

ADDENDUM TO INVITATION TO BID

PROJECT: **BID #D00424 – STAUNTON CROSSING – ELEVATED WATER STORAGE TANK**

DATE: **MAY 9, 2024**

ADDENDUM: **1**

The following items represent changes, modifications and/or clarifications to the Contract Documents for this project.

REVISIONS:

1. Drawings W1.0 and W1.1 have been revised to call out the “Staunton Crossing – Onsite Water and Sewer Extensions” project for the water main connection.
2. Drawings T1.0 and T2.0 have been revised to detail the retaining wall, show bollards in front of the generator pad, and instruct Bidders to confirm generator pad dimensions with generator manufacturer.
3. Drawing M2.1 has been revised to show the Overflow Splash Block detail.
4. Specification 01 4000 Part 1.2, A: revised to clarify responsibility of testing and inspections.
5. Specification 13 2100 Part 2.1, A: Water Storage Tank design standard revised to reference AWWA D107 for Composite Elevated Water Storage Tanks.
6. Specification 13 2100 Part 2.4, F.5: Interior Field Finish Coat revised to specify Tnemec Epoxoline Series 21.
7. Specification 13 2100 Part 2.4, I: revised to allow interior coating after the bowl is raised.

QUESTIONS:

1. Will the City waive permit costs?

Response: The City will waive permit fees for City-issued permits.

2. Has an FAA study been completed?

Response: Yes, included on Drawing G1.1.

3. Do you have a preferred controls company (SCADA)?

Response: Yes, the City will contract directly with Valley Automation. Valley will provide the SCADA panel to be installed by the Contractor. Valley Automation’s Scope will be provided in a future Addendum.

4. Who is the third-party inspector?

Response: The City intends to hire a third-party inspector through Timmons Group, likely as a subconsultant. It is anticipated that Quinn Consulting Services will be utilized for steel and coating inspections, although the Contract has not yet been executed at this time.

5. Does the tank's geotechnical study follow the water line path along the road?

Response: The Geotechnical Engineering Report included three bores at the elevated tank site. No bores were performed along the access road or water main alignment. Please refer to Appendix A in the Project Manual for additional information.

6. Is there any design for the retaining walls?

Response: Please refer to revised Drawings T1.0 and T2.0 for retaining wall details.

7. Can work be done on Saturday and Sunday?

Response: Normal work hours are to be between 7AM and 7PM Monday through Friday, excluding City holidays. Prior approval from the City Engineer is required to work outside of normal work hours, and will be considered on a case-by-case basis. See also response to Question #30 below.

8. Is the City going to provide any other equipment?

Response: The City will only be providing SCADA panel for this project. See also response to #3 above.

9. Are CADD files available?

Response: AutoCAD files will be provided to the successful Bidder after Award.

10. Can the trees be burnt onsite?

Response: Any open burning for the purpose of debris disposal from clearing operations must be done in accordance with all Municipal, State, and Federal regulations. If burning is desired, an Application for Open Burning must be submitted to the Fire Marshal's office and the permit approved. The Fire Marshal has indicated that a trench with a pit burner will be required. The following is the link to Staunton City Code related to open burning ordinances:

<https://www.codepublishing.com/VA/Staunton/#!/Staunton08/Staunton0820.html#8.20>

11. Is there a budget?

Response: An engineer's estimate is not being made public at this time.

12. We obtained the bid documents for the Staunton Crossing Elevated Water Storage Tank, project. While going through the documents I noticed that the Ad for Bid states the closing time is 3 PM on May 20th, however your procurement sites state 2 PM – can you please clarify?

Response: Bids are due May 20, 2024 at 3:00 PM local time. The procurement websites have been updated.

13. Do you have any expectations as to which portion of the scope will be larger in value? i.e. the tank vs the watermain work? If the latter, are there any restrictions within the bid package that would keep a local GC from being the Prime bidder on the job (with the tank builder as the Subcontractor?). If not then you may want to ensure that the Bid Form mandates that the Prime bidder highlight which tank he plans to use.

Response: An engineer's estimate is not being made public at this time. Bidders shall adhere to all State and Local codes and the requirements of the Bid Documents.

14. Please advise if the project's funding stream requires the payment of Prevailing Wages (and if so, provide the local Determination Wage Sheets), usage of an approved Apprenticeship Program, and/or AIS (Buy American) Material Procurement provisions.

Response: Not applicable. No special requirements are anticipated that would be due to funding sources (i.e. no Davis-Bacon requirements, Build America Buy America, etc.).

15. Which Permits must the Contractor still arrange for? Please provide a listing of the cost(s) that the Owner will charge us for (if these local fees are not waived)

Response: An exhaustive list of permits and associated costs will not be provided. Refer to Specification 01 1100 – Summary of Work, Paragraph 1.5.A. and Specification 31 2500 – Erosion Control, Paragraph 1.4. The City will waive permit fees for City-issued permits, including the building permit for the water tank and electrical permit for the service/generator, E&S permit, and any blasting permit and/or burn permit (if applied for). A VDOT Land Use Permit will not be required, as no work is proposed on VDOT right-of-way. See also response to Question #1.

16. Does the project plan on having any Third Party Inspection performed? If so, please advise which firm and scope is planned.

Response: See response to Question #4 above.

17. For interior paint longevity reasons, you may wish to consider mandating that the tank's roof plates be seal welded both sides.

Response: Refer to Specification 13 2100 – Water Tank and Appurtenances, Paragraph 2.1.C.5.

18. Item 1.3 D discusses the Anniversary Inspection. Please verify that the Owner will supply the water for the re-filling of the tank after the inspection.

Response: Confirmed. The City will provide water to refill the tank at no cost to the Contractor one time during the anniversary inspection process.

19. Item 2.4 I mentions the desire to have the tank's Interior Coatings applied before the bowl is raised into position (on the assumption that this would help reduce dust emissions). Please instead allow the Interior Coatings to be applied after jacking, to ensure a continuous application (while noting that the dust will be contained within the tank)

Response: Refer to revised specification.

20. CS 7.03 mandates payment of the Engineer's time if work is performed on Saturdays. Please consider waiving this if work is pre-approved on weekends (such as when good weather is forecasted during the painting phase)

Response: Waived, upon the conditions stated above.

21. Please provide a copy of the FAA Determination Letter confirming that there are no Obstruction Lights or special paint schemes necessary

Response: Please refer to Drawing G1.1 for FAA Obstruction Marking and Lighting requirements.

22. Dwg M1.0 - Note(s) 9 & 11 touch on Antenna scope. As does Dwg M1.1 which depicts (12) 6" dia conduit "floor penetrations". Please confirm that they pass under the foundation and up into the tank shaft, terminating just above the floor slab (vs entering thru the tank's concrete shaft). Furthermore, other than penetrations and supports, that any other Antenna scope is By Others in the future.

Response: The (12) 6" Conduit Floor Penetrations are intended to enter through the foundation and up through the floor slab. Final foundation and shaft design shall be performed by the Contractor. Conduits shall be capped above the floor for future use. Installation of the antennae and cables will be performed by others in the future.

23. Can you confirm funding is in place for this project?

Response: The City anticipates grant funding for this project. If the bids are over the grant awards then the City will consider making up the difference with other funds. Regardless of grant status, no special requirements are anticipated that would be due to funding sources (i.e. no Davis-Bacon requirements, Build America Buy America, etc.).

24. Can you confirm the budget amount for this project?

Response: An engineer's estimate is not being made public at this time.

25. Can you confirm that the Owner currently owns the property (or properties) where work is to be performed? If not, can you provide information on the timing in which ownership will be obtained?

Response: All property where work is to be performed is owned by the Owner and/or is permitted for the project work.

26. Can you confirm that the Owner has obtained the necessary approvals and permits required to start construction?

Response: The Owner has obtained approvals from VDH and the FAA. Refer to response to Question #15 for additional information.

27. Are there any governing agencies (federal/state/local agencies other than the building permit department) that must review and approve the project drawings prior to the start of construction? If so, who are these agencies and what is the anticipated duration for their review period?

Response: Not to our knowledge.

28. Can you describe the process or events (i.e. approval by council, board of directors, etc.) that must occur and anticipated dates and durations that must occur in order to award this project?

Response: The Construction Contract must be reviewed and signed by City staff, including the City Attorney, City Finance Director, and City Manager. (City Council does not have to approve the contract.) Execution of the contract typically is dependent upon the successful bidder acquiring the necessary bonds and certificates of insurance and/or other items as required by the contract documents, as well as City staff review and approval.

29. What is planned Notice of Award date for the project?

Response: Notice of Award is anticipated to be issued within 60 days after the Bid opening.

30. Due to the nature of tank erection work and the travel distance for our field personnel, working weekends is advantageous for the project from both a cost and schedule perspective. This is even true if the work allowed on the weekends is restricted to non-inspected work. Can you confirm that Saturday work will not be restricted?

Response: Understood. Work which does not require inspection may be allowed on weekends. Inspected work may be allowed on weekends on a case-by-case basis. Any work planned outside of normal work hours should be requested in advance; see also response to Question #7 above.

31. Is this project subject to any American Iron and Steel or other domestic material procurement requirements? If yes, can the specific requirements and or references be provided?

Response: Not applicable. No special requirements are anticipated that would be due to funding sources (i.e. no Davis-Bacon requirements, Build America Buy America, etc.).

32. Can you confirm this project IS NOT sales tax exempt and sales tax IS to be included in the bid prices?

Response: The City itself is tax-exempt and shall not be charged taxes directly for the project. The contractor must include any taxes they pay in the bid price.

33. Is this project subject to any prevailing wage rates?

Response: No.

34. Supplementary Conditions – Article 6.11 instructs the Contractor to refer to Valley Automation, Inc proposal. This proposal is not clearly identified in the Bid Documents. Can the Valley Automation, Inc proposal be provided?

Response: Refer to response to Question #3.

35. Supplementary Conditions – Article 7.09 indicates the Contractor is to provide all permits. Is a building permit required for the project or for just the elevated tank? If required, will the fees be waived, or can a fee schedule be provided so we can include the appropriate costs within our bid pricing?

Response: See response to Question #15.

36. Section 01 31 19, Part 1.3, Item C. – Can the Project Manager attend the monthly site monthly remotely if the Contractors superintendent is in attendance?

Response: The Contractor's Project Manager is expected to attend the monthly progress meetings in person. If the Contractor's Project Manager is unable to attend in person, the Contractor's superintendent being present is acceptable.

37. Section 13 21 00, Part 2.1, Item A. references D 100 as the design standard. The most current design standard for Composite Elevated Tanks is AWWA D107. Can you confirm any reference to D100 should reflect D107?

Response: The design standard for this elevated tank is AWWA D107.

38. Section 13 21 00, Part 2.1, Item F.1.e references a cable fall arrest system for the access ladder. Sheet M1.0 Elevated Tank General Notes #2 states the ladder fall arrest system is to be a rigid aluminum rail. Can you confirm that both a cable fall arrest system and rigid aluminum rail fall arrest system are acceptable?

Response: Either fall arrest system is acceptable.

39. Section 13 21 00 does not indicate the responsible party for the radiograph testing. Can you confirm the radiograph testing is to be by the Contractor?

Response: Radiograph testing is the responsibility of the Contractor.

40. Section 13 21 00 does not describe the level of weld seam preparation. We suggest the following clarification, which is industry standard: Grinding of weld contour shall approximate Condition D of NACE Standard SP0178. Can you confirm the above clarification is acceptable?

Response: The above clarification is acceptable.

41. Sheet W1.1 – Plan note instructs the Bidder to refer to the Staunton Crossing Utility Improvements – Phase 1 Plan Set. Can this plan set be provided?

Response: Please refer to City of Staunton Bid #D00324 – Staunton Crossing Water and Sewer Extensions project for details regarding the water main connection. References to this project have been revised to refer to the correct project title.

42. Sheet T1.0 – A retaining wall is shown to be installed on the north and south ends of the tank site. Can a detail of the retaining wall be provided indicating the wall material type, wall design, and foundation design?

Response: Please refer to revised sheets T1.0 and T2.0 for details regarding the retaining wall.

43. Sheet T1.0 – A generator pad is shown to be installed. Can a design details, including size, thickness and reinforcing requirements, be provided for the generator pad?

Response: Please refer to Concrete Generator Pad detail on Drawing T2.0.

44. Sheet T1.0 – A splash pad is shown to be installed. Can a design details, including size, thickness and reinforcing requirements, be provided for the splash pad?

Response: Please refer to Overflow Splash Block detail on Drawing M2.1.

45. Sheet T1.0 – Plan notes indicate an 8'-0" security perimeter fence is shown to be installed. Sheet T2.0 Fence details indicate a 6'-0" perimeter fence is to be installed. Can you confirm the security fence height is to be 6'-0"?

Response: The security fence shall be 8'-0". Please refer to the updated detail on sheet T2.0

46. Sheet M1.0 – Tank Design Criteria indicates seismic design data (Ss and S1) that are higher than what ASCE 7 prescribes. Can you confirm the tank is to be designed to ASCE7-16 seismic design parameter?

Response: Final tank loads and seismic design data shall be determined by the Contractor in Accordance with the latest editions of AWWA D107 and ASCE 7.

47. Sheet M1.0 – The South Elevation and Tank Section details indicate a domed roof for the steel tank. This is another tank manufacturers standard. Our standard roof construction is conical in shape, not domed. Either option will minimize snow accumulation and water ponding. Can confirm that individual manufacturers standard details will be acceptable?

Response: Individual manufacturer's standard roof shape is acceptable.

48. Sheet M1.0 – Tan[k] Section detail indicates a 30'-0" diameter roof handrail is shown to be installed. Sheet M2.0, Detail 2 notes a 24'-0" diameter roof handrail to be installed. Can you confirm a 30'-0" diameter roof handrail is to be installed?

Response: Roof handrail shall be designed by the tank manufacturer with a minimum diameter of 24'-0".

49. Sheet E1.0 – Power Distribution Diagram notes that the Contractor is to reference the Civil Site Plan for locations and distances for the electrical Utility Power Pole and the Utility CT & Meter base. This information is not clearly identified on the Civil drawings. Can the locations of the Utility Power Pole and Utility CT & Meter Base be provided?

Response: The location of the utility power has not been determined at this time. The City and Engineer are coordinating with the utility to extend electrical service to the tank site. Sheet E1.2 indicated the location of the Utility CT & Meter base on the north side of the tank.

50. Sheet E1.0 – Power Distribution Diagram notes that the fence is to be grounded. Can you provide additional details and requirements for the fence grounding?

Response: Please refer to specification section 26 0526 Part 3.1 Item I for requirements of fence grounding.

51. Sheet E1.1 – Electrical Note 1.1. states the Contractor is to coordinate with the local Power Company as required for the permanent power. Section 13 21 00, Part 1.1, Item E. states the Owner will provide permanent electrical service to the site prior to Substantial Completion. Can you confirm the Contractor is not responsible for any cost or fees related to the permanent electrical service?

Response: The Owner will provide permanent electrical service to the site.

