AECOM Technical Services, Inc.
5438 Wade Park Blvd
Raleigh, NC 27607
Phone: (919) 461-1100

February 6, 2026

RE: Replacement of 3.0-Million Gallon Raw Water Reservoir
AECOM Project No. 60744999

ADDENDUM NO. 2 – February 6, 2026

TO: ALL HOLDERS OF RECORD OF CONTRACT DOCUMENTS

Acknowledge receipt of this addendum by inserting its number and date in the Bid Form. Failure to do so may subject bidder to disqualification. This addendum forms a part of the Contract Documents. It modifies them as follows:

SPECIFICATIONS

Section 001113 – Advertisement for Bids

Due to the magnitude of RFIs submitted, the bid turn in date has been revised. Sealed Bids for the construction of the **Replacement of 3.0-Million-Gallon Raw Water Tank at the City's Water Treatment Plant** be received by hand delivery to the City of Elizabeth City, in **the City Hall Council Chambers, second floor, located at 306 East Colonial Avenue, Elizabeth City, NC**, until **2:00 pm** local time on **March 12, 2026**. A mandatory second pre-bid conference will be held at 1:00 PM local time on **February 24, 2026, at 1 Wilson Avenue, Elizabeth City, North Carolina**, for contractors who did not attend the initial pre-bid meeting. Attendance at this pre-bid conference is strongly encouraged for manufacturers and general contractors who attended the initial pre-bid meeting. Any additional RFIs to this project are due by **February 10th, 2026.**

Section 131624 – Prestressed Concrete Tanks

1. Part 6.C. Design parameters modified: Max Water Level changed from 46.33 to 46.09.
2. Part 1.4.A.3, section removed.
3. Part 1.4.B.3, precon added to list of approved manufacturers.
4. Part 2.12.C, interior coatings removed
5. Part 1.6.C Design table, Flat roof removed

DRAWINGS

1. **Drawing D01.10 -** Section view A wall height changed from 32'-9" to 32'-2".

2. **Drawing D02.20** – 12" Overflow Section additional pipe supports added.

3. **Drawing D02.20** – 12" Overflow Section HWL modified to 46.08, from 46.33 to eliminate water encroachment on dome roofs.

END OF ADDENDUM NO. 2

SECTION 00 11 13

ADVERTISEMENT FOR BIDS

CITY OF ELIZABETH CITY, NORTH CAROLINA
REPLACEMENT OF 3.0-MILLION-GALLON RAW WATER TANK AT THE
CITY'S WATER TREATMENT PLANT

Sealed Bids for the construction of the **Replacement of 3.0-Million-Gallon Raw Water Tank at the City's Water Treatment Plant** be received by hand delivery to the City of Elizabeth City, in **the City Hall Council Chambers, second floor, located at 306 East Colonial Avenue, Elizabeth City, NC**, until **2:00 pm** local time on **March 12, 2026**. A mandatory pre-bid conference will be held at 1:00 PM local time on **February 24, 2026**, at **1 Wilson Avenue, Elizabeth City, NC**, for contractors who did not attend the initial pre-bid meeting. Due to the volume of RFIs received, attendance at this pre-bid conference is strongly encouraged for manufacturers and general contractors who attended the initial pre-bid meeting.

The Project consists of Replacement of 3.0-million-gallon Raw Water Reservoir Tank, and all else required, complete in every respect, tested and accepted, placed into operation, to the satisfaction of the Owner and Engineer. The foregoing description shall not be construed as a complete description of all work required.

Bids will be received for a General Construction Contract. Bids shall be on a lump sum basis.

The Issuing Office for the Bidding Documents is **AECOM Technical Services of North Carolina, Inc.,** located at 5438 Wade Park Boulevard, Suite 200, Raleigh, NC 27607, telephone 919-819-9352, Attention Keiran Ryan, email address: Keiran.ryan@aecom.com. Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of 8:00 am to 5:00 pm, and may obtain copies of the Bidding Documents from the Issuing Office as described below.

Bidding Contract Documents may be examined at the following institutions during normal business hours:

1. Carolina's AGC digital plan room at www.cagc.org on IBuild
2. CDC News Office in Cary, NC (www.cdcnews.com)
3. McGraw Hill Construction Dodge digital plan room at http://dodge.construction.com/plans/
4. Hispanic Contractors Association of the Carolinas plan room in Raleigh, NC (www.hcacarolinas.org/)

Bidding Documents may be obtained from the Issuing Office during the hours indicated above. Bidding Documents are available by way of electronic file, pdf format.

A non-mandatory pre-bid conference will be held at **10:00 am** local time on **January 5, 2026** at the project site, located at the intersection of South Water Street and East Church Street, Elizabeth City, NC. Attendance by the prime bidder is required.

The City's goal is to contract or sub-contract ten percent (10%) of the contract amount to certified MWBE's on this project.

Bid Security in the amount of five percent (5%) of the Bid must accompany each Bid.

Owner: **City of Elizabeth City**
By: **E. Kirk Rivers**
Title: **Mayor**
Date: **December, 2025**

END OF SECTION

SECTION 13 16 24

PRESTRESSED CONCRETE TANKS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. This section specifies the design and construction of an ANSI/AWWA D110 wire-wound prestressed concrete storage tank with a Type II core wall and galvanized steel diaphragm including reinforced concrete dome, membrane floor and all reinforcing, concrete work, accessories, disinfection and testing directly related to the tank.

B. The tank contractor is responsible for furnishing all labor, materials, tools and equipment necessary to design and construct the prestressed concrete storage tank, including all exterior coatings, as indicated on the drawings and as described in this specification.

1.02 REFERENCES:

A. American Association of State Highway and Transportation Officials (AASHTO):

1. H-20: Wheel Loads

B. American Concrete Institute (ACI):

1. 117: Specification for Tolerances for Concrete Construction and Materials
2. 301/301M: Specifications for Structural Concrete for Buildings
3. 305R: Guide to Hot Weather Concreting
4. 306R: Guide to Cold Weather Concreting
5. 347R: Guide to Formwork for Concrete
6. 350/350R: Code Requirements for Environmental Engineering Concrete Structures and Commentary
7. 350.3: Seismic Design of Liquid-Containing Concrete Structures and Commentary
8. 372R: Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures
9. 506R: Guide to Shotcrete
10. 506.2: Specification for Materials, Proportioning, and Application of Shotcrete

C. American National Standards Institute (ANSI):

1. A21.10: Ductile-Iron and Gray-Iron Fittings for Water
2. A21.15: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
3. A21.50: Thickness Design of Ductile-Iron Pipe
4. A21.51: Ductile-Iron Pipe, Centrifugally Cast

D. American Society of Civil Engineers (ASCE):

1. 7: Minimum Design Loads for Buildings and Other Structures - Includes Supplement No. 1

E. ASTM International (ASTM):

1. A416/A416M: Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
2. A475/475M: Standard Specification for Zinc-Coated Steel Wire Strand
3. A603/603M: Standard Specification for Zinc-Coated Steel Structural Wire Rope
4. A615/A615M: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
5. A653/653M: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by Hot Dip Process
6. A821/A821M: Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks
7. A884/A885M: Standard Specification for Epoxy Coated Steel Wire and Welded Wire Reinforcement
8. A1064/A1064M: Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
9. C31/C31M: Standard Practice for Making and Curing Concrete Test Specimens in the Field
10. C33/C33M: Standard Specification for Concrete Aggregates
11. C39/C39M: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
12. C143/C143M: Standard Test Method for Slump of Hydraulic-Cement
13. C172/C172M: Standard Practice for Sampling Freshly Mixed Concrete
14. C231/C231M: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
15. C881/C881M: Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
16. D1056: Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
17. D1557: Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
18. D4397: Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
19. F593: Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

F. American Water Works Association (AWWA):

1. C652: Disinfection of Water-Storage Facilities
2. D110: Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks

G. U.S. Army Corps of Engineers (COE):

1. CRD C572: Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop

H. American Welding Society (AWS):

1. D1.2: Structural Welding Code – Aluminum

I. Geotechnical Report:

1. Appendix D: Geotechnical Report

1.03 SUBMITTALS:

A. Prequalification Data: Provide prequalification data prior to the bid in accordance with Section 1.04 B. of this specification.

B. Shop Drawings: Provide shop drawings with a minimum size of 18" x 24" with a complete plan, elevation, and sectional views showing critical dimensions as follows:

1. Size, location and number of all reinforcing bars.
2. Thickness of all parts of the tank structure including floor, core wall, dome, and covercoat.
3. Prestressing schedule including number and placement of prestressing wires on the tank wall and total applied force per foot of wall height.
4. Location and details of all accessories required.

C. Concrete Data: Submit concrete design mixes including ingredient proportions, minimum cementitious content, and water/cementitious ratio in accordance with Section 2.02 and 2.03 of this specification.

D. Design Data: Submit structural calculations for the tank, signed and sealed by a professional engineer in accordance with Section 1.04 A.4 of this specification.

E. Coating Data: Submit color charts for review by the engineer and owner. Once a color is chosen, submit actual drawdown samples for final approval prior to application of coating.

F. Test Reports: Submit concrete strength reports for 7-day and 28-day breaks taken in accordance with the requirements of Section 3.03 A.1.

G. Warranty Document: Submit warranty document in Owner's name in accordance with Section 1.05. of this specification.

H. Cleaning and Disinfection Plan: Submit a cleaning and disinfection plan which complies with Section 3.04 of this specification.

I. Project Record Documents: Record actual location layout and final configuration of tank and accessories on shop drawings and submit to engineer after construction of the tank is complete.

1.04 QUALITY ASSURANCE:

A. Qualifications and Experience:

1. Tank Construction Company: Shall be a firm with a minimum of three years of experience in the design and construction of ANSI/AWWA D110 wire-wound, circular prestressed concrete tanks with Type II core walls to ensure the owner that it has the organization, technical skill, quality control, reliability, and financial stability to build and guarantee the tank in accordance with the quality required by these specifications. The tank construction company shall have built with its own resources and have under warranty, a minimum of ten (10) dome-covered prestressed concrete tanks of equal or greater size than that required for this project which meet these specifications and are now providing satisfactory service. The tank construction company specializing in manufacturing products specified in section 1.01.A shall have constructed at least five prestressed concrete tanks with Type II core walls of equal size or larger

in the last five years. The tank construction company shall be a licensed general contractor where the project is located. The tank construction company shall employ at least 1 American Concrete Institute (ACI) certified shotcrete nozzleman. All shotcrete shall be applied by or under the direct supervision of an ACI Certified nozzleman. Each ACI certified nozzleman shall have not less than 10 years of experience in reinforced shotcrete construction work on projects of similar size and character and shall be full-time staff members.

2. Construction: The entire tank, including all portions of the floor, wall, and roof shall be built by the tank construction company, using its own trained personnel and equipment.
3. Design: All design work for the tank shall be performed by a professional engineer with no less than five years of experience in the design and construction of ANSI/AWWA D110 wire-wound, circular prestressed concrete tanks with Type II core walls. The professional engineer shall be a full-time staff member of the tank construction company and shall be licensed to work in the state where the project is located. The professional engineer shall have no less than 10 years of experience in the water & wastewater industries.
4. The diaphragm design and epoxy injection procedure shall have been used in the ten tanks required in Section 1.04 A.1 of this specification.
5. Safety: The tank construction company shall have a full written safety manual to include programs for the following areas of safety Confined Space, Personal Protective Equipment (PPE), and Scaffold E&D. The bidder must have an Incident Rate (IR) below 4.5 which is the NAICS code national benchmark. The bidder must have a Days Away, Restricted or Transferred (DART) rate below 2.9 which is the national benchmark for specialty contractors for concrete work.

