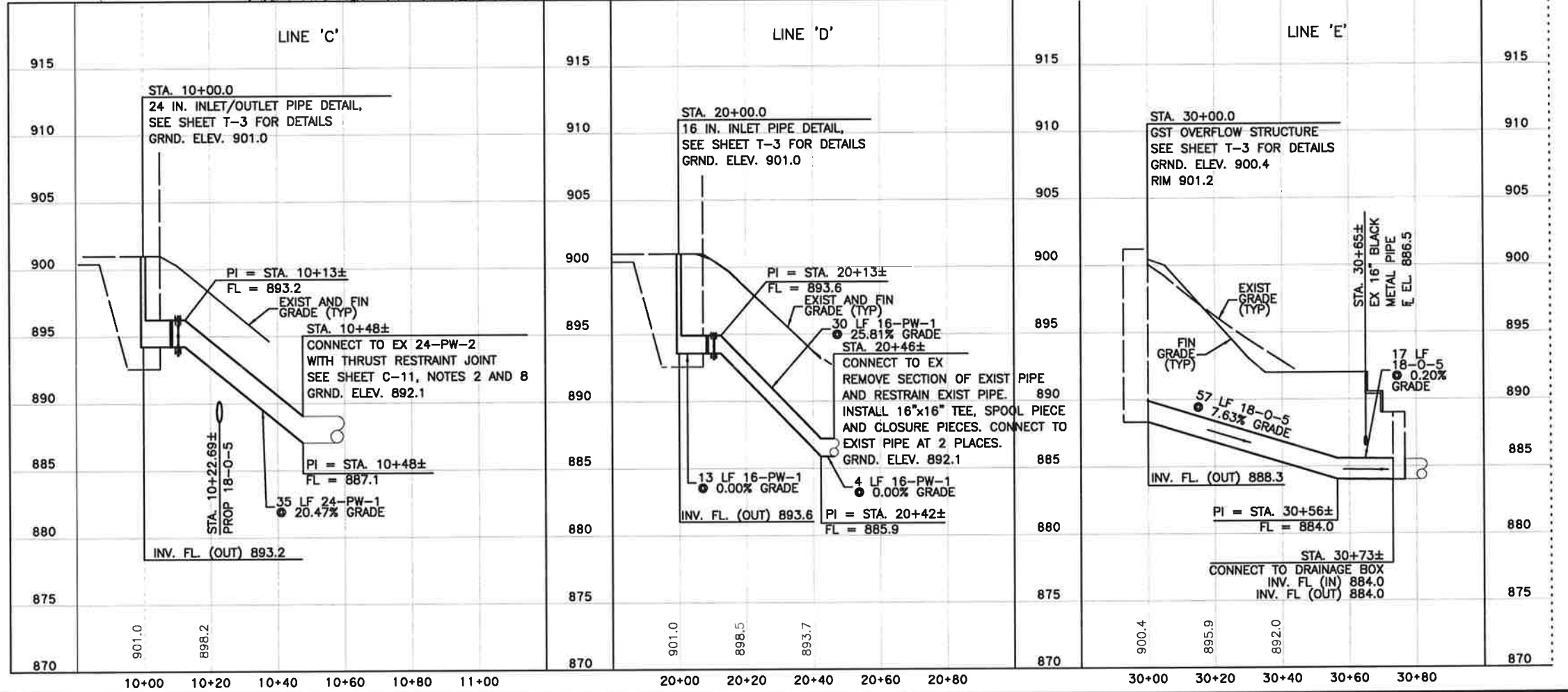
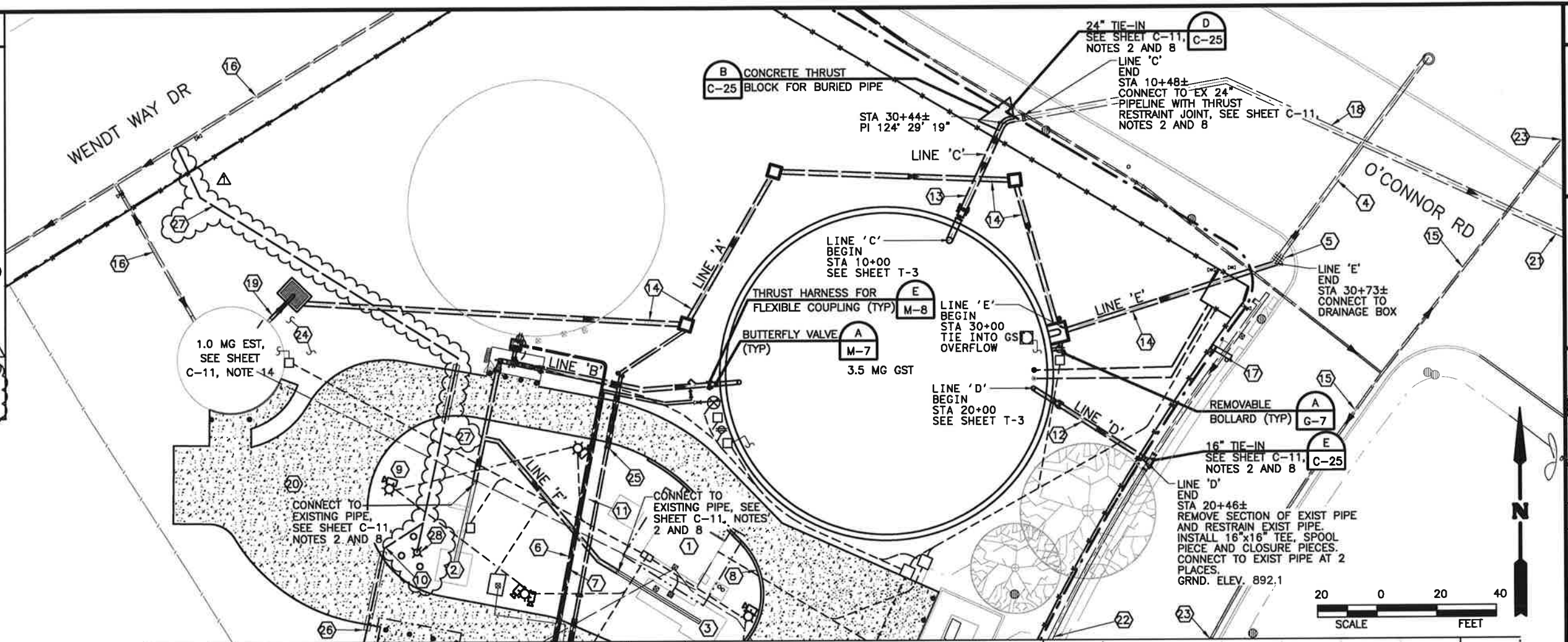
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BAR IS ONE INCH ON ORIGINAL DRAWING, NOT ONE INCH ON THIS SHEET. ADJUST SCALE