52. Sheet E1.1 – Electrical Note 1.4 states the Contractor shall obtain the services of an electrical professional engineer licensed in the State of Virginia. Can you confirm the requirements listed on Sheet E1.1 Note 1.4 are NOT intended to be included on this project?

Response: Drawing E1.1, Note 1.4 is applicable. Delete the words "PUMP STATION".

53. Does the 25 PSF Roof Snow Load shown on Drawing Sheet M1.0 satisfy the required site-specific case study requirement?

Response: No. Final tank loads and seismic design data shall be determined by the Contractor in Accordance with the latest editions of AWWA D107 and ASCE 7.

CLARIFICATIONS:

1. The specified model of tank cathodic protection system is no longer manufactured and has been replaced with the Freeman Industries MACPU Digital rectifier.
2. There is a discrepancy between Specifications 104.2.2.B and 104.3.7.C regarding maximum stone size allowed in clean earth fill. Specification 104.3.7.C shall prevail for all backfill more than 1' above the pipe; for backfill within 1' of the pipe, Specification 104.2.2.B shall prevail, and care should be taken not to place any stones larger than approximately 1" adjacent to the pipe.
3. Disregard references to Flow Meter Transmitter and Flow Sensor on Electrical Design Drawing E1.1. This equipment is not included in the project.

ENCLOSURES:

1. Revised Specification 01 4000 – Testing and Inspection
2. Revised Specification 13 2100 – Water Tank and Appurtenances
3. Revised Drawing W1.0
4. Revised Drawing W1.1
5. Revised Drawing T1.0
6. Revised Drawing T2.0
7. Revised Drawing M2.1

RESPONSE MUST ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON BID FORM

All other terms and conditions remain the same.

SECTION 01 4000
TESTING AND INSPECTION

1. GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Testing and Inspection
 - 1. Provided by Owner:
 - a) Structural Steel (Field Welding)
 - b) Coatings
 - 2. Provided by Contractor:
 - a) Structural Steel (Shop Welding)
 - b) Earthwork
 - c) Concrete
 - d) Reinforcing Steel
 - e) Piping Systems
 - f) Equipment and Controls

1.2 OWNER FURNISHED INSPECTION SERVICES

- A. The Owner shall retain the services and be responsible for payment for an independent inspection firm or firms (Inspection Firm) to provide on-site inspection of certain aspects of the elevated tank including:
 - 1. Structural Steel
 - a) Field welding
 - 2. Coatings
 - a) Weld grinding
 - b) Blasting
 - c) Holiday testing
 - d) Paint film thickness testing

1.3 CONTRACTOR FURNISHED TESTING SERVICES

- A. At the time of the Preconstruction Conference, the Contractor shall provide to the Engineer and Owner the identity of the quality control firm and laboratory (QC Firm) proposed to perform the field quality control measures. The Contractor shall be responsible for the costs of the field quality control measures at no additional cost to the Owner.
- B. The QC firms shall not be authorized to:
 - 1. Release, revoke, alter, or expand on the requirements of the Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.
- C. In coordination with the QC firms, the Contractor shall:
 - 1. Cooperate with testing personnel, to provide access to the work and to

the Manufacturer's operations where applicable.

2. Secure and deliver to the QC firm(s) adequate quantities of representational samples of materials proposed to be used and which require testing.
 3. Provide to the QC firm the preliminary design mix proposed to be used for concrete, and other materials mixes which require control.
 4. Furnish incidental labor and facilities:
 - a) To provide access to the Work to be tested.
 - b) To obtain and handle samples at the project site or at the source of the product to be tested.
 - c) To facilitate inspections and tests.
 - d) For storage and curing of test samples.
 5. Notify the QC firm sufficiently in advance of operations to allow for firm assignment of personnel and scheduling of tests.
- D. Copies of test results and product test reports shall be transmitted in quantities required by the Engineer directly from the QC firm, and shall not be handled or received by the Contractor prior to being received by the Engineer.
- E. Testing services other than those called for in these Contract Documents may be called for by the Owner to check compliance with the specification requirements. When tests indicate compliance with specifications, the testing service charges shall be borne by the Owner, but when non-compliance with specifications is indicated, the testing service charges shall be the Contractor's responsibility and be deducted from the Contract sum.

1.4 INSPECTION AND TESTING

A. Equipment Installation

1. All equipment shall be installed in accordance with the Manufacturer's installation instructions. The O & M Manual for the specific equipment shall be on hand during the inspection phases for confirmation of correct installation. Contractor shall have on site a copy of the O & M Manual with the installation instructions for review by the Inspection Agency and Engineer.

B. Inspection

1. The Inspection Firm has the right to inspect all material and equipment at all stages of development or fabrication, and shall be allowed access to the site and to the Contractor's and Supplier's shops to conduct such inspections. Inspection by the Inspection Firm shall not release the Contractor from responsibility or liability with respect to material or equipment.
2. When specified inspections or tests are required by the Contract Documents, the Work involved shall not proceed beyond that point until such inspections or tests have been completed and approved by the Inspection Firm. The Contractor shall inform the Inspection Firm of the progress of the Work and shall give the Inspection Firm a minimum of three working days written notice of appropriate times for specified inspections and tests. The Contractor shall insure that the portion of Work to be inspected is safe, accessible, dry, ventilated and well lit.
3. When local codes or laws require approval and inspection of the Work by other agencies or organizations before installation or operation, the Contractor shall obtain

such approval and submit one signed original and three copies of the approval to the Inspection Firm.

4. That portion of the Work subject to the provisions of the Virginia Uniform Statewide Building Code shall be constructed in accordance with the latest version.
 5. The Work shall be subjected to continuous inspection by the Inspection Firm and a formal inspection by the Engineer: All required labor, materials, equipment, instruments, lubricants and incidentals necessary to perform these inspections shall be furnished by the Contractor. This includes providing competent and experienced personnel, who are authorized representatives of the Manufacturers of the equipment furnished, to assist the Contractor in the installation, testing and adjustments of the equipment to perform in accordance with the Contract Documents. Before proceeding to the next inspection, all discrepancies and deficiencies observed during each inspection shall be noted and corrected and, if directed by the Engineer, the inspection shall be rescheduled and re-performed at no additional cost to the Owner.
 6. Pre-final Inspection: The Contractor shall schedule in accordance with his construction schedule and with the approval of the Engineer a Pre-final Inspection to take place a minimum of 10 days before the Contractor's date of substantial completion. The Pre-final Inspection shall fully demonstrate to the Engineer or Inspecting Firm that all individual project components function as required by the Contract Documents and that all systems are internally coordinated, as well as coordinated with other systems. Equipment shall be operated and required system tests performed. In addition, the Contractor shall demonstrate that all major site work has been brought to final configurations and restoration initiated. All items of deficiency noted for correction shall be completed before the Final Inspection is scheduled. The Engineer will prepare a punch list of items to be accomplished prior to Final Acceptance.
 7. Final Inspection : After the Contractor has shown that all systems and project work are completed and deficiencies noted in the Pre-final Inspection are corrected, a Final Inspection of the project including a test and demonstration of all equipment and systems shall be scheduled. This Inspection shall take place a minimum of 20 days before the Contractor's scheduled Final Completion date. Correction of the deficiencies noted in the Pre-final Inspection shall be accomplished before the Engineer will approve the scheduling of the Final Inspection. This Inspection shall demonstrate that all elements of the project are ready to be placed in operation and all work has been fully completed in accordance with the Contract Documents.
- C. Equipment Testing: Test procedures as specified in the Contract Documents or as otherwise required shall be coordinated and demonstrated during the Pre-final and Final Inspections. Each test shall be scheduled and performed by the Contractor in the presence of the Engineer or Inspection Firm. All required labor, materials, equipment, instruments, lubricants and incidentals to perform the tests shall be furnished by the Contractor. This shall include providing competent and experienced personnel, who are authorized representatives of the Manufacturers of the equipment furnished, to assist the Contractor in the installation, testing and adjustments of the equipment to perform in accordance with the Contract Documents. Before proceeding to the next test, all discrepancies and deficiencies observed during each test shall be noted and corrected and, if directed by the Engineer, the test rescheduled and re-performed at no additional cost to the Owner.

1. Pre-final Test: During the Pre-final Inspection, equipment shall be operated and tested to fully demonstrate to the Engineer that it works as a unit and a part of the entire system in accordance with the Contract Documents and that all systems are internally coordinated as well as coordinated with other systems. All items of deficiencies and required adjustments noted during this Test shall be corrected before the Final Inspection is scheduled.
 2. Final Test: After all equipment and systems have passed the Pre-final Inspection and are completely installed with controls, instrumentation, safety devices and all items of Work completed including correction of deficiencies, and adjustments, the Final Inspection and Test shall be scheduled. This Test shall consist of continuously operating the equipment and systems without interruption under actual operating conditions for a period of 14 days to demonstrate that all are fully operative and ready to be permanently placed in operation. The Contractor shall be responsible for operation during the Final (14 day) Test, including provision of and payment for all materials and operation costs necessary for the Tests. Should there be any disruption during the 14 day period, the Contractor shall make necessary adjustments and reschedule the Test from its beginning.
- D. Acceptance: The Engineer shall recommend to the Owner that the Work be accepted upon the Contractor's completion and to the satisfaction of the Owner, all of the Work required by the Contract Documents and all items identified on the punchlist prepared by the Engineer and Contractor, if any, at the time of the Final Inspection. The Contractor is required to coordinate with the Engineer reinspections of Work listed on the punchlist. The Engineer may require the Contractor to have groups of punchlist items completed prior to reinspecting the Work. The Owner shall accept the Work upon the recommendation by the Engineer and completion of all of the Work required by the Contract Documents and all punchlist items; all Operation and Maintenance Manuals, "as-built" drawings, Certificates and Written Warranties having been submitted and approved by the Engineer.

2. PRODUCTS (NOT USED)

3. EXECUTION (NOT USED)

END OF SECTION

SECTION 13 2100 WATER TANK AND APPURTENANCES

1. GENERAL

1.1 SCOPE OF WORK

- A. The work performed under this contract shall include labor, materials and equipment necessary to design, construct, inspect and test the composite elevated tank, foundation and accessories in accordance with AWWA D107 Composite Elevated Tanks for Water Storage and as shown on the drawings and specified herein. The composite elevated tank (CET) shall consist of a welded steel tank, a composite concrete pedestal support structure, and a concrete foundation.
- B. The Contractor shall have experience with the design and construction of a minimum of ten (10) CETs of equal or greater capacity in successful operation for at least five years.
- C. The work shall also include labor, materials and equipment necessary to construct the site improvements and site piping as shown on the drawings and specified herein.
- D. The project site is accessible via State Route 1426 - Crossing Way as indicated. The Contractor shall construct and maintain a new construction entrance and access road as indicated on the plans.
- E. The Owner will provide permanent electric service to the site prior to Substantial Completion. The contractor shall be responsible for the cost of the monthly billing until the tank is accepted as substantially complete. Invoices received for billing periods prior to the date of acceptance shall be forwarded to the contractor for payment.
- F. The Tank Manufacturer shall have on its staff a full-time professional structural engineer registered as such in the Commonwealth of Virginia, who shall have no less than five (5) years' experience in the design and field construction of tanks meeting the specification of the tank to be constructed, and who shall be in responsible engineering charge of the work to be done. All working drawings and design calculations shall carry the Commonwealth of Virginia seal of such registered professional engineer and his signature.
- G. A qualified supervisor directly employed by the Contractor shall be on site at all times during construction of the support structure and steel tank.

1.2 REGULATIONS AND STANDARDS

- A. All work and material shall conform to the requirements of the "Waterworks Regulations" of the Commonwealth of Virginia State Board of Health as herein noted. Nothing contained herein shall be construed as permitting anything that is contrary to such regulations.
- B. All coatings which will come in contact with potable water shall be Certified in accordance with Standard 61 of the National Sanitation Foundation (NSF).
- C. All electrical work and materials shall conform to the requirements of the National Electrical Code and, when required, all electrical materials shall bear Underwriters label.
- D. The latest edition of the following standards and specifications shall be used with regard to materials, design, construction, inspection and testing to the extent specified herein:

ACI 301	Standard Specifications for Structural Concrete
ACI 305	Hot Weather Concreting
ACI 306	Cold Weather Concreting

ACI 371R	Guide for the Analysis, Design and Construction of Concrete-Pedestal Water Towers
ACI 318	Building Code Requirement for Structural Concrete
ASCE 7	Minimum Design Loads for Buildings and Other Structures
AISC	Specification for Structural Steel Building ASD or LRFD
AWWA D100	Standard for Welded Steel Tanks for Water Storage
AWWA D102	Standard for Painting Steel Water Storage Tanks
AWWA D107	Standard for Composite Elevated Tanks for Water Storage
AWWA C652	Standard for Disinfection of Water Storage Facilities
NSF 61	Drinking Water System Components
OSHA	Occupational Safety and Health Standards, 29CFR, Part 1910
SSPC-PA1	Paint Application Specification
NFPA 780	Standard for the Installation of Lightning Protection Systems
NFPA 70	NEC National Electric Code

1.3 QUALITY ASSURANCE AND GUARANTEE:

- A. Guarantee: The contractor shall guarantee its work for a period of one year from the date of substantial completion. Substantial completion is defined as the date when the tank is placed, or available to be placed, into service. The contractor will repair any defects of which it is notified during that period which may appear because of faulty design, workmanship or materials furnished under the specifications at no cost to the Owner. Defects caused by damaging service conditions such as electrolytic, chemical, abrasive or other damaging service conditions are not covered by this guarantee.
- B. The Owner shall provide the services of a qualified coating system inspector with a minimum of 5 years' experience in water tank coating inspection work to perform coating inspections. The inspector shall inspect the application of primer on a full time basis and shall provide written recommendations to proceed with successive coating application. The inspector shall inspect the application of intermediate and finish coats and shall provide written recommendations as to conformance with the project specifications upon completion of each coat. The inspection work shall include holiday testing after the final paint coat is applied. Copies of all testing and inspection reports shall be provided to the Engineer and the Owner.
- C. The Contractor shall employ and pay for the services of a certified testing laboratory to provide bacteriological testing of the tank.
- D. The Contractor shall perform a first anniversary inspection approximately 11 months following the date of substantial completion and correct all defects at no cost to the Owner. This inspection shall include an inspection of the coating system to ensure it is working properly per AWWA D102. During this inspection the contractor will be required to completely drain the tank for the proper inspection of the interior coating. The contractor will be required to schedule and coordinate this effort with the Owner. The contractor shall be responsible for the water being removed from the tank

including dechlorination of the water and shall be responsible for disinfection and testing of the tank when it is refilled and prior to the tank being placed back into service. The Contractor will also be required to power wash the outside of the bowl if paint system issues, such as streaking or running, are evident.