B. Prequalification:

1. All tank construction companies must be prequalified and meet the criteria stated in Section 1.04 A.1 of this specification to be considered an acceptable tank builder.
2. A complete prequalification package shall be submitted to the Engineer for consideration 14 days prior to the date set for receipt of bids. The prequalification submittal shall include the following items:
   a. Complete construction drawings showing the principal sizes, thicknesses, reinforcing size and spacing for all structural members including: floor, wall, dome shell and dome edge.
   b. Complete details of other structural appurtenances as required by the project drawings showing principal sizes, thickness and reinforcing sizes and spacing.
   c. Complete design calculations which address applicable loads provided in Section 1.06 B. of this specification.
   d. Complete experience record for the tanks used to meet the experience requirement of Section 1.04 A. of this specification that have been designed and built in the tank construction company's own name and shall include only those tanks that are under the company's warranty. The record shall include the size of the tank, name, address and telephone number of the Owner, the year of construction and the name and telephone number of the Engineer for the project.
   e. Experience in prestressed concrete tanks of the type specified herein for the construction superintendent, foreman, and three most experienced tank builders. Experience shall be with the bidder during the three previous years.

f. Construction schedule which details the duration for tank construction.

3. The following is preapproved as acceptable tank construction company:
   a. The Crom Corporation, Gainesville, Florida.
   b. Precon Corporation, Newberry, Florida
   c. Approved equal.

1.05 WARRANTY:

A. The tank construction company shall provide a warranty for workmanship and materials on the complete structural portion of the tank for a five-year period starting 6 months after Crom's crew demobilization, after a successful leak test, or substantial completion, whichever is sooner. The warranty shall not apply to any accessory, equipment or product that is not a structural part of the tank and is manufactured by a company other than the tank construction company. The tank construction company shall provide a written company warranty to cover this five-year period.

B. If any leakage or other defects appear within the five-year period, the tank construction company shall promptly repair the tank at its own expense upon written notice by the Owner that such defects have been found. Leakage is defined as a stream flow of liquid appearing on the exterior of the tank, the source of which is from the inside of the tank. The tank construction company shall not be responsible for, nor liable for, any subsurface condition.

C. The tank construction company shall install all tank coatings and shall provide a warranty for workmanship and materials on all interior and exterior coatings for a five-year period starting 6 months after Crom's crew demobilization, after a successful leak test, or substantial completion, whichever is sooner. The tank construction company and the coatings manufacturer shall provide a written company warranty to cover this five-year period.

D. A coating system failure is defined as either (1) delamination of the coating, (2) a breach of the coating exposing the substrate below, or (3) chipping and peeling of the coating system not caused by physical damage or abrasion to the tank. Changes in color shall not be deemed a coating failure.

1.06 DESIGN CRITERIA:

A. The design shall be in conformance with applicable portions of American Concrete Institute (ACI) 372R Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures, ANSI/AWWA D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks with Type II core walls, and currently accepted engineering principles and practices for the design of such structures.

B. The following loadings shall be utilized in the design:

1. Fluid Loads: Shall be the weight of all liquid when the reservoir is filled to capacity. The unit weight of the liquid material shall be 62.4 lbs/ft3.
2. Roof Live Loads: Consideration shall be given to all applicable roof design loads in accordance with ANSI/AWWA D110, Section 3.03 and ASCE 7 whichever applicable. The minimum roof live load for the structure shall be 150 pounds per square foot.
3. Dead Loads: Consideration shall be given to all permanent imposed loads including concrete and steel.
4. Seismic Loads:

a. Seismic forces and moments resulting from water sloshing and seismic accelerations of the tank dome, wall, and water loads shall be calculated in accordance with ACI 350.3 or ANSI/AWWA D110.
b. If sufficient freeboard height is not provided to prevent uplift forces due to sloshing, the impulsive participation shall be increased due to the constrained motion of liquid, and the tank roof and its connection shall be designed to resist the uplift forces in accordance with P.K. Malhotra's "Earthquake Induced Sloshing in Tanks with Insufficient Freeboard".

5. Soil Pressure: Earth loads shall be determined by rational methods of soil mechanics. Soil pressure shall not be used in the design of the core wall to counteract hydraulic loads or provide residual compression in the wall.
6. Differential Backfill Loads: Forces from differential backfill loads shall be considered in the design and shall be based on the at-rest coefficient. Passive resistance shall not be used to resist differential backfill loads.
7. Wind Loads: Wind loads shall be considered in the design in accordance with ASCE 7.

C. Design Parameters:

Tank Volume:	3,000,000 gallons
Maximum Water Level:	Elev. 46.08’
Floor Level at Perimeter:	Elev. 13.33’
Finish Grade:	Elev. 13.00’
Inlet Pipe:	14” diameter
Outlet Pipe:	24” diameter
Drain Pipe:	4” diameter
Maximum Flow:	5 mgd
Tank Inside Diameter:	125 feet
Roof:	Dome
Floor:	Concrete membrane
Special Requirements:	Inner and outer cells

D. Subbase: A granular base material shall be used beneath the membrane slab when the subgrade materials do not allow free drainage.

1. The base material should consist of a clean, well-compacted, angular or sub-angular material with a minimum thickness of 6 in.
2. The gradation of the base material should be selected to permit free drainage without the loss of fines or intermixing with the subgrade material.
3. The maximum particle size of the base material should be limited to provide a relatively level working surface without potential intrusion of the base materials into the membrane floor slab concrete.
4. Base material should be compacted to 95 percent of the maximum laboratory density determined by ASTM D1557.

E. Floor: The design of the floor for the prestressed concrete tank shall conform to the following:

1. Concrete membrane floors shall be a minimum of 4" thick and have a minimum thickness of 8" of concrete over all pipe encasements and around sumps.
2. A minimum percentage of 0.60% reinforcing steel shall be used in the membrane floor. The minimum percentage shall apply to all thickened sections and shall extend a minimum of 2 ft into the adjacent membrane floor.

F. Core Wall:

1. The wire-wound, prestressed concrete tank core wall shall be designed as a thin shell cylindrical element using shotcrete and an embedded, mechanically bonded, galvanized steel shell diaphragm.
2. The design of the core wall shall take into account appropriate edge restraint. To compensate for bending moments, shrinkage, differential drying, and temperature stresses, the following minimum reinforcing steel shall be incorporated into the design:
   a. The top 2 ft of core wall shall have not less than 1% circumferential reinforcing.
   b. The bottom 3 ft of core wall shall have not less than 1% circumferential reinforcing.
   c. Inside Face:
      (1) The inside face of the core wall shall utilize the diaphragm as effective reinforcing.
      (2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
   d. Outside Face:
      (1) Vertical reinforcing steel in the outside face of the core wall shall be: minimum of #4 bars at 12" center to center.
      (2) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
3. The minimum core wall thickness shall be 3½".
4. Reinforcing steel used in the core wall shall be designed using a maximum allowable design tensile stress, f_s, of 18,000 psi.
5. Allowable compressive stress in the core wall due to initial prestressing force, f_{gi}, shall be:
   a. 1250 psi + 75t psi/in. with 0.5 f'_{gi} maximum or less (where f'_{gi} is defined as compressive strength at time initial prestressing force is applied and t is the thickness of the core wall in inches).
   b. Maximum of 2250 psi.
6. Allowable compressive stress in the core wall due to final prestressing force, f_g, shall be:
   a. 1250 psi + 75t psi/in. with 0.45 f'_g maximum (where f'_g is defined as compressive strength required for final prestressing force and t is the thickness of the core wall in inches).
   b. Maximum of 2025 psi.

F. Dome:

1. The dome roof shall be constructed of reinforced concrete and shall be circumferentially prestressed.
2. Dome shell reinforcement shall consist of reinforcing bars or welded wire fabric, not galvanized. Bolsters for wire fabric and reinforcing bars shall be plastic. Wire ties shall be galvanized.
3. The dome ring girder shall be prestressed with sufficient wire to withstand the dome dead load and design live loads. The ring girder shall have cross section suitable to accept the applied prestressing forces.

4. The high water level in the tank shall be permitted to encroach on the dome shell no higher than the upper horizontal plane of the dome ring girder.
5. Overflow outlets or the overflow pipe shall be capable of providing an overflow open area three times the area of the largest influent pipe.
6. Overflow outlets plus the dome ventilator shall be capable of providing an open area three times the area of the largest pipe.
7. The dome shall be designed as a free-span, spherical thin shell with one-tenth rise in accordance with the following:
   a. Typical Dome Design: The typical dome thickness and steel reinforcement shall meet the requirements of ANSI/AWWA D110.
   b. In all cases, the thickness of the dome shall be no less than 3".
   c. Dome Edge Design: The dome edge and upper wall shall be designed to resist the moments, thrusts, and shears that occur in this region due to dome and wall prestressing and loading conditions. The design of the edge region shall conform to the following:

      Dome Edge Thickness:

      (1) A determination of the buckle diameter shall be made, as defined by:

$$d_b = 2.5 \cdot \sqrt{r_d \cdot t_d}$$ rounded up to the next foot

Where: d_b = buckle diameter in feet

r_d = dome radius in feet

t_d = typical dome thickness in feet

      (2) Dome edge thickening shall begin at a radial location on the dome, defined as s_2 which is at least one buckle diameter away from the tank wall.

      (3) A springline haunch shall be provided, which extends radially from the inside face of the tank wall to radial location s_1 which is defined as:

$$s_1 = 0.6 \cdot \sqrt{1.5 \cdot r_d \cdot t_d}$$ rounded up to the next foot

Where: s_1 = distance from inside face of wall to haunch in feet
s_2 = distance from inside face of wall to typical dome
t thickness in feet.

This springline haunch shall begin at the inside face of the tank wall with a springline thickness as required by paragraph (f) below and shall end at radial location s_1 with the following thickness:

$$t_{d1} = 1.33 \cdot t_d$$

Where: t_{d1} = minimum thickness at s_1 in feet

t_d = typical dome thickness in feet at one buckle diameter from tank wall

(4) Beginning at S_1 and continuing to S_2 the dome shell shall have a uniform straight line taper.
(5) Parameters (2), (3), and (4) above are not required for domes where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.
(6) Sufficient concrete thickness at the springline of the dome shall be provided so that no more than 2 ft of the springline haunch is considered in calculating the effective dome edge ring cross sectional area. Compressive stress in this area shall not exceed 1000 psi when subjected to initial prestressing, offset by dead load only.

Dome Edge Steel Reinforcement:

(1) Throughout the dome edge, the percentage of steel reinforcement, both radially and circumferentially, shall be no less than 0.25% of the gross cross sectional area of concrete.
(2) Along the dome edge, steel reinforcement shall be distributed between the upper and lower layers unless finite element analysis calculations indicate that tensile stress does not exist in the concrete along the bottom face of the dome edge. In that case, only top bars are required radially and circumferentially. In addition, radial and circumferential reinforcing bars will not be required along the bottom face of the dome edge where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.
(3) Where reinforcing bars are required in the bottom layer, they shall be placed near the tank wall to insure adequate development at the intersection between dome and wall.
(4) In all cases, the percentage of circumferential steel reinforcement in the effective dome ring shall be no less than one percent of the gross cross sectional area of concrete. The effective dome ring is defined as ¼ of the haunch length not to exceed 2 ft'.
(5) Where bottom dome edge steel reinforcement is required, vertical steel reinforcement along the inside face of the tank wall shall be no less than 0.5% of the cross sectional area of wall shotcrete.

G. Prestressing:

1. Circumferential prestressing of the tank shall be achieved by the application of cold-drawn, high-carbon steel wire placed under high tension.
2. A substantial allowance shall be made for prestressing losses due to shrinkage and plastic flow in the shotcrete and due to relaxation in the prestressing steel.
3. The prestressing design shall conform to the following minimum requirements:
   a. Working stress for the tank wall, f_s, shall be a maximum of 115,000 psi.
   b. Working stress for the dome ring, f_{sd}, shall be a maximum of 120,000 psi.
   c. The allowable design tensile stress in the prestressing wire before losses, f_{si} shall be 145,600 psi or no greater than 0.63 fu, where fu is defined as the ultimate strength of the wire.

d. Areas to be prestressed will contain no fewer than 10 wires per foot of wall for 8 gauge and 8 wires per foot of wall for 6 gauge.
e. A maximum of 24 wires per layer per foot for 8 gauge and 20 wires per layer per foot for 6 gauge will be allowed.