Date:	JULY 2014
Designed:	JAM
Drawn:	GWM
Reviewed:	JM
CP&Y Proj. No.	SAWS13348

NOTES BY SYMBOL

- 1 ELECTRICAL BUILDING
- 2 WELL NO 2
- 3 WELL NO 2
- 4 18" STORM SEWER PIPING
- 5 DRAIN GATE INLET
- 6 4-CLS-4 (SEE SHEET C-11, NOTES 7)
- 7 2-FL-4 (SEE SHEET C-11, NOTES 7)
- 8 CURB
- 9 LIGHT POLE AND CAMERA (TYP)
- 10 2-PW-3 (SEE SHEET C-11, NOTE 2)
- 11 SAMPLE TAP TO CHEM BLDGS
- 12 16-PW-1 (SEE SHEET C-11, NOTE 2)
- 13 24-PW-1 (SEE SHEET C-11, NOTE 2)
- 14 18-0-5
- 15 EX 8-PW-2
- 16 EX 12-PW-2
- 17 EX 16" ASBESTOS CONCRETE PIPE
- 18 EX 24" ASBESTOS CONCRETE PIPE
- 19 EX 12-0-2
- 20 REINFORCED CONCRETE PAVEMENT TO AND FROM SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 22 TO SAWS PZ-950 (950 HGL) DISTRIBUTION SYSTEM
- 23 FROM SAWS PZ-6 (1060 HGL) DISTRIBUTION SYSTEM (SEE SHEET C-11, NOTE 5)
- 24 GENERATOR AND PROPANE TANK (SEE SHEET C-3, NOTE 10)
- 25 12" PVC PIPE SLEEVE, 12-D-5 (TYP 9)
- 26 6" PVC PIPE SLEEVE, 6-D-5
- 27 8-PW-3 (SEE SHEET C-11, NOTE 2)
- 28 FIRE HYDRANT (SEE SHEET C-11, NOTE 24)

NOTES:
1. REFER TO C-11 FOR NOTES.