1.4 SUBMITTALS

- A. Submit the following manufacturer's product data.
 - 1. Each bidder shall submit a bid sketch with the proposal showing major dimensions of the steel tank, concrete support structure and foundation. The bid sketch shall also show preliminary details for the foundation.
 - 2. After award the successful contractor shall furnish construction drawings of the steel tank, concrete support structure and foundation and interior control room structure. These drawings shall be sealed by a registered professional engineer in the Commonwealth of Virginia.
 - 3. Paint systems
 - 4. Chlorination procedures and bacteriological analysis test reports
 - 5. Pipe, Joints and Fittings
 - 6. Valves
 - 7. Sample Spigots and Petcocks
 - 8. Pipe Sleeves and Penetration Seals
 - 9. Flexible Couplings
 - 10. Pipe Hangers and Supports
 - 11. Pressure Gauges
 - 12. Affidavit of compliance of steel pipe in accordance with AWWA C200
 - 13. Tank Mixing System
 - 14. Cathodic Protection System
 - 15. Obstruction Marking/Lighting
 - 16. Tank Identification Plate

2. PRODUCTS

2.1 WATER STORAGE TANK

A. General

The design, materials, fabrication, construction and inspection of the steel tank shall conform to AWWA D107, except as modified herein. The composite elevated tank shall consist of a welded steel tank and concrete support structure generally configured as indicated on the drawings. The upper water storage portion of the tank shall be a welded steel vessel which includes steel roof, sidewalls, bottom, access tube and appurtenances. The tank support structure shall be configured with the upper vessel supported by a dome shaped concrete slab that is integrally supported by the composite concrete pedestal. A steel floor shall not be used to support the water without the aid of a concrete support slab. The tank shall have a

shape as indicated on the drawings with a net capacity of 1,000,000 gallons. The head range; outside diameter of the pedestal support wall; outside diameter of the upper water storage vessel wall; overall structure height; and top and bottom capacity levels shall be as indicated on the drawings.

B. Tank Design Criteria

The steel tank, concrete support structure and foundation shall be designed to safely withstand the following loads acting separately or in load combinations as specified by AWWA D107 and ACI 371 R. Snow, wind and seismic loads shall be in accordance with ASCE 7 for category IV structures (essential facility), except as modified by ACI 371 R; and shall be as indicated.

C. Welded Steel Tank

For areas of the steel tank where the water is supported by a steel cone, the cone plate thickness may be determined using a nonlinear buckling analysis. The analysis shall include the effects of material and geometric nonlinearities, residual stresses and imperfections. The imperfections considered in the analysis shall not be less than $0.04(Rt)^{1/2}$ over a length of $4.0(Rt)^{1/2}$, where R is the radius normal to the plate at the point of consideration and measured to the axis of revolution, and t is the corroded plate thickness. The analysis shall demonstrate that the cone has a factor of safety of at least 2.0 against buckling in the corroded condition. The contractor shall measure the actual imperfections after welding. The actual imperfections shall not exceed $0.04(Rt)^{1/2}$ when measured over a gage length of $4.0(Rt)^{1/2}$.

The concrete tank floor shall be covered with a welded steel liner to provide a watertight boundary. The minimum thickness of the liner plate shall be 1/4 inch. Liner plate welds shall be tested by the vacuum box testing method before the tank is painted.

1. Liner plates may be placed directly on the concrete when the tank floor is a slab, or when the liner plates are formed to match the shape of the tank floor.
2. Liner plates that are not formed to match the shape of the tank floor shall be erected with at least 1 inch of grout space between the liner plates and the tank floor. The space shall be completely filled with a 1:1.5 cement-sand grout, or equivalent, after welding is completed.
3. Provide drip rings at the top of the shell and cone to reduce the amount of rainwater and condensation that drain onto the shell and cone.
4. Welding procedures and details shall be specifically designed to minimize cracking and spalling of the concrete when it is necessary to weld on steel members embedded in concrete.
5. All interior tank joints, including the roof plate laps and rafter-to-roof plate seams, shall be seal welded.

D. Composite Concrete Pedestal

1. The exposed exterior surface of the concrete support wall is designated architectural concrete. The concrete and formwork requirements of this section shall be strictly enforced to ensure concrete of the highest practicable architectural standard.

2. The design, materials, construction and inspection of the concrete support structure shall conform to ACI 318 applicable requirements of ACI 347, and ACI 371 R, except as modified herein. Concrete proportioning production, placement, quality control and curing procedures shall comply with Division 3, ACI 318 and ACI 117, except as modified herein.
3. The concrete support structure wall shall be constructed using a jump form process. The form system shall use curved, prefabricated form segments of the largest practical size to minimize panel joints. Form system shall be designed to lap and be secured to the previous wall pour. The space between the form and the previous pour shall be sealed to prevent grout leakage. Wall forms shall incorporate a positive means of adjustment to maintain dimensional tolerances specified. Walls forms shall be adjusted for vertical plumb and placement. Concrete pour heights shall be a minimum of 6 feet and a maximum of 12 feet. Form panels shall extend the full height of the concrete pour using only vertical panel joints. Form system shall be designed to lap and be secured to the previous wall pour. The space between the form and the previous pour shall be sealed to prevent grout leakage. Wall forms shall incorporate a positive means of adjustment to maintain dimensional tolerances specified. Walls forms shall be adjusted for vertical plumb and circularity and locked into position with through wall form ties prior to concrete placement. Formwork shall be secured using bolts through the wall prior to concrete placement. Working platforms that allow safe access for inspection and concrete placement shall be provided. Form facing material shall be metal, or plywood faced with plastic or fiberglass. Support wall shall be reinforced concrete with a minimum thickness of 8 inches exclusive of any architectural relief. Wall thickness shall be provided such that the average compressive stress due to weight of the structure and stored water is limited to 25% of specified compressive strength, but not greater than 1000 psi. The tank construction company shall have at least five years' experience and a minimum of ten (10) completed tanks using this construction technique.
4. The form system shall incorporate a uniform pattern of vertical and horizontal rustications to provide architectural relief to the exterior wall surface. Construction joints and panel joints shall be located in rustications. Formwork panel joints shall be sealed using closures which combine with the form pattern to prevent grout leakage and panel joint lines. Broken edges and chamfers will not be accepted. The top of each concrete placement shall be finished with a grade strip. The vertical and horizontal rustications shall be proportioned and combined to impart a symmetrical architectural pattern to the completed structure. Form ties shall be located so as to impart a uniform patterned effect.
5. Support wall forming system shall incorporate segmented concrete placement. Temporary vertical bulkheads shall divide the wall pour into segments that are less than a single batch of concrete. Placement from multiple batches is not permitted. The bulkheads shall be located at rustications, braced rigid and tight to maintain vertical alignment under concrete load. Each segment shall be continuously placed with concrete to the full form height. Temporary bulkheads shall not be removed until adjacent concrete is placed. Support wall concreting operations shall occur a maximum of once per day. Multiple form movements and concrete placements within a day are not permitted.
6. Form work shall remain in place until the concrete strength is such that the concrete

will not be damaged by the removal operation and subsequent loads without damage to the structure. Formwork removal procedures and times shall be based on early-age test results. Form movements and concrete placements shall be limited to a maximum of once per day.

7. The surfaces of the concrete support structure shall receive the following finishes:
 - a) All exterior exposed surfaces shall receive a smooth as-cast form finish. These surfaces shall also be finished with a light brush blast to help provide a more uniform appearance.
 - b) All interior exposed surfaces shall receive a rough as-cast form finish. No additional finishing of the interior exposed surfaces is required.
8. Support structure concrete construction shall conform to the following:
 - a) Variation in thickness:

wall	-3.0% to +5.0%
dome	-6.0% to +10%
slab floor	-3.0% to 5.0%
 - b) Support wall variation from plumb:

in any 10 feet of height	3/8 inch
in any 50 feet of height	1 inch
maximum in total height	2 inches
 - c) Support wall diameter variation 0.4%

Not to exceed	3 inches
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 - d) Dome floor radius variation 1.0%
 - e) Level alignment variation:

from specified elevation	1 inch
from horizontal plane	½ inch
9. Tank floor shall be a reinforced concrete dome not less than 8 inches thick. The average compressive stress due to the weight of the structure and stored water shall not exceed 15% of the specified compressive strength, nor greater than 600 psi.
10. The interface region includes those portions of the concrete support structure and steel tank affected by the transfer of forces from the tank cone and the tank floor to the concrete support wall. This includes a ring beam and connection details. The Contractor shall provide evidence that a thorough review of the interface region has been performed. Finite element and finite difference analyses are the required methods for examining such local stresses in detail. The geometry of the interface shall provide for positive drainage and not allow either condensate or precipitation to accumulate at the top of the concrete wall or ring beam. The ring beam shall be reinforced concrete with a nominal width and height of at least two times the support wall thickness. Minimum radial and circumferential reinforcement shall be 0.25%. Ring beam design shall

consider unbalanced forces from the steel tank cone and concrete dome, load conditions varying with water level, eccentricity of loads resulting from design geometry, and allowance for variations due to construction imperfection and tolerance.

E. Tank Foundation and Floor Slab

1. The design, materials, construction and inspection of the foundation shall conform to ACI 318 and ACI 371 R, except as modified herein.
2. Foundations shall be constructed to provide at least 3.5 feet of pipe cover for pipes passing through the tank wall below grade.
3. Excavated areas inside and outside the concrete support wall shall be backfilled and compacted in accordance with the City of Staunton Specification Section 104, entitled "Trenching & Backfilling For Utility Lines."
4. The interior of the concrete support structure shall have a concrete floor slab for the ground level. The design, materials and construction of the concrete work shall be in accordance with ACI 318 and ACI 371R.

F. Accessories and Appurtenances

1. Access ladders: Provide the access, ladders, platforms, fall arrest systems and climbing harnesses as shown on the drawings and specified herein. Access, ladders, ladder safety devices, handrails, platforms, fall arrest systems and climbing harnesses shall comply with OSHA. Ladders shall not have cages but shall be supplied with fall arrest systems as specified herein. Ladder materials and finishes shall be as follows:
 - a) Galvanized ladder from grade to the walkway.
 - b) Galvanized ladder from the walkway to the floor manhole.
 - c) Paint ladder inside the access tube from the walkway to the roof as specified for interior tank coatings.
 - d) Fabricate ladders to comply with ANSI A14.3, unless otherwise indicated. For ladders outside of the storage tank, siderails shall be continuous, 3/8-by-2-inch steel flat bars, with eased edges, spaced 16 inches apart, and bar rungs shall be 3/4-inch- diameter steel bars, spaced 12 inches on centers vertically. For ladders inside of the storage tank, siderails shall be continuous, 1/2-by-2-inch steel flat bars, with eased edges, spaced 16 inches apart, and bar rungs shall be 1-inch- diameter steel bars, spaced 12 inches on centers vertically. Fit rungs in centerline of side rails with drilled holes for run protrusion. Plug-weld and grind smooth on outer rail faces. Support each ladder at top and bottom and not more than 10 feet on center with welded or bolted steel brackets. Brackets attached to the access tube shall be reinforced to prevent potential damage to the access tube due to stresses from ice and differential temperatures. Size brackets to support design loads specified in ANSI A14.3.
 - e) Fall Arrest Systems: The fall arrest systems shall be Mansafe LadderLatch as manufactured by Latchways Inc., 15401 Vantage Parkway West, Suite 120, Houston, TX 77032. Provide intermediate

cable guides at maximum 13 feet spacing. The manufacturer shall demonstrate that the product is capable of withstanding a static load of 3375 lbs. for a duration of 3 minutes. The product shall be independently tested by a notified body in accordance with the ANSI Z359.1-2007 Protection against falls from height. The product shall be manufactured from 316 stainless steel and electro polished to finish. The product shall be clearly marked with a batch reference code, ensuring traceability. The product shall always be fixed using suitable stainless bolts minimum grade A4/70. The product shall have a top mounted energy absorber which limits the impact forces to 1,350 lbs. System shall be rated for two users and the potential of a third user for rescue. The product/system should incorporate a bottom mounted tension indicator and means of adjustment. The product/system shall incorporate a visible Fall Indicator. The product shall have the ability to attach/detach at any point along the entire length of the system. The product/system shall use an 8mm 1x19 316 Stainless Steel Cable with a minimum breaking strength of 10,000 lbs. The attachment device shall pass intermediate cable guides automatically when ascending or descending, promoting hands-free operation. The product shall be installed by a Registered Latchways Installer strictly in accordance with the manufacturer's requirements and specification. Contact Bruce Simms at (804) 414-1130 for additional information and/or list of approved installers. The product shall hold an EC declaration of conformity and be clearly marked as ANSI compliant. Data sheets are to be provided on all component parts of the system. The manufacturer should hold a valid ISO9001 certificate. The manufacturer shall provide evidence that batch conformance tests using periodic X-ray's of components and periodic static and dynamic tests are carried out to prove component quality.

- f) Climbing Harnesses: The climbing harnesses shall be DBI-SALA ExoFit NEX Tower Climbing Harness as manufactured by Capital Safety, 7900 International Dr. Suite 405, Bloomington, MN 55425. Two climbing harnesses shall be provided; size to be selected by Owner during the submittal process. The product shall feature hybrid shoulder, back and leg comfort padding, stand-up Tech-Lite™ aluminum back D-ring, Tech-Lite™ aluminum front D-ring, body belt/hip pad with Tech-Lite™ aluminum side D-rings, removable seat sling with aluminum board and suspension D-rings, Duo-Lok™ quick connect chest and leg straps, Repel™ webbing, built-in lanyard keepers, Revolver™ vertical torso adjusters, impact indicator, integrated trauma straps, built-in reflective materials and protected labels equipped with i-Safe™.
2. Access Tube: The access tube shall be located on the vertical center line of the tank and provide access from the walkway to the roof. The diameter of the access tube shall not be less than 72 inches.
3. Walkway: The walkway shall be located near the top of the support wall and provide access from the support wall to the access tube. All walkways shall be 48 inches wide and have handrails and kick plates. The walkway shall be fabricated of galvanized steel.

4. Handrailing: As indicated on the plans, black finish or galvanized finish as specified elsewhere in these specifications.
 - a) Steel Pipe: ASTM A 53; standard weight (Schedule 40), Type F, or Type S, Grade A.
 - b) Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A.
 - c) Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
5. Access Openings: Provide access openings in the tank and concrete support structure as shown on the drawings and specified herein:
 - a) Mandoors: Shall comply with Steel Door Institute “Recommended Specifications for Standard Steel Doors and Frames” (SDI-100) and as herein specified. A 36 inch x 84 inch mandoor shall be provided at grade in the concrete pedestal and at the interior of control room. The mandoors and frame shall be steel and of commercial quality. The doors shall be insulated and utilize 18 gauge galvanized and shop primed face panels. The frame shall be 16 gauge welded steel, galvanized and shop primed, and prepared for a masonry opening. Both the door and frame shall be topcoated in the field with the same paint as provided on the exterior of the tank. The door hardware shall be commercial quality stainless steel. The door shall have a door closer mounted at the top of the door. Cylinders and cores shall have six pin tumblers. Cylinders shall be products of one manufacturer, and cores shall be the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets shall have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.
 - b) Overhead door: Provide 12 feet wide by 12 feet high manually operated, insulated overhead steel rolling door in the base of the concrete support structure and at the interior of control room. The door shall have a minimum R-value of 6.0. Provide two 8 inch pipe bollards (guard posts) outside the door openings to protect the door. The pipe bollards shall be filled with concrete. Door installation shall be on the interior face of the support wall. The door frame shall be a steel plate fabrication suitably detailed, fastened and reinforced to accept the door. Operation shall be manual with a chain hoist. The curtain shall be formed of 22-gauge steel interlocking clats with end locks and wind locks designed for a wind loading of 20 psf. torsion springs shall be mounted on a solid torsion rod, which is attached to an exterior mounted spring tension adjustment wheel. A 24-gauge steel hood shall be provided with a weather seal to protect the assembly. Steel brackets shall be installed to the interior face of the wall with expansion anchors which enclose and support the counterbalance assembly with sealed bearings. Steel curtain guides are mounted to the brackets. The curtain, bottom bar, brackets, guides, hood, pipe and chain shall be galvanized and provided with locking device. Overhead door location shall be as shown on the drawings.