H. Wall Openings:

1. When it is necessary for a pipe to pass through the tank wall, the invert of such pipe or sleeve shall provide no less than 18" clear space at the bottom of the wall to provide sufficient clear area for the prestressing wires. The prestressing wires required at the pipe elevation shall be distributed into circumferential bands immediately above and below the opening to maintain the required prestressing force while leaving an unbanded strip around the entire tank.
2. Unbanded strips shall have a vertical dimension of no more than 36" unless an axi-symmetric shell analysis is performed to account for compressive forces plus shear and moments caused by displacement of the prestressing wires into adjacent bands.

PART 2 - PRODUCTS

2.01 PERFORMANCE:

A. Performance of the materials used in the tank construction shall conform to the minimum requirements of this specification.

B. Substitutions to the materials in this specification may only be made if submitted in writing and approved by the engineer.

2.02 CONCRETE:

A. Concrete shall conform to ACI 301/301M.

B. All concrete shall utilize either Type I/II or Type IL cement.

C. A maximum of 25% of cementitious material may be fly ash.

D. Admixtures other than air-entraining and water reducing admixtures will not be permitted unless approved by the engineer.

E. Coarse and fine aggregate shall meet the requirements of ASTM C33/C33M.

F. Concrete mixes used in the construction of the tank shall conform to the following:

Mix	Compressive Strength (psi)	Minimum Cement Content (lbs)	AASHTO Aggregate	Maximum W/C Ratio	Air Content (%)	Slump (in)
Floor	4000	560	#57	0.45	5 +/- 1.5	4"+/-1"
Dome	4000	600	#8	0.45	5 +/- 1.5	4"+/-1"

2.03 SHOTCRETE:

A. Shotcrete shall conform to the requirements of ACI 506.2 except as modified herein.

B. All shotcrete mixes shall utilize either Type I/II or Type IL cement.

C. A maximum of 25% of cementitious material may be fly ash.

D. All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.

E. Admixtures will not contain more than trace amounts of chlorides, fluorides, sulfides or nitrates.

F. Fine aggregate shall meet the requirements of ASTM C33/C33M.

G. Shotcrete mixes used in the tank construction shall conform to the following:

Mix	Compressive Strength (psi)	Maximum W/C Ratio	Air Content (%)	Slump (in)	Fiber Reinforcement (lbs/cyd)
Core Wall	4000	0.42	5 +/- 1.5	5"+/-1"	-
Covercoat	4000	0.42	5 +/- 1.5	5"+/-1"	

2.04 MOISTURE BARRIER:

A. The moisture barrier shall be polyethylene, Class A, conforming to ASTM D4397 with a minimum thickness of 6-mils.

2.05 PRESTRESSED REINFORCEMENT:

A. The prestressing wire shall conform to the requirements of ASTM A821/A821M, Type B.

B. The prestressing wire size shall be 0.162" (8 gauge), 0.192" (6 gauge) or larger, but no larger than 0.250".

C. The ultimate tensile strength, fu shall be, 231,000 psi or greater for 8 gauge wire, 222,000 psi or greater for 6 gauge.

D. Splices for horizontal prestressed reinforcement shall be ferrous material compatible with the prestressing reinforcement and shall develop the full strength of the wire.

2.06 NON-PRESTRESSED REINFORCEMENT:

A. Non-prestressed mild reinforcing steel shall be new billet steel meeting the requirements of ASTM A615/A615M with a minimum yield strength, fy, of 60,000 psi.

B. Welded wire reinforcing shall be plain wire conforming to the requirements of ASTM A1064/A1064M with a minimum yield strength, fy, of 65,000 psi.

2.07 GALVANIZED STEEL DIAPHRAGM:

A. The galvanized steel diaphragm used in the construction of the core wall shall be 26 gauge with a minimum thickness of 0.017 in. conforming to the requirements of ASTM A653/A653M. Weight of zinc coating shall be not less than G90 of Table 1 of ASTM A653/A653M.

B. The diaphragm shall be formed with re-entrant angles and erected so that a mechanical key is created between the shotcrete and diaphragm.

C. The diaphragm shall be continuous to within 3 in. of the top and bottom of the wall. Horizontal joints or splices will not be permitted.

D. All vertical joints in the diaphragm shall be rolled seamed, crimped and sealed watertight using epoxy injection.

E. In all tanks designed to use a waterstop at the floor/wall joint, the steel shell diaphragm shall be epoxy bonded to the waterstop.

2.08 PVC WATERSTOPS, BEARING PADS AND SPONGE FILLER:

A. Plastic waterstops shall be extruded from an elastomeric plastic material of which the base resin is virgin polyvinylchloride (PVC). PVC waterstops shall conform to the requirements of CRD-C-572-74.

B. The profile and size of the waterstop shall be suitable for the hydrostatic pressure and movements to which it is exposed.

C. Bearing pads used in floor/wall joints shall consist of neoprene, natural rubber or polyvinyl chloride.

D. Sponge filler at the floor/wall joint shall be closed-cell neoprene.

2.09 EPOXY:

A. Epoxy Sealants:

1. Epoxy shall conform to the requirements of ASTM C881/C881M.
2. Epoxy used for sealing the diaphragm shall be Type III, Grade 1, and shall be 100% solids, moisture insensitive, low modulus epoxy.
3. Epoxy used for placing the waterstop shall be Type II, Grade 2, and shall be 100% solids, moisture insensitive, low exotherm epoxy.
4. When pumped, maximum viscosity of the epoxy shall be 10 poises at 77°F.
5. The epoxy sealants used in the tank construction shall be suitable for bonding to concrete, shotcrete, PVC and steel.

B. Bonding Epoxy:

1. Epoxy resins used for enhancing the bond between fresh concrete and hardened concrete shall conform to the requirements of ASTM C881/C881M.
2. Epoxy resins shall be a two-component, 100% solids, moisture-insensitive epoxy and shall be Type II, Grade 2.

2.10 SEISMIC RESTRAINT CABLES:

A. When required by design, seismic restraint cables shall be ½-inch diameter, seven-wire strand conforming to ASTM A416/A416M, prior to galvanizing.

B. The strand shall be galvanized in accordance with ASTM A475, or ASTM A603, with a minimum weight per unit of coated wire surface, Class A.

C. The minimum yield strength of the seven-wire strand shall be 270,000 psi.

2.11 TANK ACCESSORIES:

A. Minimum of one, 1' 5" x 4' 4" rectangular Type 316 stainless steel wall manhole for access to the interior of the tank. The cover shall also be of Type 316 stainless steel. The wall manhole shall be designed to resist hydraulic loading without excessive deflection.

B. Aluminum accessories

1. Exterior ladder shall be fabricated from 6061-T6 and 6063-T6 aluminum and shall conform to all applicable OSHA standards. The ladder shall have an aluminum safety cage and lockable security gate and/or a safety climbing device in accordance with all applicable OSHA standards.
2. Aluminum handrail shall be fabricated in 20 ft typical sections from 6061-T6 aluminum and shall conform to all applicable OSHA standards.
3. Aluminum accessories shall be shop fabricated and fully welded. All welding shall be in accordance with American Welding Society (AWS) D1.2 to fuse materials without distortion of the material. Mechanical splices shall only be used at field splice locations.
4. Aluminum accessories shall have a "mill" finish.
5. Aluminum surfaces in contact with concrete shall be protected with a coat of bituminous paint.

C. Interior ladder shall be fabricated from fiberglass shall conform to all applicable OSHA standards. The ladder shall have a safety climbing device manufactured from Type 316 stainless steel as required to meet applicable OSHA standards.

D. Roof hatch cover, roof ventilator, and liquid level indicator shall be fabricated from fiberglass.

E. Through-wall pipe shall be Type 316 stainless steel. Waterstop rings on wall-pipes shall be Type 316 stainless steel.

F. Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

2.12 COATINGS:

A. Exterior and interior tank colors shall be selected by Owner during the shop drawing process.

B. Exterior Coatings

1. Exterior tank walls and dome
2. Surface Preparation: Remove all contaminants by power washing per SSPC-SP13/NACE 6. SSPC-SP1 is included in all SP Standards.
3. First Coat: Tnemec Series 156 Enviro-Crete 4.0 to 6.0 mils DFT
4. Second Coat: Tnemec Series 156 Enviro-Crete 4.0 to 6.0 mils DFT

PART 3 - EXECUTION

3.01 EXAMINATION:

A. All subgrade elevations shall be verified prior to starting tank construction.

3.02 INSTALLATION:

A. Floor:

1. The subgrade shall be prepared by fine grading to ensure proper placement of reinforcing steel with proper bottom cover.
2. A 6-mil polyethylene vapor-barrier shall be placed after subgrade preparation has been completed.
3. Form and screed boards shall be of proper thickness and sufficiently braced to ensure that the floor is constructed within proper thickness tolerances.
4. Plate bolsters shall be used to support reinforcing steel supported directly on the subgrade to ensure positive control of placement of reinforcing steel.
5. The floor shall be vibratory screeded to effect consolidation of concrete and proper encasement of floor reinforcing steel.
6. The floor shall be water cured for a minimum of 7 days after casting.
7. The floor shall receive a light broom finish.

B. Core Wall:

1. The wall shall be constructed utilizing diaphragm and shotcrete with each conforming to the following:
    a. Diaphragm Erection:
        (1) The diaphragm shall be protected against damage before, during, and after erection. Nail or other holes shall not be made in the diaphragm for erection except in the top 3 inches. Holes shall not be made in the diaphragm except for inserting wall pipes or sleeves, reinforcing steel, bolts, or other special appurtenances. Such penetrations shall be sealed with an epoxy sealant which complies with Section 2.09 Epoxy.
    b. Shotcrete:
        (1) All shotcrete shall be applied by or under direct supervision of experienced nozzlemen certified by the American Concrete Institute (ACI) as outlined in ACI certification publication CP-60.
        (2) Each shotcrete layer shall be broomed prior to final set to effect satisfactory bonding of the following layer.
        (3) No shotcrete shall be applied to reinforcing steel or diaphragm that is encrusted with overspray.
        (4) No less than ⅛" thick shotcrete shall separate reinforcing steel and prestressing wire.
        (5) The diaphragm shall be encased and protected with no less than 1" of shotcrete in all locations.
        (6) The interior shotcrete shall receive a light broom finish.
    c. Curing:
        (1) Interior and exterior portions of the shotcrete wall shall be water cured for a minimum of 7 days or until prestressing is completed.

C. Epoxy Injection:

1. Epoxy injection shall be carried out from bottom to top of wall using a pressure pumping procedure.
2. Epoxy injection shall proceed only after the diaphragm has been fully encased, inside and outside, with shotcrete.

D. Dome:

1. All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric.

2. All surfaces at the joint between the wall and the dome shall be coated with bonding epoxy which complies with Section 2.09 Epoxy.
3. Plastic bolsters shall be used to support reinforcing steel and welded wire reinforcement to ensure positive control on placement of steel.
4. The exterior surface of the dome shall receive a light broom finish.
5. The dome shall be water cured for a minimum 7 days after casting or until dome band prestressing is completed.

E. Prestressing:

1. The initial tension in each wire shall be read and recorded to verify that the total aggregate force is no less than that required by the design. Averaging or estimating the force of the wire on the wall shall not be considered satisfactory evidence of correct placement of prestressing wires.
2. Placement of the prestressing steel wire shall be in a continuous and uniform helix of such pitch as to provide in each lineal foot of core wall height an initial force and unit compressive force equal to that shown on the design drawings. Splicing of the wire shall be permitted only when completing the application of a full coil of wire or when removing a defective section of wire.
3. Shotcrete shall be used to completely encase each individual wire and to protect it from corrosion. To facilitate this encasement, the clear space between adjacent wires is to be no less than one wire diameter.
4. Prestressing shall be accomplished by a machine capable of continuously inducing a uniform initial tension in the wire before it is positioned on the tank wall. Tension in the wire shall be generated by methods not dependent on cold working or re-drawing of the wire. In determining compliance with design requirements, the aggregate force of all tensioned wires per foot of wall shall be considered rather than the force per individual wire, and such aggregate force shall be no less than that required by the design and as shown on approved drawings.
5. The tank construction company shall supply equipment at the construction site to measure tension in the wire after it is positioned on the tank wall. The stress measuring equipment shall include: electronic direct reading stressometer accurate to within 2%, calibrated dynamometers and a test stand to verify the accuracy of the equipment.
6. After circumferential prestressing wires have been placed, they shall be protected by encasement in shotcrete. This encasement shall completely encapsulate each wire and permanently bond the wire to the tank wall.
7. When multiple layers of wire are required, shotcrete cover between layers shall be no less than ⅛" thick.