- NOTES BY SYMBOL**
- 1 EX ELECTRICAL BUILDING
 - 2 CHLORINE BUILDING
 - 3 EX FLUORIDE BUILDING
 - 4 16-PW-1, FROM WELL NO 1
 - 5 16-PW-1, FROM WELL NO 2
 - 6 LIGHT POLE AND CAMERA (TYP)
 - 7 4-CLS-3 (SEE SHEET C-11, NOTE 7)
 - 8 2-FL-3 (SEE SHEET C-11, NOTE 7)
 - 9 6-D-5
 - 10 6-D-5
 - 11 3/4-PW-3 SAMPLE TAP
 - 12 4-PW-3 FROM GST
 - 13 2-PW-3 FROM PZ-6
 - 14 REINFORCED CONCRETE PAVEMENT
 - 15 18-O-5
 - 16 ELECTRICAL CONDUIT
 - 17 16-PW-1 FROM WELLS
 - 18 12" PVC PIPE SLEEVE, 12-D-5 (TYP)
 - 19 6" PVC PIPE SLEEVE, 6-D-5
 - 20 8-PW-3 FROM PZ-6
 - 21 FIRE HYDRANT (SEE SHEET C-11, NOTE 24)

SAWS JOB NO.
12-6114

CP&Y
300 E. SOUTHERN BLVD.
SAN ANTONIO, TX 78258
TYPE REGISTRATION #F-1741

San Antonio Water System



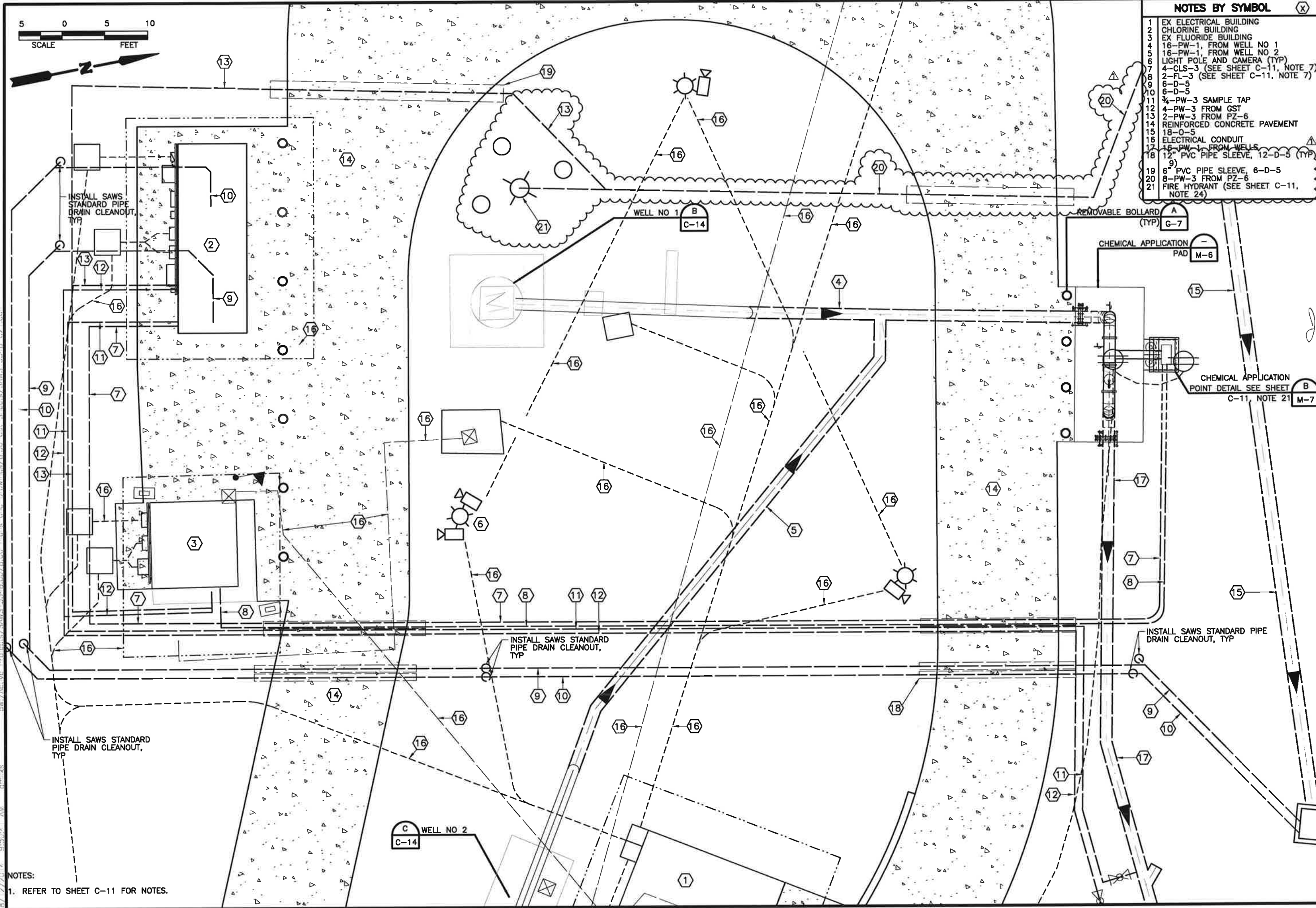
NO.	ADDED	REVISION	HYDRANT	BY	DATE	GWM
1						