- c) Painters Manhole/Vent. 24 inch x 36 inch rectangular manhole/vents shall be provided near the top of the support wall. The manhole/vents shall be accessible from the walkway, shall provide access to the exterior painter's rail and shall provide ventilation for the concrete support structure. The louver cover shall be constructed of aluminum or galvanized steel and furnished with an aluminum insect screen.
- d) Floor Manhole. A 30 inch diameter manhole shall be provided in the tank floor. The floor manhole shall be accessible from the walkway via a ladder.
- e) Roof Hatch. A 30 inch square hatch shall be provided in the roof adjacent to the access tube. The hatch shall be furnished with a handle and hasp. The opening shall have a minimum 4 in. curb. Provide aluminum covers with a 2 in. downturned edge, stainless steel hardware, hold open are and a locking mechanism.
- f) Access Tube Hatch. A 30 inch square hatch shall be provided at the top of the access tube. The opening shall have a minimum 4 in. curb. Provide aluminum covers with a 2 in. downturned edge, stainless steel hardware, hold open are and a locking mechanism. Mount a 6 inch vent with removable, frost-free insect screen on the hatch cover for access tube ventilation
- g) Roof Vent Vacuum/Pressure Relief

A 24 inch minimum flanged nozzle shall be provided in the roof adjacent to the access tube centrally on the tank roof above the maximum weir crest elevation. The pressure-vacuum vent shall be mounted on the exhaust nozzle. The vent shall consist of stainless steel or aluminum components including a support frame, screened area and cap. The support shall be fastened to a flanged opening in the tank roof. The vent cap shall be provided with sufficient overhang to prevent the entrance of wind driven debris and precipitation. A minimum of 4 inches shall be provided between the roof surface and the vent cap.

The tank vent shall have an intake and relief capacity sized to prevent excessive pressure differential during the maximum flow rate of water, either entering or leaving the tank. The overflow pipe will not be considered as a vent. The maximum flow rate of water entering the tank is approximately 5,000 gpm. The maximum flow rate of water exiting the tank shall be 15,000 gpm. The vent shall be provided with a frost-free insect screen. Vent capacity shall be determined based on open area provided by the screen.

In addition to the tank vent, a pressure/vacuum relief mechanism shall be provided that will operate in the event of vent failure. The mechanism shall be designed to return automatically to its original position after operation. The pressure/vacuum relief mechanism shall be located on the tank roof above the maximum weir crest elevation, and may be incorporated in the vent assembly. The vent shall be constructed of aluminum and furnished with frost-free insect screen. The vent shall be easily dismantled to facilitate removal and cleaning

of the screen.

- h) Painter Rail Nozzle. A 24-inch diameter painter's rail nozzle shall be provided in the roof and located to provide access to the interior painter's rail near the shell. The nozzle shall be furnished with a bolted blind flange. The nozzle shall be constructed so that an exhaust fan may be bolted to the nozzle for ventilation during painting.
- 6. Provide painters and inspection rails as shown on the drawings and specified herein.
 - a) Interior Painters Rails. The rails shall be attached to the underside of the roof. Provide one rail near the center of the tank and one rail approximately 18 inches from the tank shell. If the slope distance between these two rails exceeds 32 feet, provide a third rail near midspan. The rails shall be painted as specified for the tank interior.
 - b) Exterior Painters Rail. The rail shall be located near the top of the support wall and be accessible from the walkway via the painter's manhole/vent. The rail shall be painted as specified for the tank exterior.
 - c) Interior Inspection Rail. The rail shall be located near the top of the support wall and be accessible from the walkway. The rail and support brackets shall be galvanized.
- 7. Tank Lights: Provide exterior and interior lights as shown on the drawings and specified herein. The supply and installation of electrical components shall conform to electrical specifications.
- 8. Lightning Protection: Provide a lightning protection system for the elevated tank structure and roof mounted equipment that may be damaged by lightning. Install the system in accordance with NFPA 780 with materials that meet UL96 and UL96a. Minimum lightning protection requirements are shown on the drawings and the Division 26 electrical specifications.
- 9. Obstruction Marking/Lighting: Provide obstruction marking/lighting as required by the Federal Aviation Administration (FAA) Determination of Non-Hazard and the electrical drawings and specifications.

2.2 PIPING

Provide piping as shown on the drawings and specified herein. Piping shall be stainless steel for tank fill, overflow and drain lines greater than 8 feet above the ground floor. Provide couplings on riser piping to joint dissimilar pipe materials and diameters and provide for expansion and contraction of piping.

- A. Ductile iron pipe shall conform to the requirements of AWWA C151, Thickness Class 53 rated for 250 psi minimum with flanged end connections conforming to AWWA C115. Pipe shall be outside coated and shall have an interior cement mortar lining conforming to the requirements of AWWA C104. Flanged fittings shall be ductile iron conforming to the requirements of AWWA C110 or C153 and shall have a minimum 250 psi pressure rating. The piping shall be field painted with two coats of epoxy paint over a prime coat as specified for tank interior coating, color safety blue.
- B. Welded steel pipe inside the tank shall conform to ASTM A53 Type S, seamless, Schedule 40, Grade A, with welded joints. Fittings greater than 3" diameter shall be butt-welded. Flanges shall be welding neck type in accordance with ASME/ANSI

B16.5. Butt-welding fittings shall conform to ASME/ANSI B16.9. The piping shall be field painted with two coats of epoxy paint over a prime coat as specified for tank interior coating, color safety blue.

- C. Stainless steel pipe shall type 304L or better and shall conform to ASTM A312. Welded fittings shall conform to ASTM A403. The pipe shall be schedule 10 (Standard) weight or heavier. Pipe-to-pipe joints shall be welded. Pipe flanges shall be weld-neck type. Pipe support brackets shall be galvanized steel brackets spaced no more than 20 feet apart. (Schedule 10 pipe thickness are: 12"- 0.180"; 16"- 0.188"; 20" - 0.250"; 24"- 0.250"; 30" – 0.312"). Stainless steel pipe does not require painting. Provide an electrically isolating flange at the connection between the stainless steel piping for riser and overflow, and the tank bowl and as indicated on the plans.
- D. The tank inlet and outlet pipes shall bolt to the base elbow, extend up the support wall and penetrate the tank near the low point of the tank floor. Provide an expansion sleeve coupling near grade to accommodate differential movements between the inlet/outlet pipe and concrete support structure.
- E. The overflow piping system shall be designed to accommodate a maximum inlet rate of 5,000 gallons per minute (GPM). The overflow pipe shall extend down the outside of the access tube, offset horizontally and extend down the support wall to grade. The overflow pipe shall penetrate the support wall above finish grade and discharge downward into a concrete drop inlet as shown on the drawings.
- F. A 3-inch diameter tank drain with freeze proof, lockable handwheel operated gate valve shall penetrate the tank at the low point of the tank floor and connect to the overflow pipe as indicated.
- G. Pipe Insulation: Provide pipe insulation outside the control room to the point of entry into the water tank. Provide 1-1/2 inches of rigid cellular glass insulation complying with ASTM C552, Type II, Class 2 with vapor barrier on the inlet/outlet piping. The insulation shall have a minimum k factor of 0.19 Btu-in/hr-ft²-°F. The insulation shall be covered with a 0.016 inch aluminum jacket banded with ½ inch aluminum strapping at 3 feet on center. Aluminum jacket shall comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14. Moisture barrier shall be 1-mil thick, heat-bonded polyethylene and kraft paper or better. Insulate and heat trace the tank bowl drain line and valve. Install pipe insulation per manufacturer's recommendations.
- H. Copper pipe shall be hard drawn Type "K" or "L" with sweated joints conforming to ASTM B88. Copper pipe fittings shall be wrought copper with sweated joints conforming to ASTM B16.22.
- I. Unions shall conform to ANSI B16.18 or B16.22 for copper tubing and ANSI B2.1 with galvanized coating for steel piping. Unions shall be installed where shown on the plans and elsewhere as required for installation or piping and easy removal of equipment.
- J. Flexible couplings shall be stainless steel with flanged connections. Couplings shall be designed for a working pressure of 150 psi and shall have a protective, leakproof lining of natural rubber with 150 pound ANSI standard drilled flanges.
- K. Pipe hangers and supports shall be galvanized steel constructed of ASTM A36 steel and shall conform to MSS 58 and MSS 69. Concrete for supports shall conform to the Concrete provisions of these specifications. Anchor bolts for mounting in concrete shall be all stainless steel materials.
- L. Pipe sleeves shall be high density polyethylene as manufactured by Link Seal or

Advance Products and Systems and suitable for use with expandable, rubberized sleeves.

- M. Pipe penetration seals shall be provided at all locations where pipe passes through concrete walls and floor slabs, and shall include pipe sleeves as specified herein. Penetration seals shall be rubberized, mechanically adjustable segmented type seals. The seals shall be installed flush with the inside of the wall or floor slabs. Hardware and bolts shall be stainless steel Type 316. Seals shall be manufactured by Link Seal or equivalent.
- N. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells.
 - 1. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1, 1-1/2 inch thick.
- O. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

2.3 VALVES

- A. Ball valves smaller than three inches inside the building shall be bronze valves with a union or screwed bonnet conforming to Federal Specification WW-V-54. The valves shall be quarter turn lever operated. Threaded joints shall be Class A - 125 pound rated.
- B. Butterfly Valves: Butterfly valves shall conform to AWWA C504 for Resilient Seated Butterfly Valves. Flanged end connections shall conform to ANSI B 16.1. Valve bodies shall be ductile iron. Valve seats shall be EPDM. Discs shall be ductile iron with 316 stainless steel edges. Shaft material shall be 316 stainless steel. Valve operators shall be manual handwheel with totally enclosed stainless steel internal parts. Where indicated valves are greater than 5 feet above floor level, the operators shall be provided with chains for the convenience of personnel. The valve operator casing shall be ductile iron.
- C. Gate valves shall be iron body, resilient-seated, conforming to the requirements of AWWA C509. The valves shall have flanged ends with non-rising stems. Valve operators shall be hand-wheel type.
- D. Pressure Gauges. Pressure gauges shall be open front case type with bronze bourdon tube soldered to socket and tip, stainless steel movement, and a 4-1/2 inch white coated dial graduated as shown on the drawings. Gauges shall be Ashcroft No. 1279. Gauges shall be provided with petcocks and pulsation dampers. Petcocks shall be brass ball valves.

2.4 COATINGS AND FINISHES

- A. All coatings which will come in contact with potable water shall be Certified in accordance with Standard 61 of the National Sanitation Foundation (NSF). All tank painting shall be in accordance with AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, approved paint manufacturer specifications, and as specified herein. Each paint system shall be from a single manufacturer. The paints and paint products specified herein are manufactured by Tnemec Company and are intended to establish a standard of quality. The products of other paint manufacturers are subject to approval by the engineer.
- B. No paint shall be applied when the temperature of the surface to be painted is below the minimum temperature specified by the paint manufacturer, or less than 5 degrees above the dew point temperature. Paint shall not be applied to wet or damp surfaces or when the relative humidity exceeds 85%. Follow paint manufacturers recommendations for

the specific paint system used.

- C. After erection and before painting, remove slag, weld metal splatter and sharp edges by chipping or grinding. Surfaces that have been welded, abraded or otherwise damaged, shall be cleaned and primed in the field in accordance with the paint system requirements. All areas blasted in the field shall be coated the same day before any rusting occurs.
- D. The dry film thickness values shown below are average values subject to variation in thickness based upon industry practice and manufacturers recommendation. The actual dry film thickness value measured may vary from these average values within the range established by the manufacturer.
- E. Exterior Painting System shall conform to Outside Coating System No. 6 as defined in AWWA D102.
 - 1. Shop Surface Preparation: Remove oil and grease from the surface prior to blast cleaning. Surfaces shall be abrasive blast cleaned to a Commercial finish in accordance with the recommended methods outlined in the Steel Structures Painting Council Specification (SSPC) SP-6.
 - 2. Shop Primer: Immediately after abrasive blasting and before any rusting occurs (within 12 hour maximum) apply one coat of TNEMEC Series 94-H2O Hydro Zinc to a DFT of 2.5 to 3.5 mils. Factory primed surfaces shall meet the material and thickness requirements stated here-in.
 - 3. Field Surface Preparation: After erection and prior to field touch-up priming, surfaces shall be cleaned to remove surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld splatter, and other sharp or rough projections shall be removed. Rusted, abraded and unpainted areas shall be blast cleaned to a commercial finish in accordance with SSPC SP-6.
 - 4. Field Touch-Up: Spot prime with Zinc Rich Urethane, Tnemec Series 94-H2O Hydro Zinc to a DFT of 2.5 to 3.5 mils.
 - 5. Field Intermediate Coat: Apply one coat of Tnemec Endura Shield 2 Series 1075 to a DFT of 2.0 to 3.0. The color shall be tinted to contrast the finish coat.
 - 6. Field Finish Coat: Apply one coat of Tnemec HydroFlon Series 700 to a DFT of 2.0 to 4.0. Finish color shall be as indicated.
 - 7. Total DFT for the exterior paint system is 6.5 to 11.5 mils.
- F. Interior Painting System shall conform to Inside Coating System No. 3 As defined in AWWA D102. All coatings which will come in contact with potable water shall be Certified in accordance with Standard 61 of the National Sanitation Foundation (NSF).
 - 1. Shop Surface Preparation: Remove oil and a grease from the surface prior to blast cleaning. Surfaces shall be abrasive blast cleaned to a NEAR-WHITE finish in accordance with SSPC SP-10.
 - 2. Shop Primer: Immediately after abrasive blasting and before any rusting occurs (within 12 hour maximum), apply one coat of Tnemec Series 94-H2O Hydro Zinc to a DFT of 2.5 to 3.5 mils.
 - 3. Field Surface Preparation: After erection and prior to field touch-up priming, surfaces shall be cleaned to remove surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld splatter, and other sharp or rough projections shall

be removed. Rusted, abraded and unpainted areas shall be blast cleaned to a NEAR WHITE finish in accordance with SSPC SP-10.