F. Covercoat:

1. After all circumferential prestressing wires have been placed, a shotcrete cover having a thickness of no less than 1" shall be placed over the prestressing wires.
2. Horizontal sections of the wall shall form true circles without flat areas, excessive bumps or hollows.
3. The covercoat shall receive a sliced trowel finish.

G. Wall Openings:

1. All wall pipes, sleeves and manholes passing through the wall shall be sealed to the diaphragm by epoxy injection.

H. Coatings:

1. The interior and exterior coatings of the tank (concrete surfaces and metallic surfaces) shall be self-performed by the tank construction company. The tank construction company shall be QP-8 certified and have system responsibility for all coatings. If the tank construction company is not QP-8 certified, then a Senior Certified Coatings Inspector (CIP Level 3) shall be present full-time during the coatings application.
2. Exterior and Interior coatings shall be applied in accordance with the manufacturer product data sheet after final application of concrete or shotcrete
3. All application procedures for coatings shall meet the requirements of Section 2.12 and the manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL:

A. Inspection and Testing:

1. Concrete and Shotcrete Testing:
   a. Compression Tests:
      (1) Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. At least one set of test specimens shall be made for each 50 yards of concrete/shotcrete placed. Each set of test specimens shall be a minimum of 5 cylinders.
      (2) Compression test specimens for concrete/shotcrete shall conform to ASTM C172/C172M for sampling and ASTM C31/C31M for making and curing test cylinders. Test specimens shall be 6-inch diameter by 12-inch high or 4-inch diameter by 8-inch high cylinders.
      (3) Compression test shall be performed in accordance with ASTM C39/C39M. Two test cylinders will be tested at 7 days and two at 28 days. The remaining cylinder will be held to verify test results, if needed.
   b. Air Content Tests (concrete only):
      (1) Air content tests shall conform to ASTM C231/C231M (Pressure Method for Air Content).
      (2) Tests for air content shall be made prior to concrete placement and whenever compression test specimens are made.
   c. Slump Tests (concrete only):
      (1) Slump tests shall be made in accordance with ASTM C143/C143M.
      (2) Slump tests shall be made whenever compression test specimens are made.
2. Hydrostatic Testing:
   a. The tank shall be tested for watertightness upon completion.
   b. The testing for watertightness shall be completed as follows:
      (1) Fill the tank with water to the maximum water level and let it stand for a minimum of 24 hours.
      (2) Inspect the exterior of the tank wall and footing for damp spots. Damp spots shall be defined as spots where moisture can be picked up on a dry hand, the source of which is from inside the tank.
      (3) Leakage through the wall or wall-base joint shall be repaired and the tank shall be retested using the above procedure.

B. Coating Inspection and Testing:

1. All surface preparation, coatings application and coatings related work shall be supervised by an AMPP C-11 Concrete Coatings Inspector Level II.
2. All exterior coatings shall be final inspected by the AMPP C-11 Concrete Coatings Inspector and found holyday free prior to owners' acceptance.
3. All interior high-performance coatings shall be inspected by the AMPP C-11 Concrete Coatings Inspector to include HV or LV spark testing per ASTM D-4787 and found holyday free prior owners' acceptance.

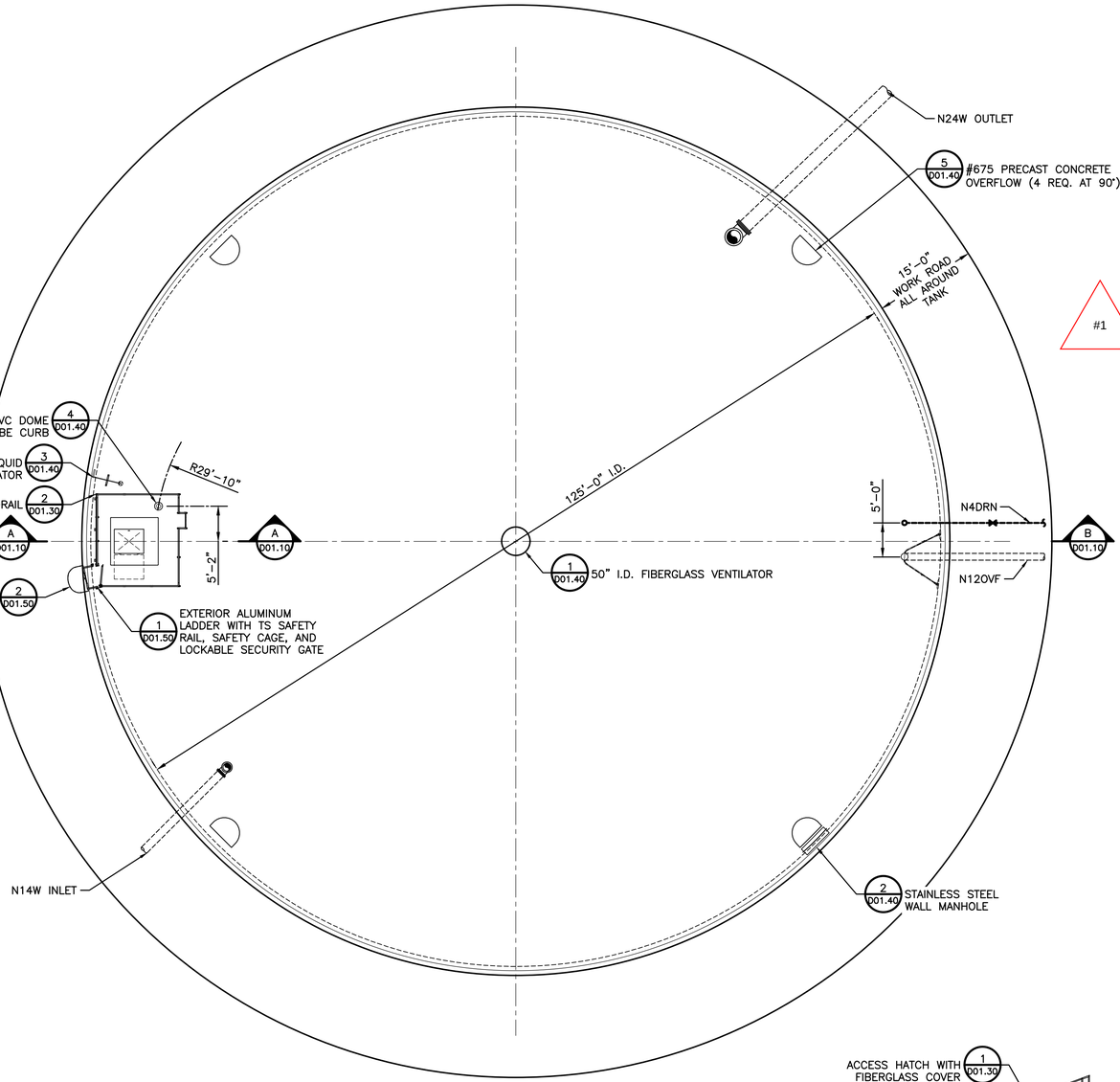
3.04 CLEANING AND DISINFECTION:

A. The interior of the tank shall be cleaned to remove debris, construction items, and equipment prior to testing and disinfection.

B. The following disinfection procedure shall be used to disinfect storage tanks used for potable water:

1. Method 2 or 3 will be used for disinfection of the tank in accordance with ANSI/AWWA C652.
2. When Method 3 is used, the disinfection plan required by Section 1.03 H. shall address any compatibility issues with the form of chlorine used for disinfecting the storage tank with the type of disinfectant used in the normal production of the water used to fill the tank.

END OF SECTION

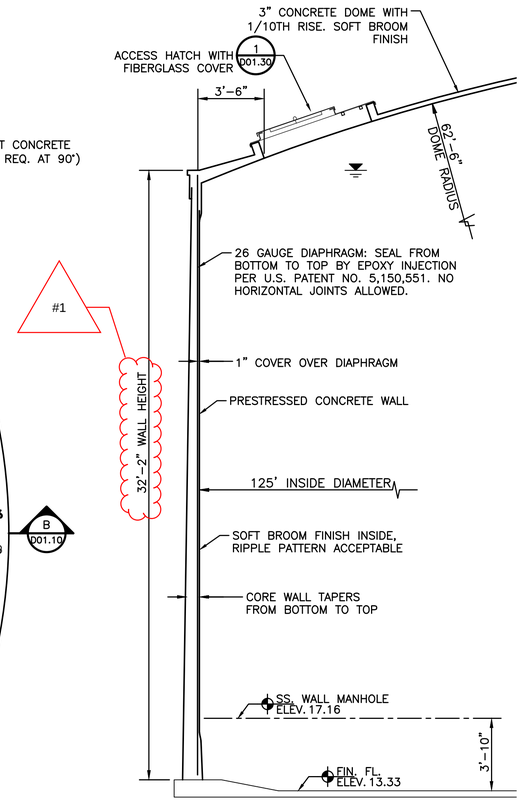


PLAN

SCALE: 3/32" = 1'-0"

0 8 16

GRAPHIC SCALE

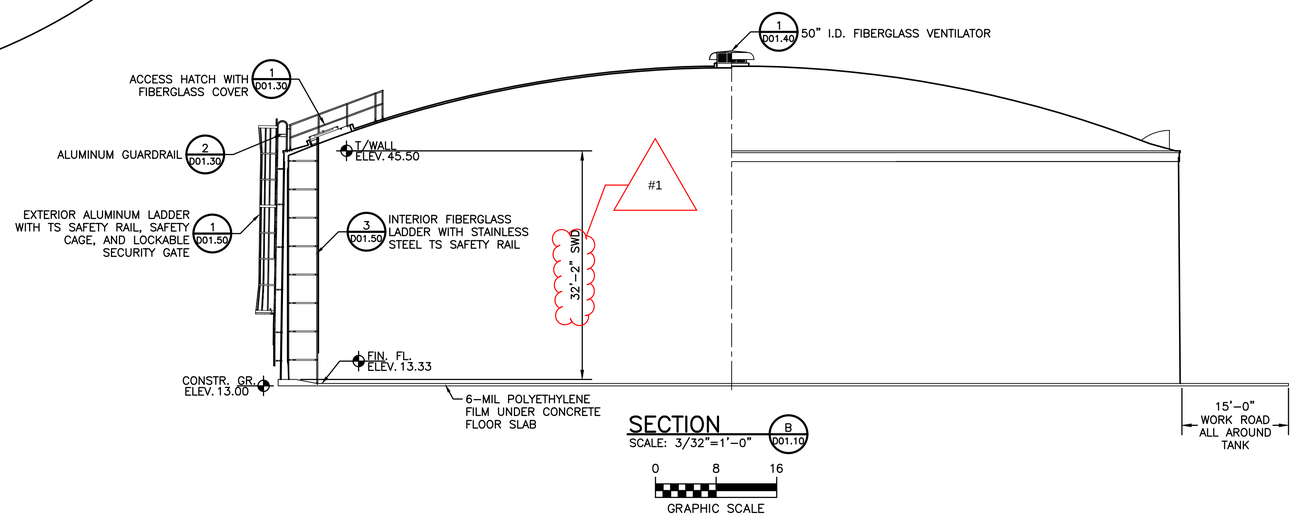


SECTION

SCALE: 1/4"=1'-0" A D01.10

0 4 8

GRAPHIC SCALE



SECTION

SCALE: 3/32"=1'-0" B D01.10

0 8 16

GRAPHIC SCALE

NOTES:

1. SHORTCRETE SHALL BE APPLIED BY OR UNDER DIRECT SUPERVISION OF NOZZLEMEN CERTIFIED BY THE AMERICAN CONCRETE INSTITUTE AS OUTLINED IN ACI CERTIFICATION PUBLICATION CP-60.
2. TENSION IN PRESTRESSING WIRE SHALL BE MEASURED BY AN ELECTRONIC DIRECT-READING STRESSOMETER ACCURATE TO WITHIN 2%.
3. FIELD VERIFY ALL ACCESSORY & PIPE LOCATIONS WITH ENGINEER PRIOR TO PLACEMENT.