VERIFY SCALE: 1" = 10' (AS SHOWN)
BAR IS ONE INCH ON ORIGINAL DRAWING. NOT TO SCALE.

SAN ANTONIO WATER SYSTEM
DSP NEW WORLD TANK & PUMP STATION IMPROVEMENTS
CHEMICAL APPLICATION PLAN

Date: JULY 2014
Designed: JAM
Drawn: GWM
Reviewed: JIM
CP&Y Proj. No. SWS13348

SHEET C-21
SHEET 35 OF 91

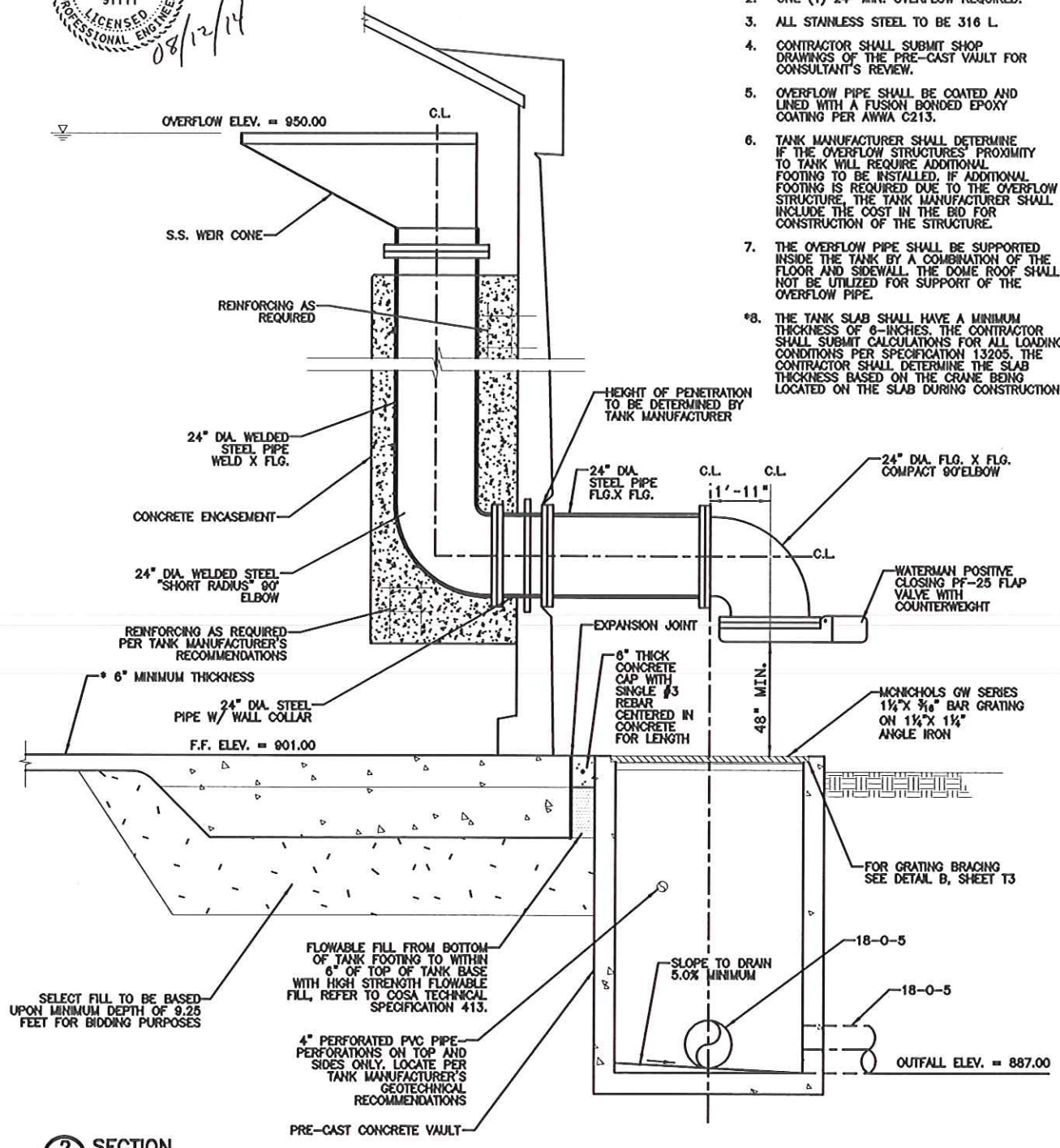


NOTES:
1. REFER TO SHEET C-11 FOR NOTES.

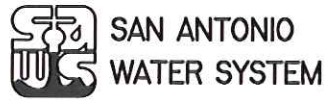
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U. R. Sowa
 STATE OF TEXAS
 V. RYAN SOWA
 91171
 LICENSED PROFESSIONAL ENGINEER
 08/12/14

- NOTES:
1. PIPE SIZE, WEIR DIMENSIONS, AND ENCASEMENT DIMENSIONS AS REQUIRED FOR 12.5 MGD OVERFLOW RATE AND A WEIR DEPTH OF 11".
 2. ONE (1) 24" MIN. OVERFLOW REQUIRED.
 3. ALL STAINLESS STEEL TO BE 316 L.
 4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE PRE-CAST VAULT FOR CONSULTANT'S REVIEW.
 5. OVERFLOW PIPE SHALL BE COATED AND LINED WITH A FUSION BONDED EPOXY COATING PER AWWA C213.
 6. TANK MANUFACTURER SHALL DETERMINE IF THE OVERFLOW STRUCTURES' PROXIMITY TO TANK WILL REQUIRE ADDITIONAL FOOTING TO BE INSTALLED. IF ADDITIONAL FOOTING IS REQUIRED DUE TO THE OVERFLOW STRUCTURE, THE TANK MANUFACTURER SHALL INCLUDE THE COST IN THE BID FOR CONSTRUCTION OF THE STRUCTURE.
 7. THE OVERFLOW PIPE SHALL BE SUPPORTED INSIDE THE TANK BY A COMBINATION OF THE FLOOR AND SIDEWALL. THE DOME ROOF SHALL NOT BE UTILIZED FOR SUPPORT OF THE OVERFLOW PIPE.
 8. THE TANK SLAB SHALL HAVE A MINIMUM THICKNESS OF 6-INCHES. THE CONTRACTOR SHALL SUBMIT CALCULATIONS FOR ALL LOADING CONDITIONS PER SPECIFICATION 13205. THE CONTRACTOR SHALL DETERMINE THE SLAB THICKNESS BASED ON THE CRANE BEING LOCATED ON THE SLAB DURING CONSTRUCTION.