4. Field Touch-Up: spot prime with Zinc rich Urethane Tnemec Series 94-H2O Hydro Zinc to a DFT of 2.5 to 3.5 mils.
5. Field Finish Coat: Apply one coat of phenalkamine epoxy Tnemec Epoxoline Series 21 to a DFT of 8.0 to 12.0 mils.
6. The total DFT of the three coat Interior Paint System is 10.5 to 16.5 mils.
7. Sufficient cure, per the manufacture's recommendations, of the final coat on the interior wet surface shall be allowed before the elevated tank is disinfected or filled with water.
- G. Exterior Anti Graffiti Coating For Composite Concrete Pedestal. The first sixteen (16) feet of the exterior tank shall have an anti graffiti coating which is resistant to overcoating and can be easily washed to remove unwanted graffiti. One acceptable manufacturer's product is Tnemec/Chemprobe Conformal Clear Anti Graffiti coating.
- H. Tank Colors: Tank colors shall be "Water Green" and shall be approved by the Owner prior to ordering materials.
- I. The tank interior and exterior coatings shall be applied after the majority of the steel tank has been fabricated on the ground around the concrete pedestal and before the tank is raised to the top of the pedestal in order to reduce the exposure of the surroundings to sandblasting and painting operations. The Contractor may also elect to apply tank interior coating after final installation of the bowl, provided that sandblasting and painting operations are fully contained.

2.5 CONTROL ROOM STRUCTURE

- A. Provide a control room as indicated in plans. The ceiling shall be designed for a uniform dead load of 20 psf. The ceiling shall consist of a concrete slab supported by galvanized formed steel decking and painted steel joists or beams. The ceiling shall be a clear span design, with loads carried by the concrete support structure and interior masonry wall. The concrete support structure, floor slab and foundation shall be designed to accommodate the control room loads.
- B. Walls and ceilings in the control room shall be framed out and insulated using steel framing and pre-insulated metal panel cladding as follows:
 1. Cold-Formed Steel Framing for walls and ceilings shall be designed according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions." Framing for walls and ceilings shall be spaced a maximum of 2' on centers and shall be attached by mechanical fasteners.
 2. Steel Studs shall be manufacturer's standard C-shaped steel studs, punched, with stiffened flanges, minimum base-metal thickness of 0.0329 inch, web depths for walls of 2 inches, and flange width of 1-5/8 inches.
 3. Steel Ceiling Joists (non-structural): Manufacturer's standard C-shaped steel sections, punched with enlarged service holes, with stiffened flanges, minimum base-metal thickness of 0.0329 inch, web depths for ceilings of 4 inches, and flange width of 1-5/8 inches.
 4. Mechanical fasteners shall be provided for attaching steel framing to concrete walls and ceilings conforming to ASTM C 1513, and shall be corrosion-resistant-coated,

self-drilling, self-tapping steel drill screws. Head type shall be low-profile head for use beneath sheathing.

5. Pre-insulated metal panel cladding shall be Metl-Span Part No. CF42 4" or equivalent. The panels shall be 42" wide and a minimum of 2" thick with a 26 gauge profiled and embossed metal face. Color shall be white to match painted CMU walls and ceiling in the control room.

C. Interior Paint for control room CMU walls, door and frame shall be White and conform to the following requirements.

1. CMU walls: Water-Based Epoxy, Semigloss Finish. Coat with the following system or approved equal:

a) Sherwin-Williams

First Coat: S-W Heavy Duty Block Filler, B42W46; 10 mils

Second Coat: S-W Pro Industrial HB/Waterbased Epoxy, B71W111 / B71W100 Series; 4-6 mils

Third Coat: S-W Pro Industrial HB/Waterbased Epoxy, B71W111 / B71W100 Series; 4-6 mils

2. Doors and frames: Coat with the following system or approved equal:

a) Sherwin-Williams

First Coat: S-W ProCryl Universal Primer, B66

Second Coat: S-W Metalatex Semi-Gloss Coating, B42 Series

Third Coat: S-W Metalatex Semi-Gloss Coating, B42 Series

D. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a) Concrete Block Insulating Systems; Korfil.

b) Shelter Enterprises Inc.; Omni Core.

2.6 TANK MIXING SYSTEM

- A. Provide a submersible tank mixing system for continuous use in the water storage tank. The mixer shall consist of a low-voltage, 0.5 HP submersible motor. The mixer shall meet NSF-61 Certification for all material being placed inside the tank and headspace, including the motor power cable. The mixing system shall consist of an impeller mounted on a submersible motor and supported approximately three feet in height from the tank floor to launch a jet of water from the bottom of the tank up toward the surface of the water. Power for mixer shall be 240V AC. The mixer shall be installed per manufacturers specifications or be a fixed mount type and provided with a flanged connection to the steel tank center tube as designed by the tank contractor. The mixer impeller shall be AISI Type 316 Stainless Steel, balanced to within 0.5 gram-inches, passivated per ASTM A380 to minimize corrosion, not more than 6 inches in overall height, not more than 4.5 inches in diameter, and shall not create cavitation at any rotational speed up to 2500 RPM. The mixer motor shall be

AISI Type 316 Stainless Steel body, Chlorine/Chloramine resistant rubber seals, fully submersible with built-in attachments secure motor cable away from impeller.

- B. Design calculations shall be provided by the mixer manufacturer based on models validated and/or calibrated with experimental data from laboratory-scale and real scale representative systems for similarly-sized reservoirs. The calculations shall show completely mixed conditions for equipment configuration. The manufacturer shall provide documentation of the Computational Fluid Dynamics (CFD) model parameters and assumptions, tank geometry and dimensions considered, mesh information, and CPU time required. Analysis should show velocity vectors and contour plot at different cross-sections; the average flow induced throughout the tank; the corresponding average turnover for the tank (in hours); and the corresponding average power consumption of the mixer.
- C. The mixer shall be provided with a control panel allowing ON/OFF control and provide signals to the SCADA system for mixer status including ON, OFF and ALARM.
- D. Mixer shall be manufactured by PAX Water Technologies Richmond, California.

2.7 CATHODIC PROTECTION

The water tank shall be provided with a Modular Automatic Cathodic Protection Unit (MACPU®) and submerged floating anode system manufactured by Freeman Industries, Inc. The purpose of the system shall be to automatically control corrosion of the submerged interior surfaces of the water tank. Design cathodic protection system to provide and maintain tank-to-water potentials of -900 mV with respect to a Cu/CuSO₄ reference cell. The reference set point potential of the rectifier unit(s) shall be capable of adjustment from -850 mV to -1050 mV. The reference cell potential shall be monitored free of IR drop. Total bare surface area to be protected shall be 100% of the submerged interior tank surfaces. Minimum current density shall be 1 ma / sq. ft. of the bare surface area.

A. Automatic Cathodic Protection Rectifier:

1. General:

The automatic cathodic protection unit shall be a Modular Automatic Cathodic Protection Unit (MACPU®) manufactured by Freeman Industries, Inc., and shall contain the necessary transformers, rectifiers, meters, control circuits, circuit breakers, wiring, etc., to afford adequate cathodic protection to protect the structure. It shall be designed for 60 Hertz, 120 volt, single phase operation.

2. Enclosure:

The MACPU® shall be housed in a NEMA 4X stainless steel enclosure with a provision for locking. It should be designed to contain up to five independently controlled rectifiers and their associated circuits.

3. Meters:

System monitoring shall utilize a digital meter and be capable of monitoring anode current, anode voltage, reference cell voltage, and reference voltage for up to five independently controlled rectifiers.

4. Control Circuitry:

The control circuitry shall be able to control rectifier output in any one of three

modes:

- a) Automatic Potential Control Mode. In this mode the control circuits sense the potential of a reference half cell electrode located within the electrolyte and automatically adjust the rectifier current to maintain the half cell potential at a desired value. Reference cell potentials shall be free of "IR" drop error.
- b) Voltage Control Mode. The control circuits should be able to maintain a constant anode voltage independent of anode current or other parameters within the rated voltage and current ranges of the control unit.
- c) Current Control Mode. The control circuits should be able to maintain a constant current output independent of voltages required within the rated voltage and current ranges of the control unit.

5. Overload and Short Circuit Protection:

The control unit should be designed to sustain continuous short circuit conditions and prevent overloading of system components during normal operation. Once short circuit or overload conditions cease, control unit should automatically restart its normal operation.

B. Submerged Floating Anode System:

1. Bowl Submerged Floating Anode System:

The submerged floating anode system shall be designed for a minimum life of 20 years and shall be securely attached to the tank to prevent damage from ice conditions. The anode system shall consist of platinized niobium wire anodes with a minimum diameter of 0.062 in. with a minimum of 25 micro-inch of platinum. The anodes shall be attached to a buoyant submerged structure suspended to the interior tank walls or floor by flexible attachments, preferably 5/16 in. polyester rope. Welding of anode mounting anchors will be 1/8 in. fillet welded all around.

2. Wet Riser Anode System:

The wet riser anode (if applicable) shall consist of a vertically suspended platinized niobium wire anode attached to a 5/16 in. polyester support rope. The anode shall be secured to the support rope every 10 ft. minimum or as necessary. The anode shall be secured at the top and bottom to eliminate the anode coming in contact with the interior walls of the wet riser. The anode shall be designed for uniform distribution of current. Welding of anode mounting anchors will be 1/8 in. fillet welded all around.

3. Anode and Reference Electrode Lead Wires Entrance Fitting:

- a) Anode and Reference Electrode lead wires shall enter the tank below the minimum water level through pressure tight fittings. The pressure entrance coupling shall be a maximum size of 1-1/2 inches with a minimum rating of 3000 lb. Welding of the pressure entrance coupling will be completed by a certified welder.
- b) As an alternate to a. for access tube type tanks, a 3/4" conduit may be used to carry the DC and control wiring from the rectifier to the top of the tank. A second conduit line will be run on the water side of the tank access tube to feed the submerged anode. This eliminates the need for a pressure entrance fitting in the access tube.

C. Reference Electrodes and IR Drop Correctors

1. Reference Electrodes:

Each independent rectifier circuit shall utilize a Cu-CuSO₄ half-cell reference electrode designed with a minimum ten year life for monitoring the submerged steel potentials.

2. IR Drop Correctors:

The measured potentials of each rectifier circuit shall be free of IR Drop error by utilizing IR Drop Correctors as manufactured by Freeman Industries, Inc

D. Criteria for Protection:

After the system has been set into operation by an authorized manufacturer's representative, complete potential tests will be performed to confirm that protection is being achieved in conformance with criteria established by the National Association of Corrosion Engineers in the NACE Standard Practice SP0388-2007.

E. Guarantee:

The cathodic Protection System shall be guaranteed against all defects in materials and workmanship for a period of one year.

F. Service Contract:

The proper operation of cathodic protection systems depends on adequate periodic maintenance and testing. As an additional submittal the bidder shall supply an annual service contract to cover all maintenance requirements for the installed system. The contract shall provide for the following:

1. Inspection and adjustment of the equipment once per year during the period covered by the proposal.
2. Complete maintenance of the equipment by furnishing all labor and equipment to replace or repair, all parts worn or damaged so as to impair the operation of the system, except those parts damaged through war, fire, Acts of God, negligence, tampering or other fault of the purchaser.

G. Testing of the Cathodic Protection System:

1. The cathodic protection system is to be left off for the paint warranty period, however it shall be temporarily put into operation and tested by experienced personnel of the manufacturer to determine that it does provide protection in accordance with NACE Standard Practice SP0388-2007, and then it shall be turned off for the paint warranty period.
2. After the paint warranty period ends, the cathodic protection system shall be tested by experienced personnel of the manufacturer to determine that it does provide protection in accordance with NACE Standard Practice SP0388-2007.

H. Training of Personnel:

A representative of the manufacturer will train personnel on the operation and monitoring of the cathodic protection system. This will include recording rectifier parameters and transmitting them to the manufacturer for review, so that continued protection is assured.

2.8 TANK IDENTIFICATION PLATE

Provide a stainless steel plate with stamped or etched text identifying the contractor's name, contractor's project number, year constructed, nominal capacity, overflow elevation and finished grade elevation. The plate shall be affixed to the concrete pedestal adjacent to the manway door at approximately 5' above finished grade.

3. EXECUTION

3.1 TANK INSTALLATION

- A. Tanks shall be constructed in accordance with the manufacturer's approved drawings and as indicated. The elevated tank shall be set level and plumb in final position. All pipe fittings, valves and other appurtenances shall be adequately supported with special supports provided at each bend or elbow with adequate rigidity and flexibility from the tank support structure.
- B. Concrete shall not be placed during precipitation or extreme temperatures unless protection is provided.
- C. A mock up panel shall be constructed using the proposed form work, concrete and placement methods. Minimum size will be 4 ft wide by 6 ft high. This panel shall be agreed upon by the Contractor, Engineer, Owner/Developer and City as the reference standard with which to judge surface quality, appearance and uniformity of texture and color.

3.2 TANK PREPARATION AND PAINTING

- A. The interior surface of the tank shall be cleaned, prepared and painted with an inside paint system in accordance with the procedures of AWWA D102.
- B. The exterior surface of the tank shall be cleaned, prepared and painted with an outside paint system in accordance with the procedures of AWWA D102.
- C. Field Inspection: The inspector shall provide daily inspection during the field blasting and application of the primer, intermittent inspection during the application of the intermediate coat, inspection of the intermediate coat prior to the application of the finish coat and intermittent inspection during the application of the final coat.
- D. Final Inspection: The inspector shall be responsible for Evaluation of the paint application equipment, monitoring and measuring ambient conditions to insure suitable atmosphere for the application of the coatings, inspection of surface preparation, blast quality, mil profile, monitoring of mixing and application of coatings, determination of both wet and dry film thickness of applied coatings, holiday testing, adhesion testing and final inspection of all completed work. Upon completion of the work, the inspector shall submit a final written report with photographs, inspection and testing logs to the City.

3.3 TANK TESTING

- A. The Owner shall furnish potable water for testing. The booster pumps will be required to fill the tank to the maximum working level. Any leaks in the tank that are disclosed by this test shall be repaired by gouging out defective areas and rewelding. No repair work shall be done on any joint unless the water in the tank is at least two feet below the joint being repaired. Any paint damaged by repairs shall be properly restored.
- B. If the tank testing fails, the contractor shall be responsible for the cost of water for all subsequent flushing, filling, and testing.