AECOM

PROJECT

REPLACEMENT OF 3.0 MILLION GALLON RAW WATER RESERVOIR

WATER TREATMENT PLANT
1 WILSON STREET
ELIZABETH CITY, NC 27909

CLIENT

CITY OF ELIZABETH CITY, NC
410 PRITCHARD STREET
ELIZABETH CITY, NC 27909
(252) 337-6628

CONSULTANT

AECOM
5438 WADE PARK BOULEVARD
SUITE 200
RALEIGH, NC. 27606
(919) 461-1100 (919) 461-1415 (fax)
WWW.AECOM.COM

REGISTRATION

NORTH CAROLINA CERTIFICATE OF AUTHORIZATION — AECOM TECHNICAL SERVICES, INC. — No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 056757 ENGINEER KIERAN A. RYAN

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	2/6/2026	Addendum No.2

KEY PLAN

SHEET SCALE: AS SHOWN

BID DOCUMENTS

THESE DOCUMENTS ARE FOR THE PURPOSE OF SOLICITATION OF BIDS AND ARE NOT FOR USE FOR CONSTRUCTION

PROJECT & FILE NUMBER

PROJECT NO.: 60744999
DWI PROJECT NO.: SRP-D-134-0076

SHEET TITLE

RAW WATER RESERVOIR PLAN & SECTIONS

SHEET NUMBER

D01.10

Last saved by: KOSTUCHENKOL (2025-10-03) Last Plotted: 2026-02-02
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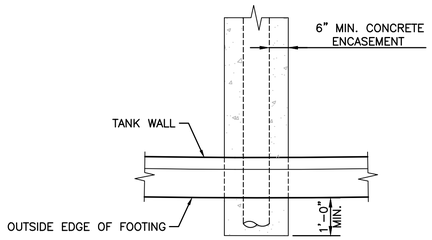
Project Management Initials: Project Engr.: Designer: KR Drafter: CJP Checked: Approved: KR ANSI D 22" x 34"

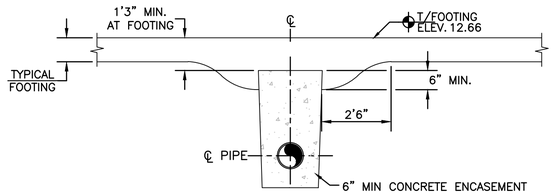


TYPICAL PIPE ENCASEMENT PLAN

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

0 2 4

GRAPHIC SCALE



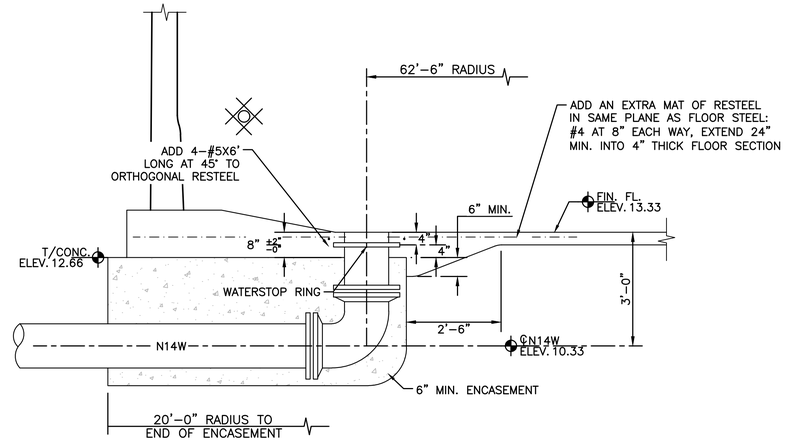
TYPICAL PIPE ENCASEMENT AT FOOTING

SECTION

SCALE: 1/2"=1'-0" D01.20

0 2 4

GRAPHIC SCALE



14" DIP INLET

SECTION

SCALE: 1/2"=1'-0" D01.20

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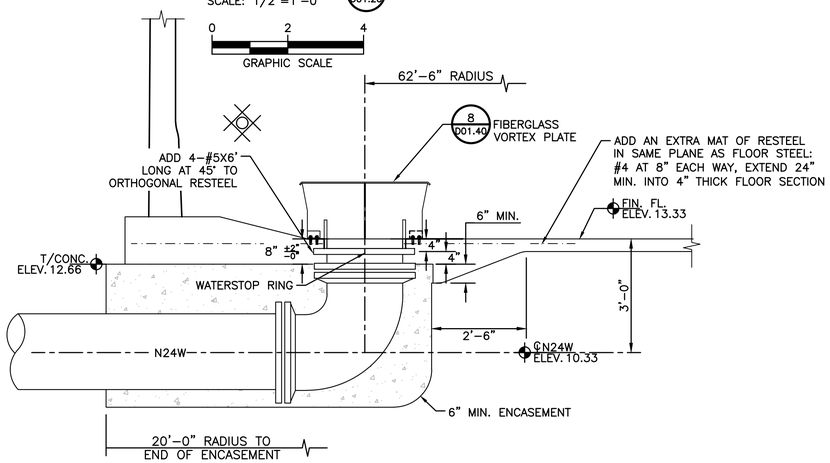
GRAPHIC SCALE



24" DIP OUTLET

SECTION

SCALE: 1/2"=1'-0" D01.20

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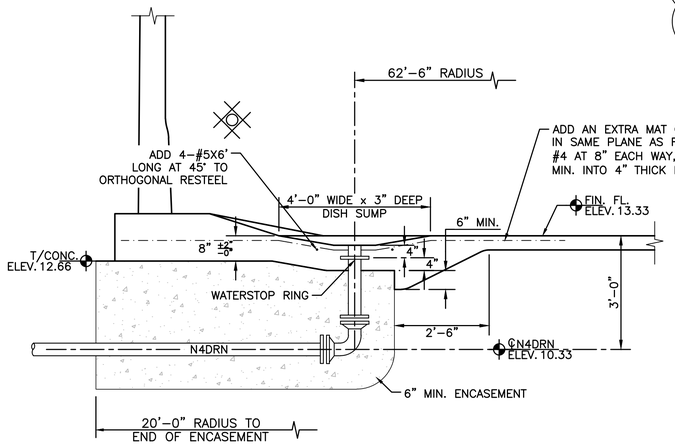
GRAPHIC SCALE



4" DIP DRAIN

SECTION

SCALE: 1/2"=1'-0" D01.20

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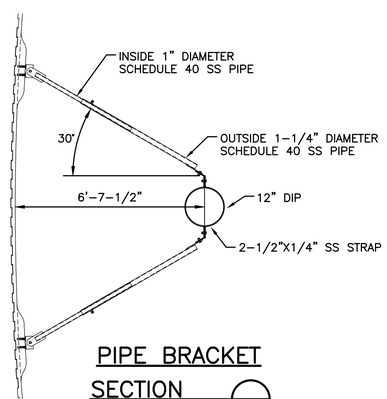
GRAPHIC SCALE



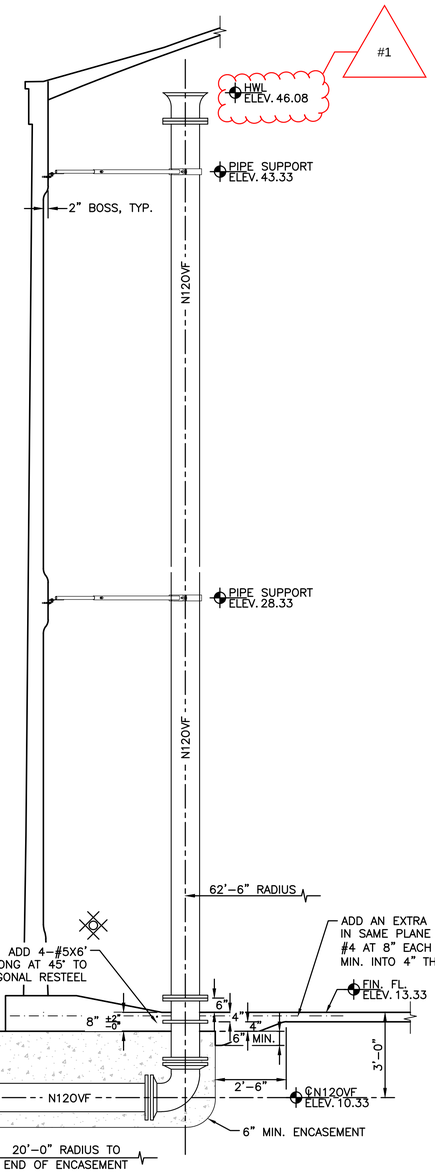
PIPE BRACKET

SECTION

SCALE: 1/2"=1'-0" D01.20

0 2 4

GRAPHIC SCALE



12" DIP OVERFLOW

SECTION

SCALE: 3/8"=1'-0" D01.20

0 2 4

GRAPHIC SCALE

AECOM

PROJECT

REPLACEMENT OF 3.0 MILLION GALLON RAW WATER RESERVOIR

WATER TREATMENT PLANT
1 WILSON STREET
ELIZABETH CITY, NC 27909

CLIENT

CITY OF ELIZABETH CITY, NC
410 PRITCHARD STREET
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WWW.AECOM.COM

REGISTRATION

NORTH CAROLINA CERTIFICATE OF AUTHORIZATION — AECOM TECHNICAL SERVICES, INC. — No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 056757 ENGINEER KIERAN A. RYAN

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	2/6/2026	Addendum No.2

KEY PLAN

SHEET SCALE: AS SHOWN

BID DOCUMENTS

THESE DOCUMENTS ARE FOR THE PURPOSE OF SOLICITATION OF BIDS AND ARE NOT FOR USE FOR CONSTRUCTION

PROJECT & FILE NUMBER

PROJECT NO.: 60744999
DWI PROJECT NO.: SRP-D-134-0076

SHEET TITLE

RAW WATER RESERVOIR PIPING SECTION

SHEET NUMBER

D01.20

ANSI D 22" x 34"
Approved: KR
Checked:
Drafter: CJP
Designer: KR
Project Management Initials: Project Eng:
Last Plotted: 2026-02-02
Last saved by: KOSTUCHENKOL (2025-10-03)
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CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC1
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Contractor Staging & Laydown Area

Drawing: C01.10
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to C01.10, the Contractor Staging & laydown are is located directly east of the proposed Storage Tank, we will need to move equipment directly underneath of OHP (overhead power lines). Can the Owner de-energize the OHP between the Contractor Staging & Laydown area and the proposed Storage Tank location?

Requested by:

Response: OHP line in question running North-South WILL NOT be denergized during construction.

Keiran Ryan, PE
Answered by

AECOM
Company

01/29/2026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC2
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Crane Working Area

Drawing: C01.11
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to C01.11, the Working Area for Crane is physically located on Durant Street, this brings up multiple concerns in regards to traffic control & ROW permitting. Has the Owner applied for any applicable permitting associated with putting a working area on top of the Street? Will the Contractor be required to re-pave Durant Street? Do we need to include Traffic control in our bid?

Requested by:

Response:

A path has been located for pedestrian and Duke energy use during concrete pours. The contractor shall be responsible for restoring Durant St to it's original conditions post construction.

Keiran Ryan, PE
Answered by

AECOM
Company

01/29/2026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC3
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Existing Tank Foundation Demolition

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to C01.20, we are to demolish the Existing 3.0 Million Gallon Storage Tank including Entire Floor, during the Pre-Bid meeting existing wooden piles were discussed. Can the EOR please confirm if there are any existing tank foundation support such as Pile Supports. How are we to address this in the bid sum? How many piles and do they need to be fully demolished if any?