SECTION 2
 SCALE: NTS

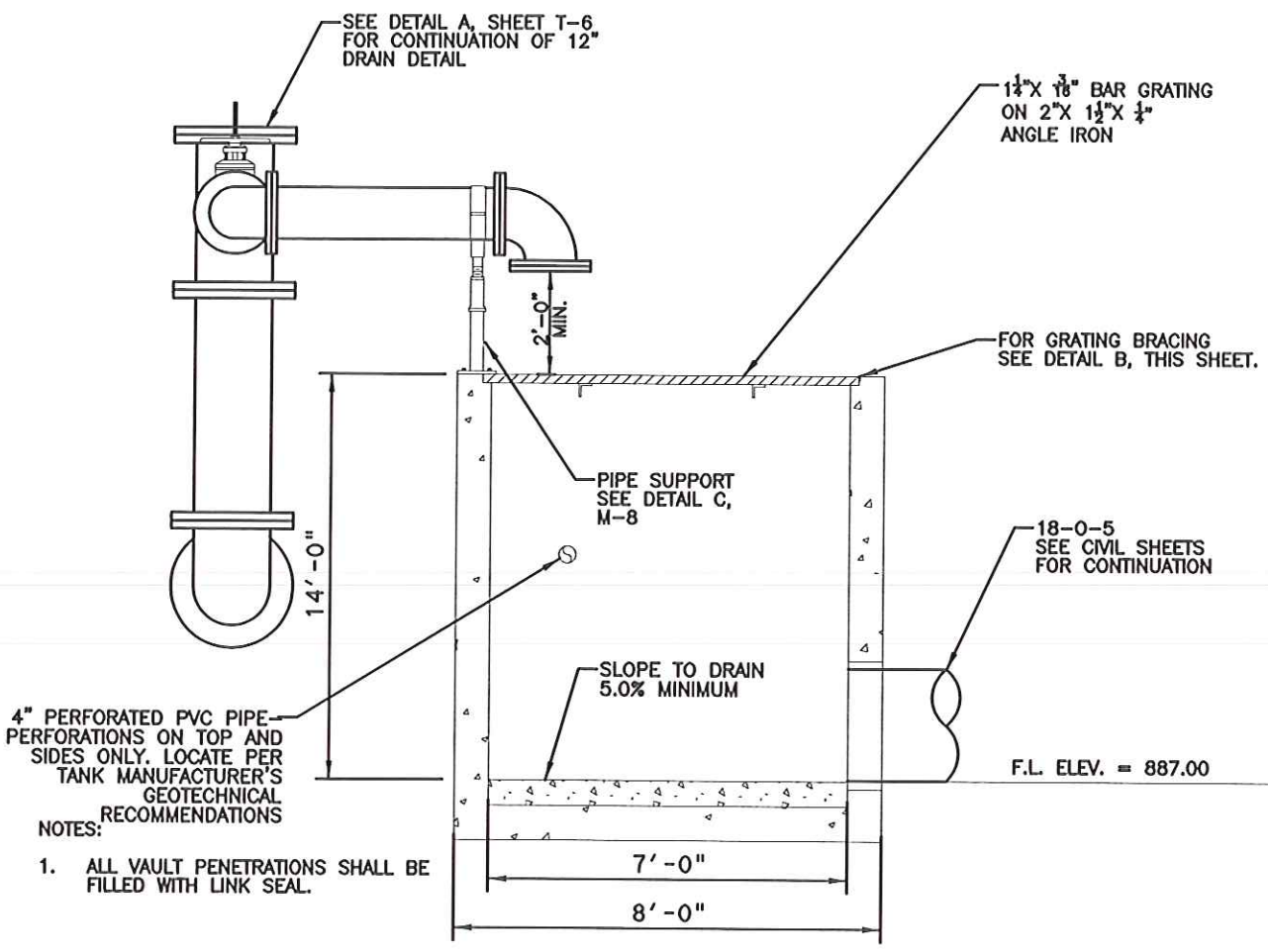


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DSP NEW WORLD TANK AND PUMP STATION IMPROVEMENTS
OVERFLOW SECTION
 SAWS JOB NO 12-6114
 DATE: 08-11-14 Reference Sheet No. T-2 Addendum No. 01

FIGURE
 2

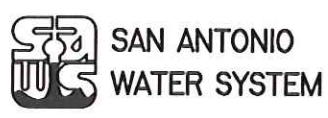
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 V. RYAN SOWA
 91171
 LICENSED PROFESSIONAL ENGINEER
 08/12/14



4" PERFORATED PVC PIPE—
 PERFORATIONS ON TOP AND
 SIDES ONLY. LOCATE PER
 TANK MANUFACTURER'S
 GEOTECHNICAL
 RECOMMENDATIONS

- NOTES:
 1. ALL VAULT PENETRATIONS SHALL BE
 FILLED WITH LINK SEAL.