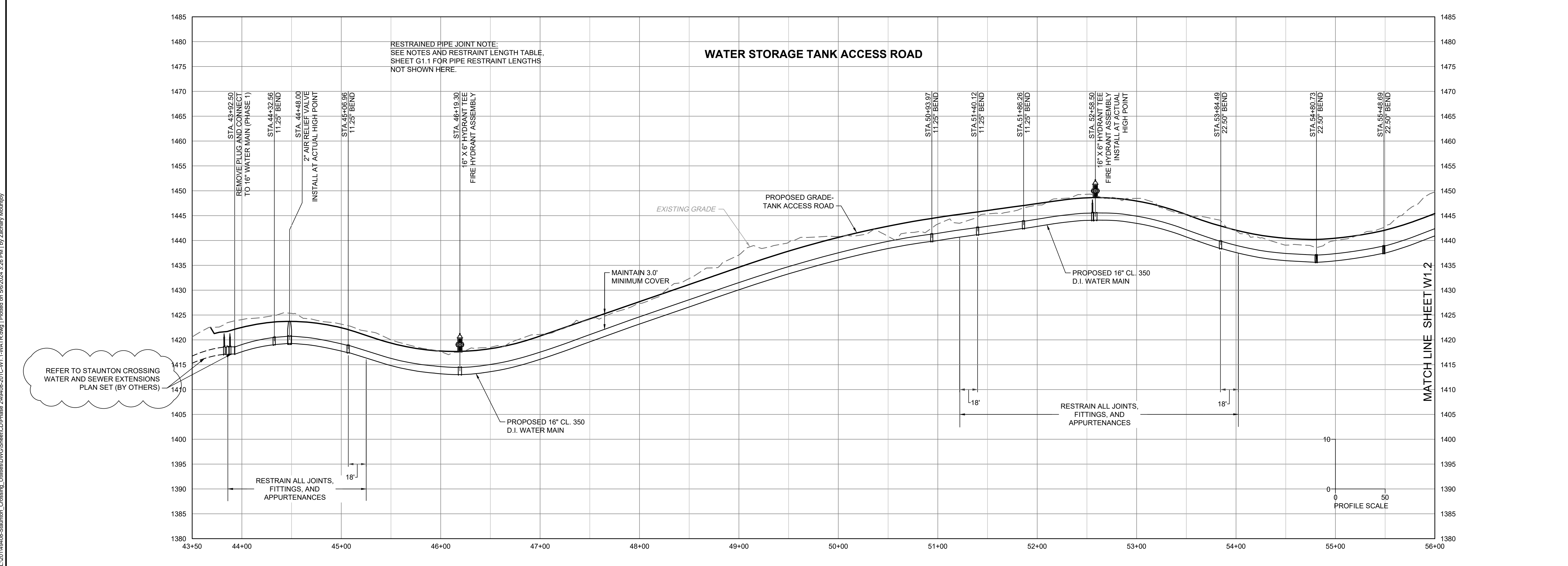
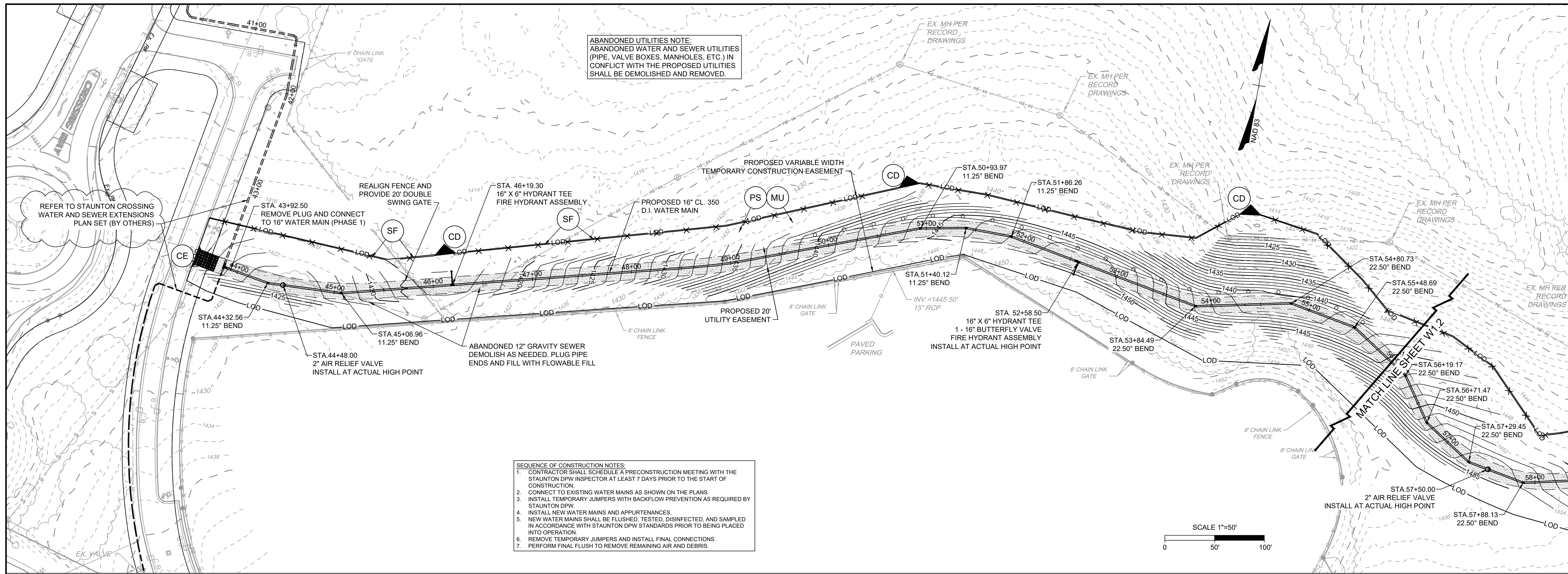
3.4 TANK DISINFECTION

- A. The tank shall be sprayed, filled and satisfactorily disinfected in accordance with AWWA C652, Chlorination Method Number 2. The chlorination shall conform to the "VDH Waterworks Regulations" prior to being placed in operation. The disinfection of the tank shall be repeated until it is determined, by bacteriological testing, that the water is free of coliform bacteria. Only potable water shall be used for initial cleaning of the storage tank.
- B. Testing of the water following disinfection:
 - 1. All chlorine residual determinations shall be made using only those methods approved by the Virginia Department of Health (VDH).
 - 2. Two water samples for bacteriological analysis must be collected at least 24 hours apart and analyzed by a certified laboratory. The results of these samples must indicate no coliform contamination before the tank can be placed into service. If contamination is indicated, the disinfection procedure must be repeated.
 - 3. The waterline jumper connection to the public water system shall be left in place until the tank is disinfected and after two good water samples are obtained. Then the waterline jumper connection can be removed.
- C. Disposal of water shall be in accordance with state and local regulations. The Contractor may dispose of disinfection water to the tank overflow line via the bottom drain valve while providing dechlorination to reduce the chlorine concentration to zero (0).

3.5 HYDROSTATIC TESTING FOR PIPING

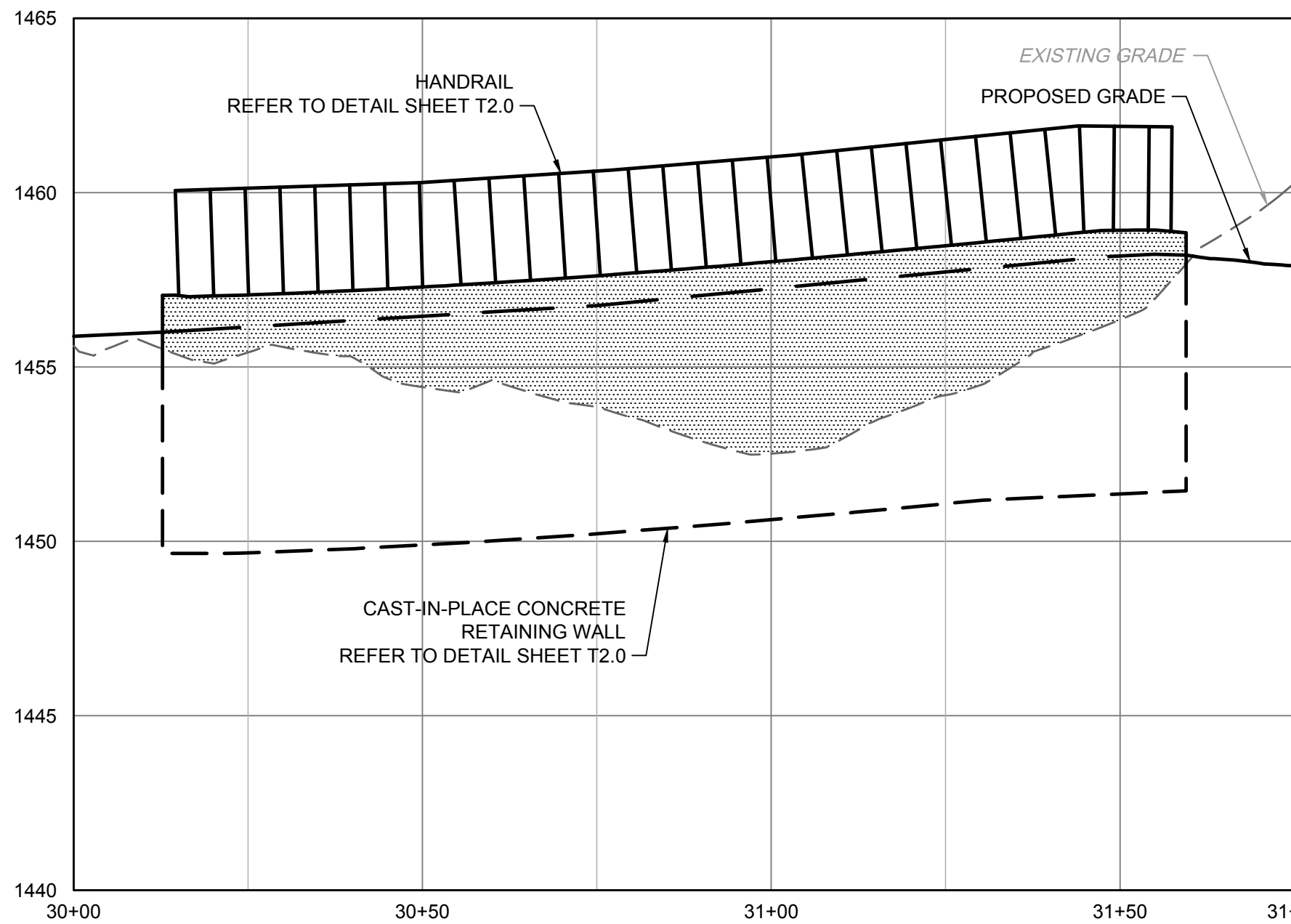
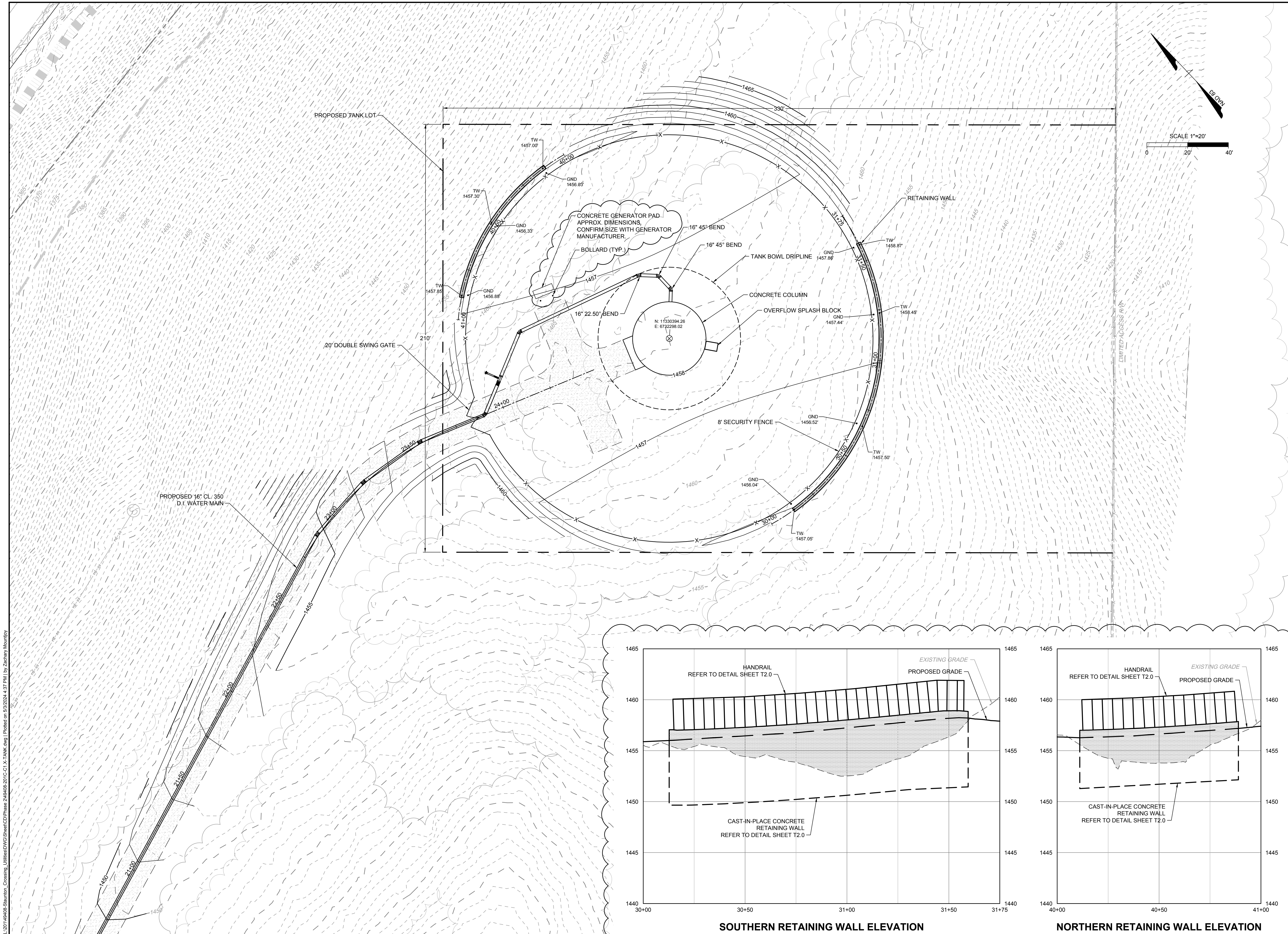
- A. The Contractor shall provide all labor, materials and personnel to conduct the following test of the water system. Tests must be performed in the presence of the Owner's/Developer's authorized representative and at least 48 hours advance notice of the time for testing must be given to the City.
- B. Each valved section of the water system shall be subjected to a hydrostatic testing for pressure and leakage in accordance with AWWA C600. Prior to applying pressure to the lines, all joint restraints shall have been completed. As the pipes are being filled, all air shall be expelled. After the system is filled, all taps shall be tightly plugged. Any defects discovered during this test shall be corrected as directed and the test shall be repeated until the results are satisfactory. The Contractor shall provide all equipment and materials and perform all labor necessary to conduct the test in a manner satisfactory to the Engineer. All lines shall be tested to a pressure of 150 p.s.i. measured at the highest point on the section being tested. The pressure shall be accurately maintained throughout the duration of the test. The specified test pressure shall be maintained for a period of 120 minutes. Any joint showing visible leakage shall be repaired and other corrective action taken as required to maintain the test pressure for the duration of the test.