Requested by:

Response:

As part of the bid form, a geotechnical investigation line item can be found. During that phase of work, additional borings will be drilled to further evaluate the soil conditions and identify the exiting supports.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC4
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Geotechnical Report Building Subgrade

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to the Geotechnical Report, Executive Summary, it states that the presecense of thick layer of very soft/soft clays within the proposed tank footprint will impact site development. These materials are unsuitable to directly support the proposed building due to the potential for detrimental settlement, one option to improve building subgrade support conditions that will allow the use of a conventional slab system is to install a rigid inclusion system.

Will the GC be required to include a Rigid Inclusion System or Driven Pile Foundation system for the Tank Subgrade support in their bid?

Requested by:

Response:

The GC should include a rigid inclusion foundation system as part of their bid as identified in the geotechnical report. This foundation system supports the membrane floor design for Crom and Precon tanks.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC5
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Unsuitable Soils

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to the Geotechnical Report, it states that the presence of thick layers of very soft/soft clays within the proposed tank footprint will impact site development. These materials are unsuitanle to directly support the proposed building due to the potential for detrimental settlement of the slab. How shall we address unsuitable soils found underneath of the existing Tank? How are we to account for Unsuitable Soils in our bid? Unit price, allowance, or unit price with allowance?

Requested by:

Response:

This should be included in the lump sum line item for 'Subgrade Improvements" as identified in the bid form

Keiran Ryan
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC6
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Tank Settlement & Tank Piping

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

After the New Storage Tank has been constructed, will there be a Tank Settlement period in which we need to fill the tank and observe any settlement prior to Final Tank piping connections?

If there is a Tank Settlement period, and we need to fill the Tank full of water, will the Owner provide the Water required to fill the Tank?

Has this been accounted for when the project duration was established for the bid?

Requested by:

Response:

Yes, there should be a period for testing tank settlement. Owner can supply the water.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC7
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Existing Conditions, As-Builts

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

Do you have any as-builts or record drawings of the Existing Raw Water reservoir? If so, can they be made available to the bidders?

Requested by:

Response:

No, the asbuilts drawings can not be identified for the RWR.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC8
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Permits & Permit Responsibility

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request:
Date Required:

Have ALL Permits been submitted for approval? Which permits are the GC required to obtain and pay for if any?

Requested by:

Response:

NCDEQ PWSS has been approved. A sediment and erosion control permit must be obtained as responsibility to the owner.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC9
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Construction Materials Testing & Special Inspections

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

Is the Owner responsible for providing Construction Materials Testing agency and Special Inspections? Is the Owner responsible for providing a Special Inspections/Observer for the Prestressed Concrete Storage Tank Concrete, Reinforcing Steel, Shotcrete & Coating scope of work?

Requested by:

Response:

Yes construction oversight will be provided from the owner. Specific testing services required are found within the project specifications.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC10
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Tank Coatings

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

Will the Tank be required to have Coatings on the Interior & Exterior fo the Prestressed Concrete Storage Tank?

Requested by:

Response:

Yes, please refer to paining and prestressed concrete specification 131624.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC11
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Mandatory Pre-Bid

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to Section 001113 Advertisement for Bids - The specification states the following: A non-mandatory pre-bid conference will be held at 10:00 am local time on January 5, 2026 at
the project site, located at the intersection of South Water Street and East Church Street, Elizabeth City, NC. Attendance by the prime bidder is required.

It states that ATTENDANCE BY THE PRIME BIDDER IS REQUIRED. But it also states that the Pre-Bid Conference is Non-Mandatory.

Could you please advise which is accurate? Was the Prime Bidder required to attend the Pre-Bid Conference?

If the Pre-Bid is non-mandatory there would be a best practice potential of receiving multiple bids. if it IS mandatory - it would be an mathematical impossibility.

Requested by:

Response:

Addendum No.2 will be issued addressing this.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC12
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Evaluation of Bids and Award of Contract

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

It has come to our attention that only 1 Prime General Contractor attended the Prebid Meeting, in the event that only 1 Prime General Contractor submits a bid on this project, will the bid be opened or readvertised? Will there be a re-advertisement with less than 3 bids? will there be a re-advertisement now in order to meet Best Practice and open up for the possibility of more bids?

Requested by:

Response:

Addendum No.2 will be issued addressing this.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC13
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: SCADA Scope of Work

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

According to the specification, some Instrumentation such as the Water Level Sensor will require power & connectons to the Plants SCADA System, we do not see any Electrical or Instrumentation drawings, are there any Electrical or Instrumentation scope of work on this project, will the Owner be responsible for all Electrical or SCADA scope of work?

Requested by:

Response:

Please provide an allowance for this scope of work.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC14
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Anticipated Schedule Dates

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request:
Date Required:

What is the Anticipated Date of Award, Anticipated Date of Contract Commencement & Final Completion?

Requested by:

Response:

Addendum No.2 will be issued addressing this.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC15
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Builders Risk Insurance

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

Is Builders Risk Insurance required for this contract? Will the owner provide or shall the bid include the cost of builders risk?

Requested by:

Response:

All insurance is covered in front end specifications.

Keiran Ryan
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC16
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Bid Form & Schedule of Values

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

Will the Bid Form be the basis of the Schedule of Values? If awarded will we be able to propose a Schedule of Values that will be easier to track & bill the project progress subject to approval.

Requested by:

Response:

This project is subject to NCDEQ DWI protocols. All front end contract documents must be followed in accordance with the Division of Water Infrastructure.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC17
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Bid Form Subsurface Investigation & Improvements

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request:
Date Required:

According to the Bid Form, Line item #3 is for Subsurface Investigation & Improvements, what does this scope of work consist of? Does this include any kind of Tank Subgrade improvements such as Rigid inclusions or Drive Piles?

Requested by:

Response:

This shall include: 1.) An additional geotechnical investigation as mentioned in the geotechnical report, to understand soil conditions within the tank footprint. Once the report has been updated with the new findings a recommended improvement will be provided, including a foundation design for the tank. All of which would be subject to approval by the owner.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC18
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Construction Budget Range

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request:
Date Required:

Can the EOR & Owner please provide a Construction Budget range for Bid Bond purposes?

Requested by:

Response:

Information is not available for public.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC19
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Overhead Power Lines Height

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

What are the currently heights for the Overhead Power Lines on the East, South & West Side of the Proposed Storage Tank?

Requested by:

Response:

See Electrical OHP Figure as part of this Addendum.

Answered by

Company

Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC20
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Underground Electric on East Side of Tank

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request:
Date Required:

What elevation is the Underground Electric run at on the East Side of the Tank?

Requested by:

Response:

See OHP Figure in Addendum No.2

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC21
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Permitting

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

With respect to any/all permits related to the project and construction for this project, will the owner apply, coordinate, and obtain all permits for this project? Will the owner pay for all permits for the project so the costs will not have to be included in the bid? If the referred information is not completely known at this time will the owner specify an allowance sum for the contractor to include in the Bid Sum.

Requested by: Keiran Ryan
AECOM Techanical Services, Inc

Response:

All permits will be covered by the owner. See previous response regarding permits obtained.

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

CONSENSUS CONSTRUCTION

4722 A Highway 17 Bypass South
Myrtle Beach, SC 29588
Ph : 843-546-2667

RFI

To: Keiran Ryan
AECOM Techanical Services, Inc
2151 Pickens Street, Suite 301
Columbia, SC 29201
Ph: 845-594-9570

RFI #: PC22
Date: 1/20/2026
Job: 25-C-323 Elizabeth City 3.0 MG GST
Phone:

CC:

Subject: Bid Solicitation

Drawing:
Spec Section:
Cost Impact: None
Schedule Impact: None

Request: **Date Required:**

It is our understanding that the following may be relevant for the current bid: North Carolina law does not strictly require three (3) bidders to award a construction project in all cases. However, there is a specific provision for formal bidding on larger public projects that sets a minimum threshold for proceeding without re-advertising.North Carolina's public construction contracting is governed primarily by N.C. Gen. Stat. § 143-129 (formal bidding for projects = $500,000), § 143-131 (informal bidding for smaller projects), and crucially § 143-132 (minimum number of bids).

Under G.S. 143-132, for contracts subject to formal competitive bidding requirements (typically those = $500,000 under G.S. 143-129), if fewer than three (3) competitive bids are received from reputable and qualified bidders after proper advertisement, the public entity generally cannot open the bids or award the contract immediately. Instead, the project must be re-advertised to seek more bids.

If, after a second advertisement, still fewer than three (3) bids are received, the entity may then proceed to open and award the contract based on the bid(s) received (often the lowest responsive and responsible one).

This is a procedural safeguard to promote competition, not an absolute requirement that exactly three (or more) bidders must be present to make an award valid. The law allows award even with fewer than three bids in certain circumstances (after re-advertising fails to produce more). Due to the fact that there were only two potential prime bidders at the Pre-Bid, if the Pre-Bid is deemed to be mandatory and if the owner wants to follow good practice and to receive more than 2 bids the current solicitation will not result in 3 bids if the pre-bid is deemed to be mandatory. If the Pre-Bid is mandatory could the bid be cancelled, be readvertised to seek more bids? In essence, the owner could start the second advertisement since the outcome for the original bid could not yield 3 or more bids if Pre-Bid is mandatory attendance. Furthermore, we are planning on providing a bid but if 3 bids are not received, does the owner plan to open and read aloud or hand back to the bidders which submitted.

Requested by:

Response:

A second prebid meeting will be mandatory for all new contractors, a new bid turn in date is provided

Keiran Ryan, PE
Answered by

AECOM
Company

01292026
Date

RFIs from Crom January 20, 2026

AECOM ***UNOFFICIAL DRAFT*** Response February 2, 2026

- Please confirm if the project is subject to BABA/AIS requirements.

No

- Please confirm if the project is subject to Davis-Bacon/Prevailing Wage rates.

No

- We note that a Geotechnical report was not provided. Please provide a Geotech report for review subsurface and site conditions. Please ensure the Geotech report/bid document defines the following parameters:
a. Design Groundwater Elevation for Tank
b. Design Floor Elevation for Tank
c. Uniform Total Settlement of Tank
d. Uniform Differential Settlement of Tank
e. Allowable Bearing Capacity for Tank

Report Provided

- Specification 13 16 24-1.06.C Table: The specification states the max water elevation to be 46.33. Please modify spec table to match the TOW elevation of 46.08 to ensure the water elevation does not encroach onto the dome overflow base elevation of 46.33.

Specification 131624-6.C Design parameters: Max Water Level changed from 46.33 to 46.08.

- Specification 09 90 00-3.6.K: This paint specification section requires the concrete walls (exterior) to be clean, dry and cured for a minimum 28 days. There is a tank exterior paint specification in specification section 13 16 24-2.12.B that describes a Tnemec system for the external tank coating. We have worked extensively with the coating manufacturer Tnemec who has approved that the external coating system for the tank can be applied to the shotcrete walls after 14 days of shotcrete curing. Please confirm that the contractor will be allowed to follow manufacturer's recommendations during application which would allow the 14 days.

Yes

- Specification 13 16 24-2.12.C: Please confirm internal coatings are not required for the tank.

Internal coatings removed.

- Plan Drawing C01.20 – Limits of Disturbance (LOD)

Following up on the discussion held during the pre-bid meeting, we are requesting an expanded Limits of Disturbance (LOD) area extending west along Durant Street. Please refer to the attached marked-up drawing illustrating the requested additional LOD. This expanded area is required to support construction activities, material staging, equipment access, and other necessary project operations.

8. Plan Drawing G00.40 – Proposed Laydown Areas
   Following up on the discussion held during the pre-bid meeting, we are requesting approval for additional laydown areas on the east side of the tank construction site. These designated laydown areas are required to support various construction activities, including material storage, equipment staging, and overall site logistics. Please refer to the attached marked-up plan sheet indicating the proposed laydown areas.

Owner/Engineer will work on E&SC permit to allow for additional laydown space.