TANK OVERFLOW STRUCTURE
SECTION
 1
 T2 SCALE: NTS



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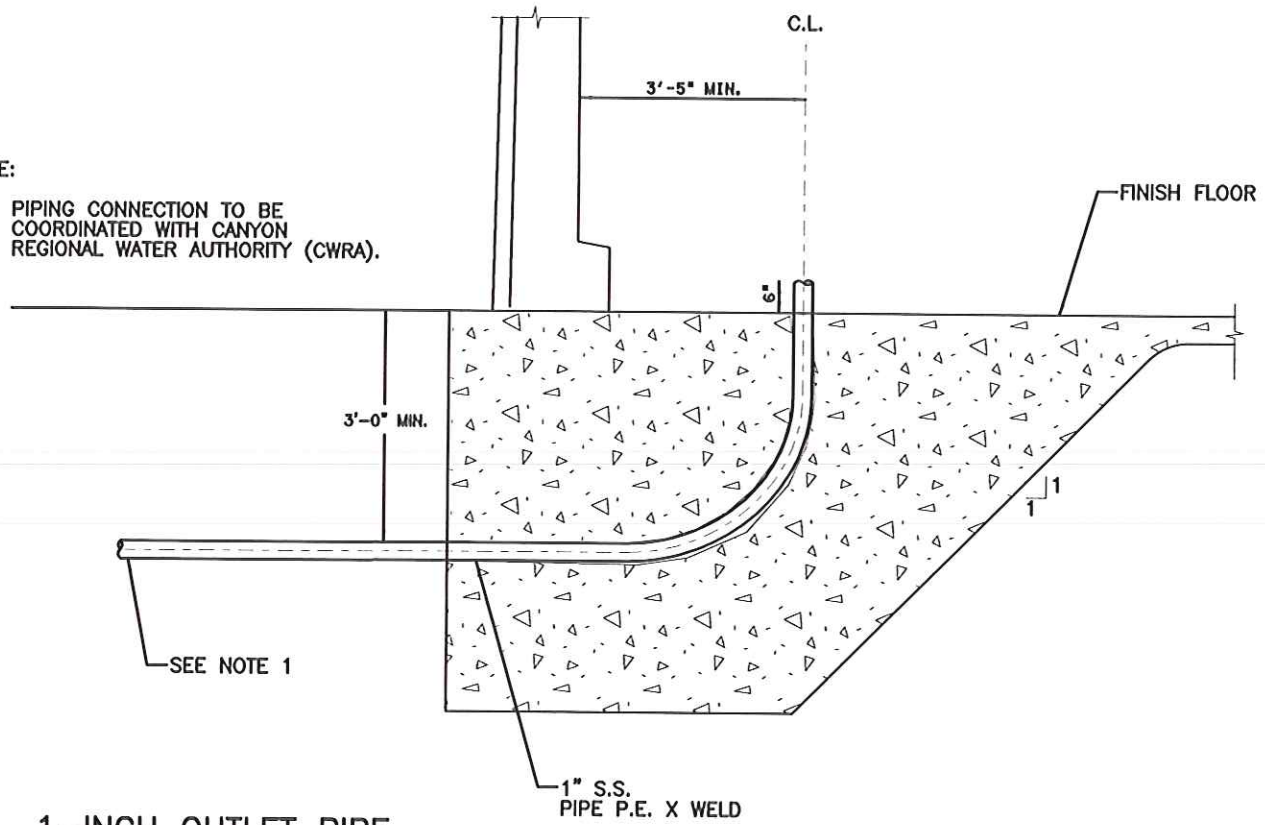
DSP NEW WORLD TANK AND
 PUMP STATION IMPROVEMENTS
TANK OVERFLOW STRUCTURE
 SAWS JOB NO 12-6114
 DATE: 08-11-14 Reference Sheet No. T-3 Addendum No. 01

FIGURE
1

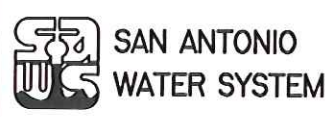
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NOTE:

1. PIPING CONNECTION TO BE COORDINATED WITH CANYON REGIONAL WATER AUTHORITY (CWRA).



A 1-INCH OUTLET PIPE
 DETAIL
 SCALE: NTS



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DSP NEW WORLD TANK AND PUMP STATION IMPROVEMENTS 1-INCH OUTLET PIPE		
SAWS JOB NO 12-6114		
DATE: 08-11-14	Reference Sheet No. T-7	Addendum No. 01

FIGURE
A