END OF SECTION

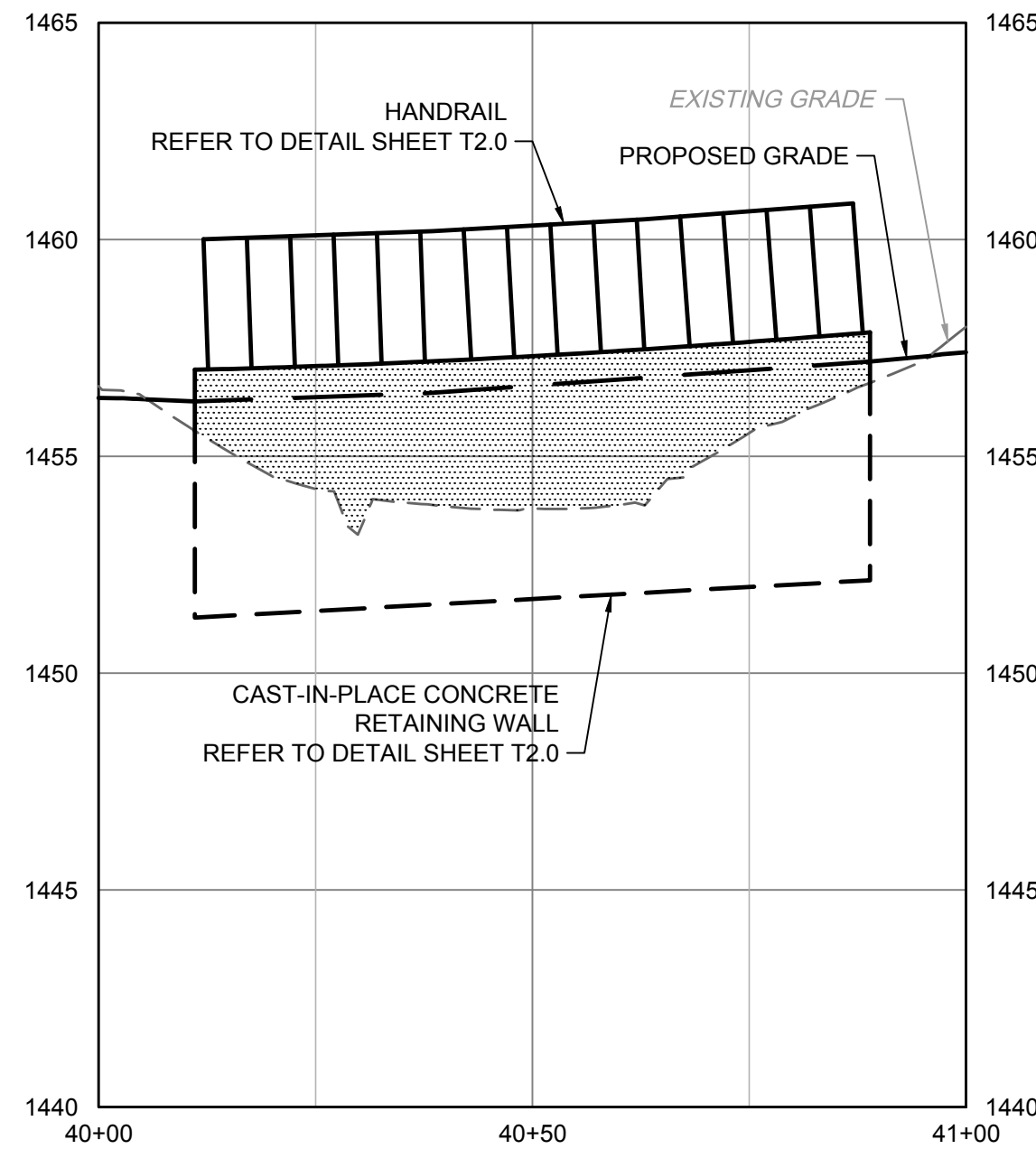


TIMMONS GROUP	STAUNTON CROSSING - ELEVATED WATER STORAGE TANK CITY OF STAUNTON, VIRGINIA WATER MAIN PLAN AND PROFILE	JOB NO.	49408		
		SHEET NO.	WI.1		
		DRAWN BY	Z. MOUNTJOY		
		DESIGNED BY	J. CARTER		
		CHECKED BY	B. STRICKLAND		
		SCALE	H: 1" = 50' V: 1" = 10'		
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		DATE	05/02/2024	REVISED PER CITY COMMENTS	
				ADDENDUM 1	
					

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SOUTHERN RETAINING WALL ELEVATION

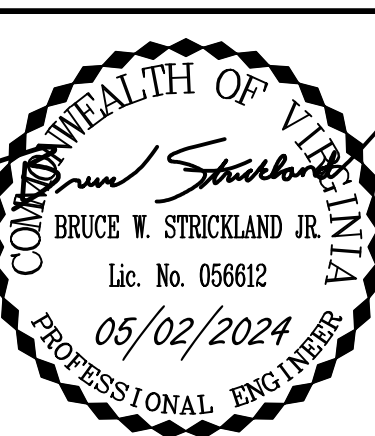


NORTHERN RETAINING WALL ELEVATION

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STAUNTON CROSSING - ELEVATED WATER STORAGE TANK
CITY OF STAUNTON, VIRGINIA
TANK SITE LAYOUT