9. Plan Drawing C02.10 identifies multiple overhead powerlines in proximity to the proposed tank construction limits that present a significant safety risk to personnel, equipment, and lifting operations. The attached drawing depicts the minimum overhead powerline clearance required to safely construct the tank, including selective removal, temporary de-energization, and/or installation of protective shielding as applicable. These utility-related measures are required to support safe access and allow tank construction to proceed safely.

10. Plan Drawing C02.10 indicates an underground electrical line located on the east side of the tank. Please confirm whether this underground utility is designed and rated to accommodate heavy construction traffic, including concrete trucks, delivery vehicles, and other construction equipment traveling over it. If the utility is not suitable for these loads, should the contractor assume that temporary protection measures (such as steel road plates, crane mats, or similar load-distribution systems) are required to protect the utility during construction operations?

The electrical line in question is within a concrete electrical duct bank. During the site walk, it was assumed that vehicular traffic could drive over it.

Plan Drawing C02.10: Plan Drawing C02.10: The ramp access from the east side crossing over the underground electrical line will have a safe slope back to existing grade. Please confirm the elevation of the lowest wire above this area so contractor may back calculate the distance to the ramp ensuring that distance will not impede any traffic going up to or down from the work road

See Electrical OHP Figure in Addendum No.2. Power Line 5.) states 20’-10” from ground to comm. Wire and 23’ from ground to ground wire, 30’-7” from ground to first hot wire.

Additional RFI:

Plan Drawing C02.10 identifies multiple overhead powerlines in proximity to the proposed tank construction limits that present a significant safety risk to personnel, equipment, and lifting operations. The attached drawing depicts the minimum overhead powerline actions required to safely construct the tank, including selective removal, temporary de-energization, and/or installation of protective shielding as applicable. These utility-related measures are required to support safe access and allow tank construction to proceed safely.”

See electrical Figure as part of Addendum No.2

11. Plan Drawing D01.10, D01.40 detail 4: These drawings show a PVC dome probe required. Please indicate the size required.

Please account for standard sizing, determination will be made during shop drawing phase

12. Plan Drawing D01.10 Section view A: The wall height is shown to be 32'-9". Please modify this dimension to be 32'-2" as the footer rises from the FFE is roughly 7".

Revised

13. Plan Drawing D02.20: The 12" DIP OVERFLOW SECTION view shows 2 pipe supports. Supports are typically provided every 12'-15' of vertical pipe length. Please confirm quantity of supports required and modify drawing if changed.

Revised

14. Plan Drawing D02.20: The 12" DIP OVERFLOW SECTION view shows the HWL elevation at 46.33. Please modify this HWL such that the HWL water does not encroach onto the dome overflows base elevation of 46.33 and remains at least 3" below the bottom base elevation of the dome overflows. This will avoid any spillage out of the dome overflows under normal operating conditions. In addition, this adequate confirm maximum flow from plant will also not cause the water line to rise to 46.33 under normal operating conditions.

Revised

15. The bid documents state that question deadline is 7 days before bid. Will more questions be allowed up to that time to address any final items that may come from initial addenda?

16. Specification 13 16 24-1.06.C Table: The table states the roof as dome/flat roof. Please remove reference to the flat roof.

Specification 131624-6 Part C Design Parameters, Flat Roof removed.

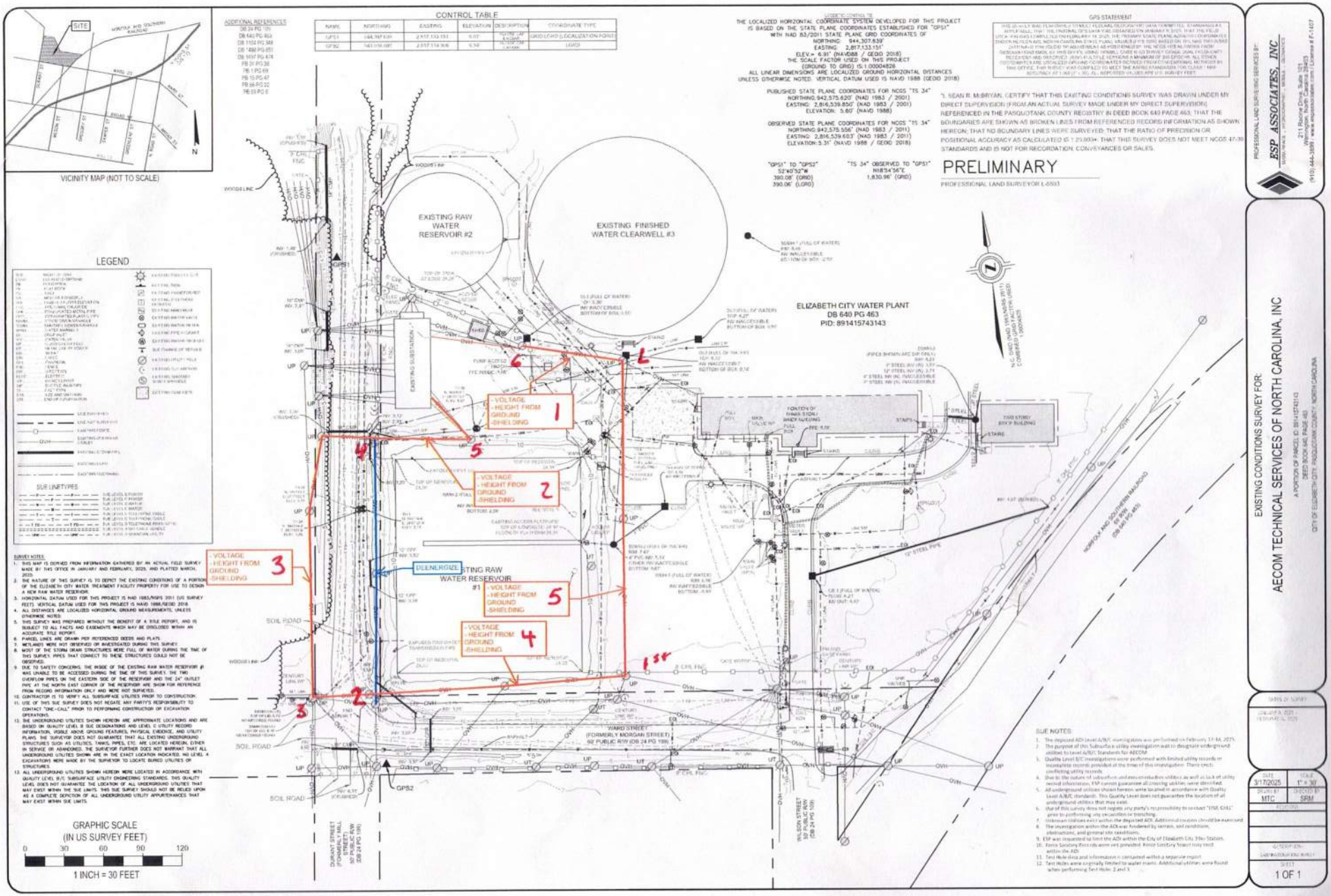
17. Plan Drawing C02.30: The top of dome elevation is shown. Please note the center vent will add roughly 2.5’ to the overall height.

Noted

18. Plan Drawing D01.10 Section view A: The dome radius is shown be 62’-6”. Please note this to be finalized in submittals.

Noted

APPENDIX A


VICINITY MAP (NOT TO SCALE)
CONTROL TABLE
LEGEND
EXISTING RAW WATER RESERVOIR #2
EXISTING FINISHED WATER CLEARWELL #3
ELIZABETH CITY WATER PLANT
DB 640 PG 463
PID: 891415743143
EXISTING RAW WATER RESERVOIR #1
DE-ENERGIZE
- VOLTAGE
- HEIGHT FROM GROUND
- SHIELDING
1
2
3
4
5
1st
GPS1
GPS2
SOIL ROAD
WOODS LINE
WARD STREET (FORMERLY MORGAN STREET) 60' PUBLIC R/W (DB 24 PG 109)
DURANT STREET (FORMERLY MILL STREET) 50' PUBLIC R/W (DB 24 PG 109)
WILSON STREET 50' PUBLIC R/W (DB 24 PG 109)
NORFOLK AND SOUTHERN RAILROAD 80' R/W (DB 640 PG 463)
GRAPHIC SCALE (IN US SURVEY FEET)
0 30 60 90 120
1 INCH = 30 FEET
PRELIMINARY
PROFESSIONAL LAND SURVEYOR L-6503
GPS STATEMENT
"I, SEAN R. McBRYAN, CERTIFY THAT THIS EXISTING CONDITIONS SURVEY WAS DRAWN UNDER MY DIRECT SUPERVISION (FROM AN ACTUAL SURVEY MADE UNDER MY DIRECT SUPERVISION) REFERENCED IN THE PASQUOTANK COUNTY REGISTRY IN DEED BOOK 640 PAGE 463; THAT THE BOUNDARIES ARE SHOWN AS BROKEN LINES FROM REFERENCED RECORD INFORMATION AS SHOWN HEREON; THAT NO BOUNDARY LINES WERE SURVEYED; THAT THE RATIO OF PRECISION OR POSITIONAL ACCURACY AS CALCULATED IS 1:23,000+; THAT THIS SURVEY DOES NOT MEET NCGS 47-30 STANDARDS AND IS NOT FOR RECORDATION, CONVEYANCES OR SALES.
SURVEY NOTES:
SUE NOTES:
ESP ASSOCIATES, INC
211 Racine Drive, Suite 101
Wilmington, North Carolina 28403
(910) 444-3995
EXISTING CONDITIONS SURVEY FOR:
AECOM TECHNICAL SERVICES OF NORTH CAROLINA, INC
A PORTION OF PARCEL ID: 891415743143
DEED BOOK 640, PAGE 463
CITY OF ELIZABETH CITY, PASQUOTANK COUNTY, NORTH CAROLINA
DATE OF SURVEY
DRAWN BY: MTC
DESIGNED BY: SRM
DATE: 3/17/2025
SCALE: 1" = 30'
SHEET: 1 OF 1

OHP FIGURE

1) 34 KV phase to phase
20' 10" com. wire
26' 9 ground wire from ground
30' + to first hot wire
Aluminum wire / no shielding

2) 34 KV
19' 2" ground wire from ground
25' 2" to first hot wire
Aluminum wire / no shielding

3) 34 KV
37' to first hot wire
Aluminum wire / no shielding

4) 34 KV
22' ground wire from ground
29' to first hot wire
Aluminum wire / no shielding

5) 34 KV

20' 10" com. wire

23' ground wire from ground

30' 7" to first hot wire

1st guy to tank 22'

to road 15'

2nd guy to tank 25'

3rd guy to trees 23 & 28

4th guy to substation 21' & 25

pole guy 40'

23' high from ground

5th guy to water plant 17'

to tank 10'

6th guy to tank 10'

7th guy to water plant 8'

to round tank 12' & 14'

FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Elizabeth City 3 MG Tank
Elizabeth City, North Carolina
F&R Project No. 66D-0004

Prepared For:
AECOM
5438 Wade Park Boulevard, Suite 200
Raleigh, North Carolina 27607

Prepared By:
FROEHLING & ROBERTSON, INC.
310 Hubert Street
Raleigh, North Carolina 27603

July 3, 2025

July 3, 2025

Keiran Ryan, P.E.
Water/Wastewater, Southeast Region
AECOM
5438 Wade Park Boulevard, Suite 200
Raleigh, North Carolina 27607

Subject: Report of Subsurface Exploration & Geotechnical Engineering Evaluation
Elizabeth City 3 Million Gallon (MG) Tank
Elizabeth City, North Carolina
F&R Project No. 66D-0004

Dear Mr. Ryan:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the proposed Elizabeth City 3 MG Tank replacement in Elizabeth City, North Carolina. Our services were performed in general accordance with F&R Proposal No. 2366-00282 REV. 1 dated September 3, 2024. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and subsurface conditions, and presents geotechnical engineering recommendations for project design and construction.