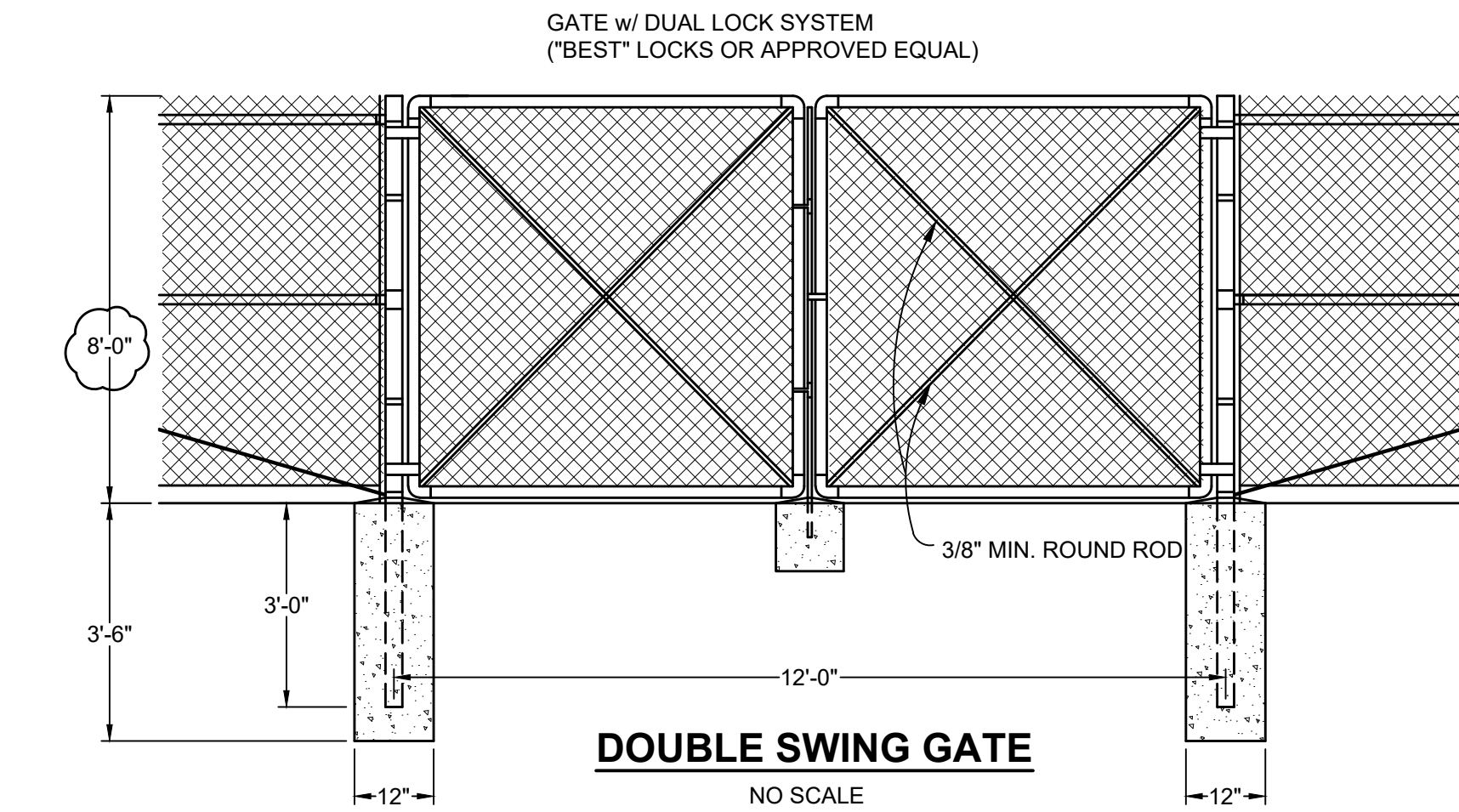
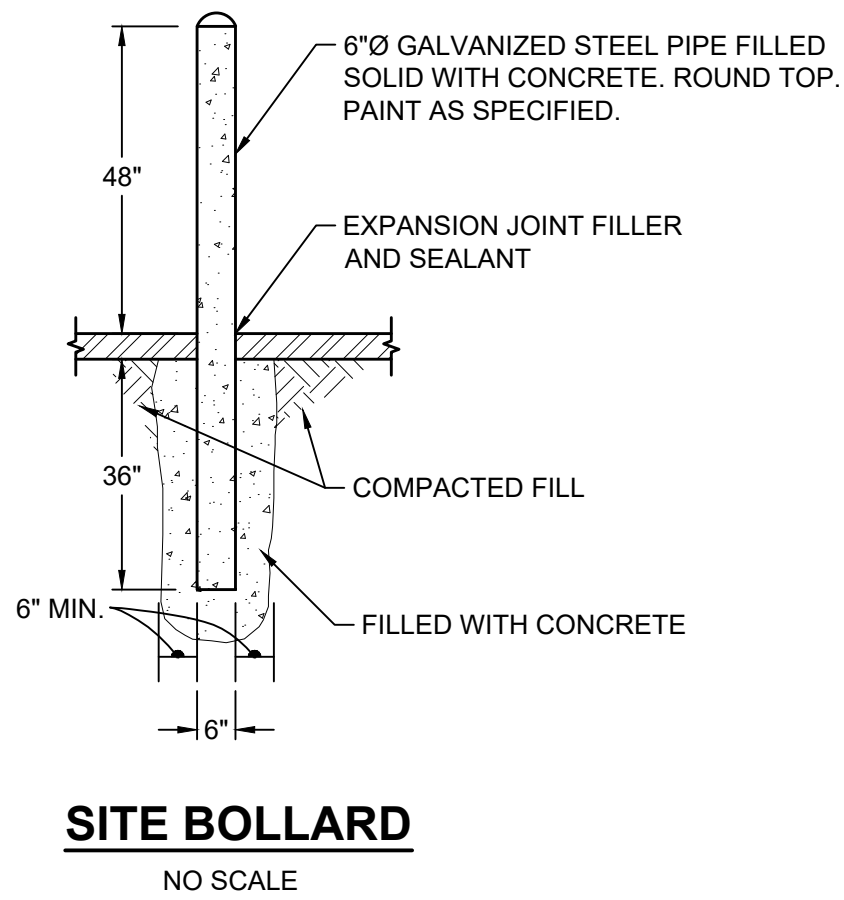
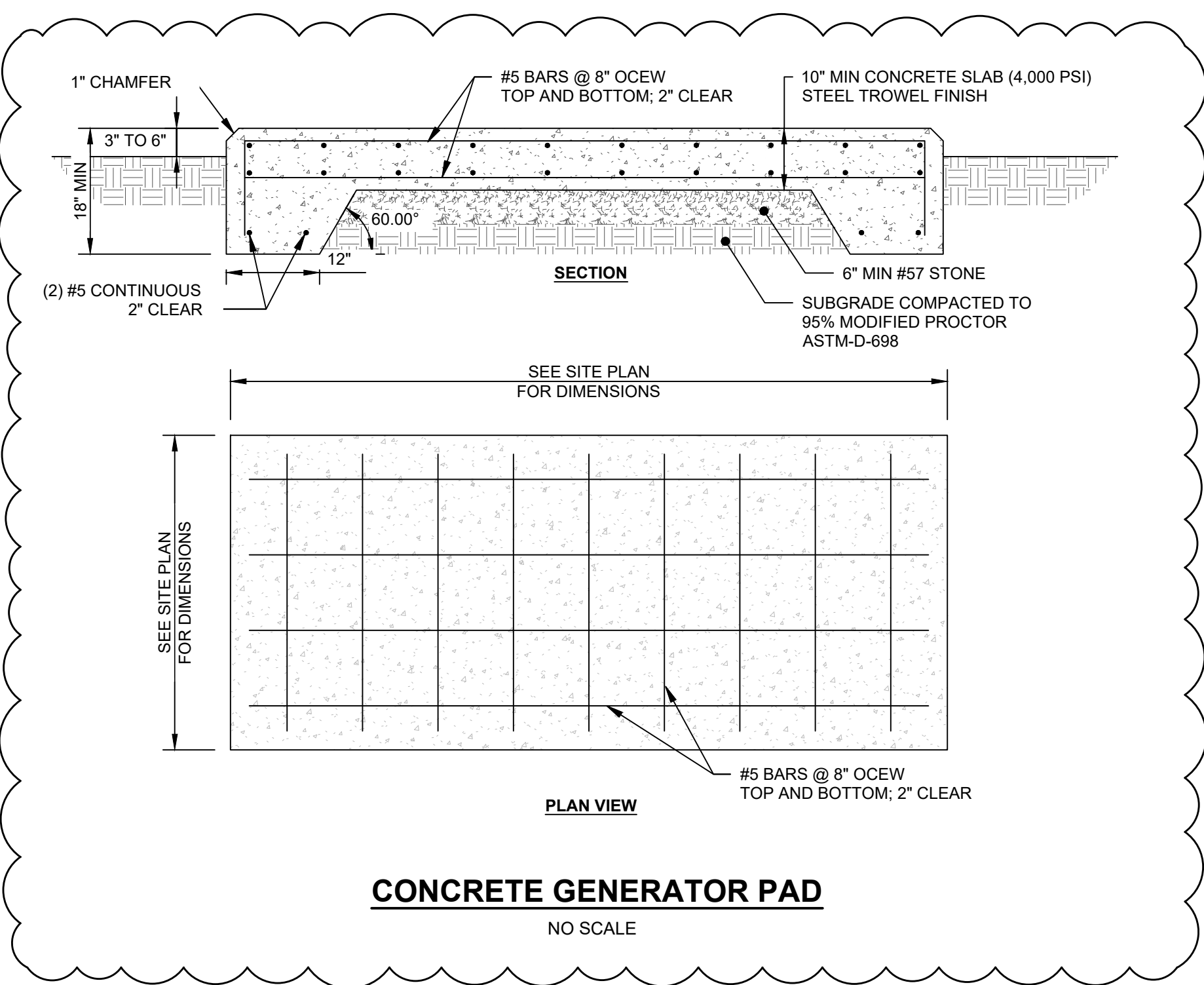
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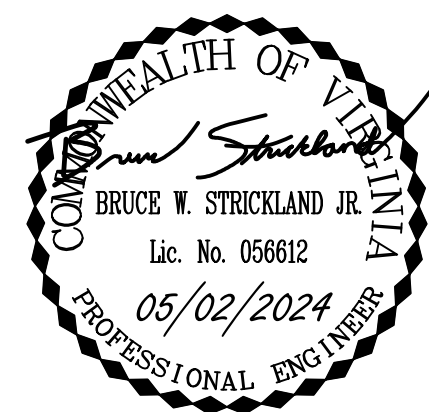
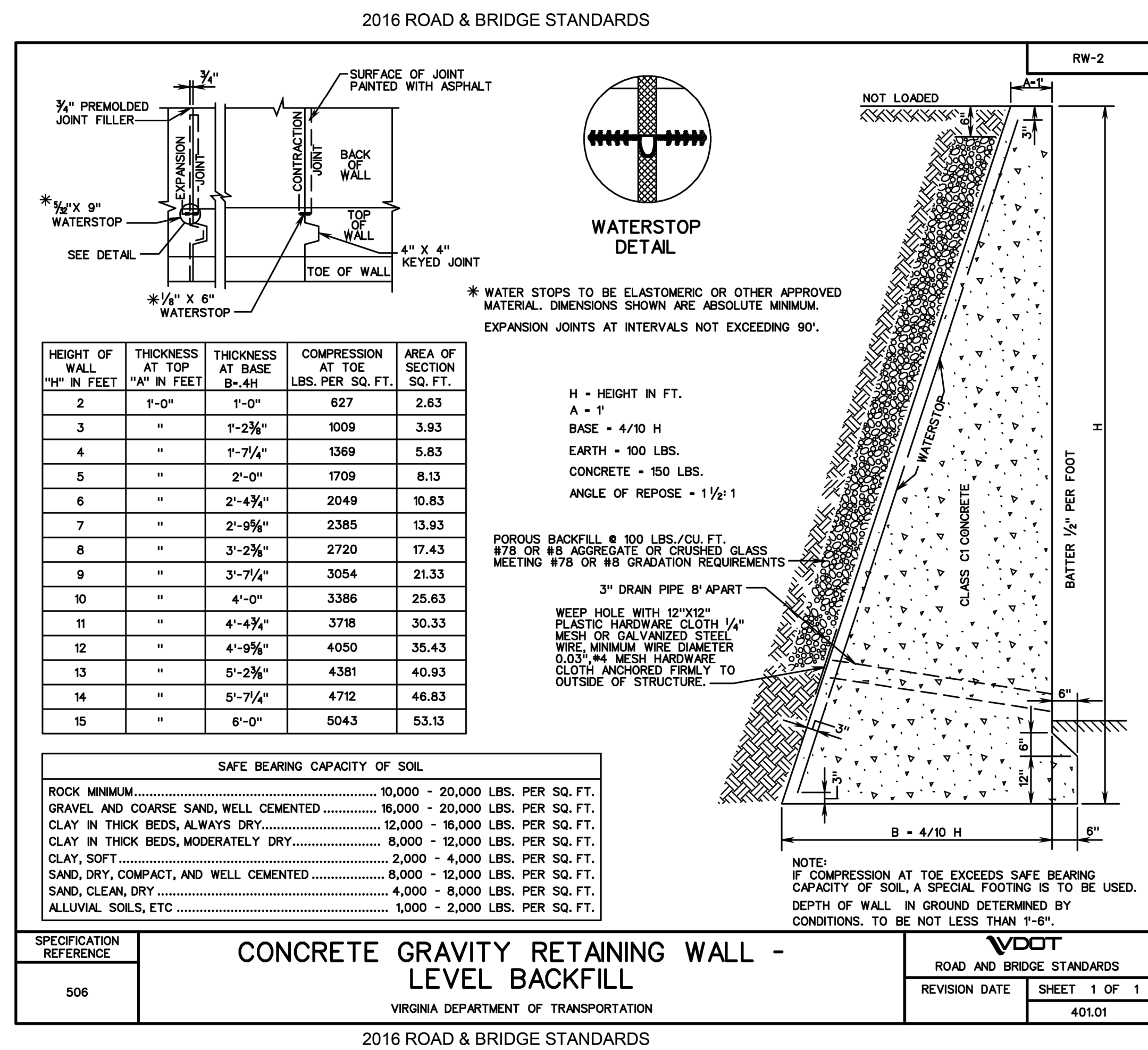
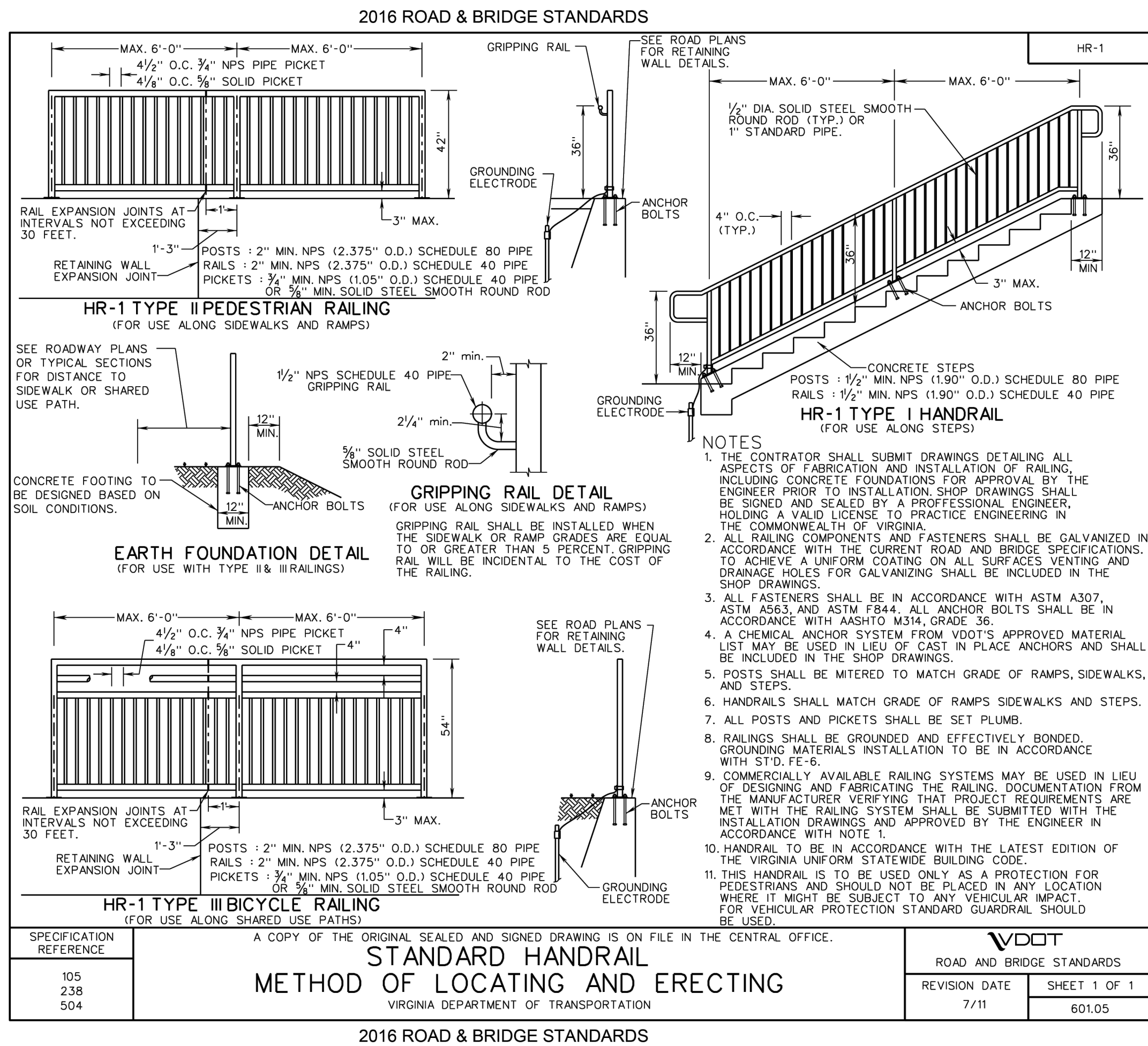
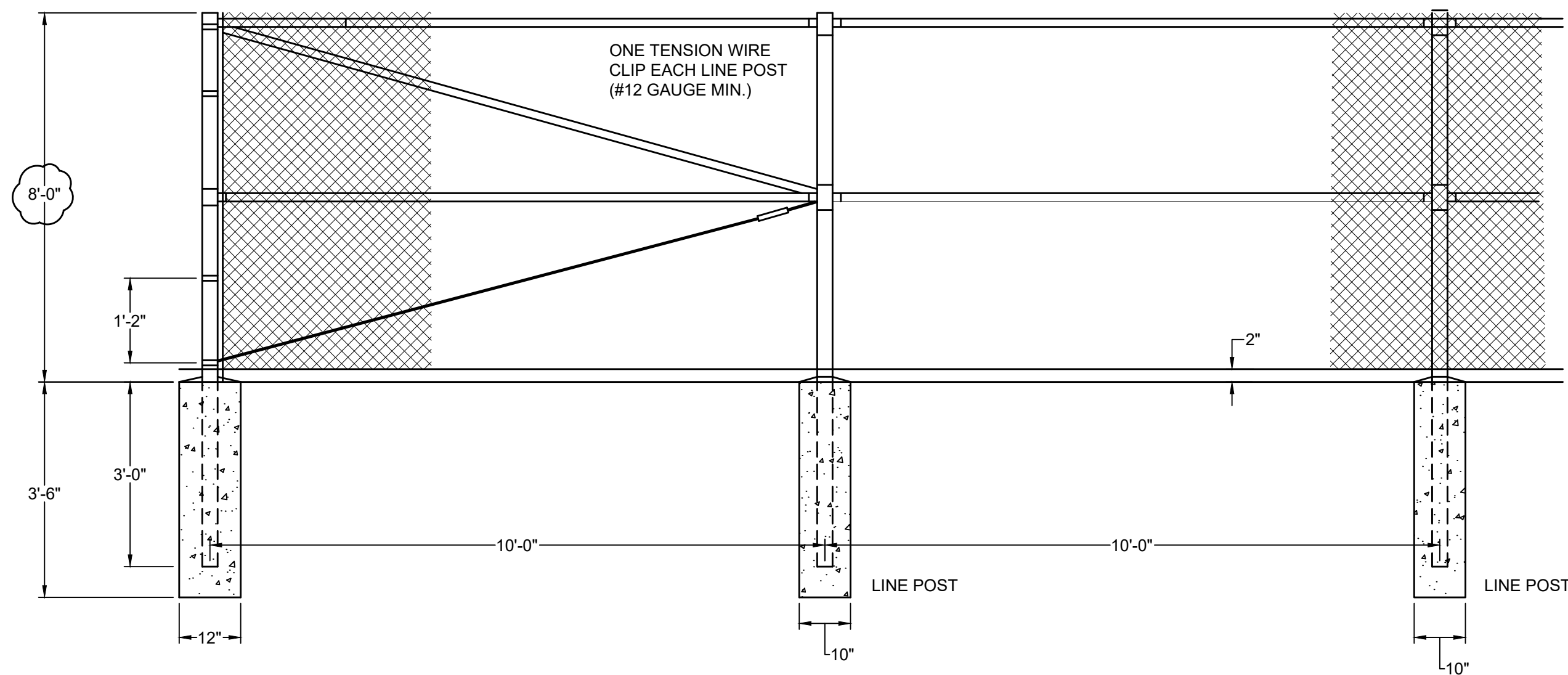
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YOUR VISION ACHIEVED THROUGH OURS.	REVISION DESCRIPTION
DATE	REVISED PER CITY COMMENTS
01/19/2024	ADDENDUM 1
05/02/2024	
DATE	
5/2/2024	
DRAWN BY	
J. MARSHALL	
DESIGNED BY	
B. STRICKLAND	
CHECKED BY	
B. STRICKLAND	
SCALE	
1" = 20'	

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NOTE:
FENCE POSTS, SUPPORTS,
AND FABRIC SHALL BE
BLACK PVC CLAD



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DATE REVISED PER CITY COMMENTS
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05/02/2024 ADDENDUM 1

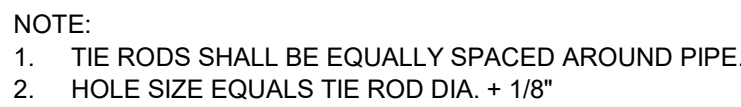
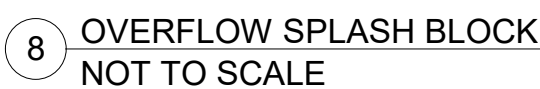
DATE
5/2/2024
DRAWN BY
Z. MOUNTJOY
DESIGNED BY
B. STRICKLAND
CHECKED BY
B. STRICKLAND
SCALE
AS SHOWN

TIMMONS GROUP

STAUNTON CROSSING - ELEVATED WATER STORAGE TANK
CITY OF STAUNTON, VIRGINIA
TANK SITE DETAILS

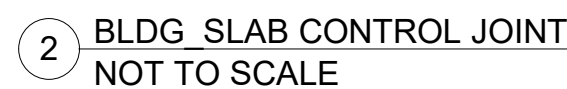
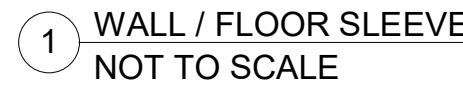
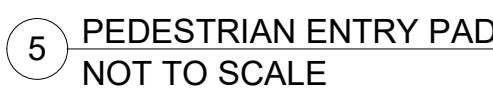
JOB NO.
49408
SHEET NO.
T2.0

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PIPE SIZE	TIERODS		FLANGE CLAMP			
	NO.	DIA.	THICKNESS	NO. OF FLANGE BOLTS PER CLAMP	"A"	"B"
6"	2	1/2"	1/2"	2	2"	7 3/4"
8"	2	5/8"	1/2"	2	2"	8 5/8"
10"	3	3/4"	1/2"	2	2"	7 3/4"
12"	3	1"	1/2"	2	2"	8 1/2"
14"	3	1 1/8"	3/4"	2	2"	9"
16"	4	1 1/8"	1"	2		
18"	5	1 1/8"	1"	2		
20"	6	1 1/8"	1"	2		
24"	9	1 1/8"	1"	2		
ALL PLATES, RODS, & NUTS TO BE STAINLESS STEEL						

4 SLEEVE COUPLING RESTRAINT
NOT TO SCALE



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REVISION DESCRIPTION

DATE _____

6/2

DRAW

J. MARSHALL

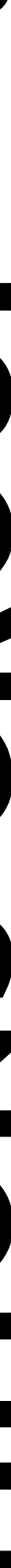
DESIGNED BY

B. STRICKLAND

CHECKED BY

SCALE

AS NOTED

The logo for the Timmons Group, featuring the company name in a bold, sans-serif font, followed by a graphic of a series of dots of increasing size arranged in a curved, upward trajectory.

STAUNTON CROSSING - ELEVATED WATER STORAGE TANK

CITY OF STAUNTON, VIRGINIA

JOB NO.
49408.003

SHEET NO.
M2.1

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