We have enjoyed working with you on this project. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

Brian W. McCarthy
Date: 2025-07-03 17:16-04:00

NORTH CAROLINA PROFESSIONAL SEAL 047377 ENGINEER Brian William McCarthy

Michael S. Sabodish Jr. 2025-07-03 17:15-04:00

Brian W. McCarthy, P.E.
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EXECUTIVE SUMMARY

This Executive Summary is provided as a brief overview of our geotechnical engineering evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. As an overview, this summary inherently omits details that could be very important to the proper application of the provided geotechnical design/construction recommendations. This report should be read in its entirety prior to implementation into design and construction.

- *The subsurface exploration consisted of performing soil test borings B-1 and B-2 to depths of 89.3 and 89.9 feet below the existing ground surface, respectively.*
- *Fill and/or possible fill soils were encountered in the borings from just below the surficial materials to depths of 6.5 feet in boring B-1, and 13.5 feet in boring B-2. The fill and possible fill soils consisted of loose clayey and silty sands (USCS – SW-SC and SM); soft to stiff sandy silts, clays, and silty clays (USCS – ML and CL); and firm, high plasticity sandy silt (USCS – MH). The fill and possible fill soils appeared to be free of deleterious materials. The fill soils typically appeared to be moderately to well-compacted.*
- *Extending below the fill and possible fill soils, Coastal Plain Soils were encountered in both borings to the boring termination depths of 89.3 feet in boring B-1 and 89.9 feet in boring B-2. The Coastal Plain soils consisted of very soft to firm, low plasticity sandy silts and clays (USCS – ML and CL); very soft to stiff highly plastic silty clays (USCS –CH); and silty and clayey sands (USCS – SM, SP-SC, and SC)*
- *Thick layers of very soft and/or soft Coastal Plain soils (SPT N-value less or equal to 4 bpf) were encountered in borings B-1 and B-2 at depths of 8.5 and 13.5 feet, respectively, and extended to depths of 73.5 feet in both borings.*
- *A layer of very dense (SPT N-values greater than 50 bpf) sand with trace clay (SP-SC) was encountered in boring B-1 at a depth of 78.5 feet and extended to a depth of 83.5 feet below the existing ground surface. Deeper layers of very dense silty sands (SM) were encountered in both borings B-1 and B-2 at a depth of 88.5 feet, and extended to the termination depths of 89.3 and 89.9 feet, respectively.*
- *Most of the soil samples from the borings were observed to be in a wet condition (i.e., greater than 3 percentage points over the estimated optimum moisture content). Moist soil conditions (within 3 percentage points of the estimated optimum moisture content) were encountered in the boring B-1 at a depth of 3.5 feet in the soil profile and extended to a depth of 6.5 feet. A deeper layer of moist soils was encountered in boring B-1 from 88.5 to 89.3 feet. In boring B-2, moist soil conditions were encountered just below the surficial soils and extended to a depth of 8.5 feet. A deeper layer of moist soils was encountered in boring B-2 from 78.5 to 88.5 feet.*
- *Groundwater was encountered at depths of 2.7 and 3.5 feet below the existing ground surface. The groundwater level was recorded again in boring B-2 after a stabilization period of approximately 24-hours following the completion of drilling and was encountered at a depth of 0.6 feet.*
- *The presence of thick layers of very soft/soft clays within the proposed tank footprint will impact site development. These materials are unsuitable to directly support the proposed building due to the potential for detrimental settlement of the slab system unless efforts are made to improve subgrade support conditions.*
- *One option to improve building subgrade support conditions that will allow the use of a conventional slab system is to install a rigid inclusion system to support the tank slab.*
- *Another alternative would be to support the structure on a driven pile foundation system. F&R anticipates that a driven pile foundation system may be less economical than a rigid inclusion system for structural support.*
- *The lower plasticity soils (USCS – CL, ML, SC, and SM) encountered in the borings are generally considered fair to good materials for use as structural earth fill and are suitable subgrades for slabs. The highly plastic*

clays (USCS – CH) are generally considered poor material for use as structural fill and poor material for direct support of building foundations and slabs. The higher plasticity soils can be more difficult to properly place and compact and it is generally recommended that they be used in non-load bearing areas or in the lower portion of deeper fills provided they can be properly placed and compacted. If highly plastic soils are present at finished subgrade or foundation bearing grade, undercutting and repair is recommended.

- *Depending on the time of year when site grading takes place, moisture conditioning will likely be required (i.e., drying of wet soils). These practices are typical at projects in this geologic area. Due to the moisture sensitivity of the soils and potential for wet conditions, it is recommended that earthwork activities be performed during the seasonally dryer months (typically May to October) when weather conditions are most conducive to moisture conditioning and performing subgrade repairs.*
- *As the project design progresses and more-specific information becomes available regarding site grading and structural loads, F&R recommends that a final geotechnical engineering evaluation be performed to provide final geotechnical design and construction recommendations. Additional subsurface exploration may also be recommended at that time.*

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the area of the proposed construction and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of soil test borings B-1 and B-2 to depths of 89.3 and 89.9 feet below the existing ground surface, respectively;
- Performing geotechnical laboratory testing on representative soil samples;
- Preparation of typed Boring Logs and a Subsurface Profile;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this geotechnical report by a professional engineer.

2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The project site is located at the existing Elizabeth City Water Treatment Plant addressed as 1 Wilson Street in Elizabeth City, North Carolina (see Figure No. 1 in Appendix I). More-specifically, the site is located on the north side of W Ward Street at its intersection with Wilson Street. A Norfolk Southern railway is located along the southeastern property boundary, and the site is bound to the west by Durant Street, and to the north by a wooded parcel.

It is F&R's understanding the water treatment plant was original constructed in 1926 and has been in continuous operation since opening. The facility is currently fed by eleven (11) groundwater wells capable of supplying approximately 3.5 million gallons of water per day. The overall site is relatively flat, with ground surface elevations ranging from approximately EL 3 to EL 8, with elevations falling from the northern portion of the site to the southeast. The overall site consists of multiple tank structures, a main plant building, and an electrical substation.

2.2 PROPOSED CONSTRUCTION

Based on information provided by AECOM to F&R at the issuance of this report, the City of Elizabeth City plans to replace the existing 3 million-gallon, above ground, open-air, rectangular, concrete, raw water reservoir with a new manufactured 3 million-gallon, circular, pre-stressed concrete water tank with a concrete dome roof.

The existing reservoir will be demolished, and the new tank will be constructed in its place. The existing reservoir has the following approximate interior dimensions: 138' wide, 161'-4" long, and 18'-10" deep. The new tank would be a wire and strand-wound, circular, pre-stressed concrete water tank meeting the requirements of American Water Works Association's (AWWA) D110 standards. The tank would have an inner diameter of 125 feet and a stabilized water depth of 32'-9" with a finished floor elevation (FFE) of EL 13.33. The walls would consist of wire-wrapped shotcrete with a sloped concrete floor, and a 24-inch outlet pipe terminating above floor level to provide a sediment zone. The tank would include a free span dome roof complete with four overflows, a dome vent, access hatch, level probe opening, and openings for the 14-inch inlet pipe and two existing 6-inch miscellaneous pipes.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced soil test borings B-1 and B-2 to depths of 89.3 and 89.9 feet below the existing ground surface, respectively. The SPT borings were advanced at the approximate locations shown on the Boring Location Plan presented as Figure No. 2 in Appendix I. The test boring locations were established in the field by F&R using a hand-held GPS unit with reported sub-meter accuracy. Ground surface elevations at the boring locations were interpolated from topographic data of the area. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced with an ATV-mounted drill rig using 2.25" inside diameter (I.D.) hollow stem augers and mud rotary drilling techniques for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split barrel sampler

in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils (Standard Penetration Test - SPT). The number of blows required to drive the split barrel sampler three, consecutive 6-inch increments with an automatic hammer is recorded, and the blows of the last two 6-inch increments are added to obtain the SPT N-value representing the penetration resistance of the soil. Five (5) SPT samples were collected in the top 10.0 feet and then at a nominal interval of 5.0 feet thereafter.

A representative portion of the soil was obtained from each SPT sample, sealed in an eight-ounce glass jar, labeled and transported to our laboratory for final classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS), using visual-manual identification procedures (ASTM D2488). A Boring Log for each test boring is presented in Appendix II.

Groundwater level measurements were attempted at the termination of drilling in both borings. Following the collection of an initial groundwater level measurement in boring B-1, the borehole was backfilled with soil cuttings. A temporary piezometer was installed in boring B-2 to facilitate the measurement of stabilized groundwater level. The temporary piezometer consisted of 1-inch diameter, hand-slotted PVC pipe installed into the completed boring. Following the collection of the stabilized groundwater reading, the temporary piezometer was removed from the boring, and the borehole was backfilled with soil cuttings.

3.2 LABORATORY TESTING

F&R selected six (6) representative soil samples and subjected them to geotechnical index testing consisting of natural moisture content, percent fines analysis (#200 Sieve Wash), and Atterberg Limits determinations. The purpose of the index testing was to aid in our classification of the soil samples and development of engineering recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The laboratory test results are presented in Appendix III of this report.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project site is located within the Coastal Plain Province of North Carolina. The Coastal Plain Province is a broad flat plain with widely spaced low rolling hills where the near surface soils have their origin from the deposition of sediments several million years ago during the period that the ocean receded from this area to its present location along the Atlantic Coast. It is noted that the Coastal Plain soils vary in thickness from only a few feet along the western border areas of the Coastal Plain to over ten thousand feet in some areas along the coast. Our test borings were terminated in Coastal Plain soils.

According to our review of the 1985 Geologic Map of North Carolina, published by the Department of Natural Resources and Community Development, the site is located within an area mapped as Quaternary period deposits and is comprised of surficial deposits. These marine deposits are indicated to have been deposited less than 2 million years ago and are considered relatively young in terms of geologic age. The surficial deposits are identified as typically consisting of sand, clay, gravel, and peat deposited in marine, fluvial, eolian, and lacustrine environments.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached Boring Logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the Boring Logs presented in Appendix II of this report.

A Subsurface Profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site. The subsurface profile is presented as Figure No. 3 in Appendix I. Strata breaks designated on the boring logs and subsurface profile represent

approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within areas of proposed construction at the project site. More detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II.

4.2.2 Surficial Materials

Surficial organic soils were encountered in borings B-1 and B-2 from the ground surface to depths of 0.1 and 0.3 feet, respectively. The surficial organic soils generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed surficial organic soil materials. Therefore, the term "Surficial Organic Soil" is not intended to indicate suitability for landscaping and/or other purposes. The surficial organic soil depths provided in this report are based on driller observations. As such, the surficial organic soil depths should be considered approximate. We note that the transition from surficial organic soil to underlying materials may be gradual, and therefore the observation and measurement of the surficial organic soil depths are subjective. Actual surficial organic soil depths should be expected to vary across the site.

4.2.3 Fill and Possible Fill Soils

Fill and possible fill soils were encountered just below the surficial organic soils in borings B-1 and B-2 and extended to depths of 6.5 and 13.5 feet below the existing ground surface, respectively, and were likely placed during the construction of the existing water treatment facility. It is noted that sometimes the relatively small and disturbed sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Since man-made materials, deleterious materials, or other obvious evidence of fill were not encountered in the soil samples that appeared to be earth fill, some of the materials believed to be earth fill are referred to as "possible fill". The fill and possible fill soils consisted of loose clayey and silty sands (USCS – SW-SC and SM) with SPT N-values ranging from 5 to 10 blows per foot (bpf); soft to stiff sandy silts, clays, and silty clays (USCS – ML and CL) with SPT N-values ranging from 3 to 10 bpf; and firm,

high plasticity clayey silt (USCS – MH) with an SPT N-value of 6 bpf. The fill and possible fill soils appeared to be free of deleterious materials.

Highly plastic fill soils (MH) were encountered in boring B-2 at a depth of 3.5 feet below the existing ground surface, and extended to a depth of 6.5 feet below the existing ground surface. A layer of soft (less than or equal to 4 bpf) sandy clay (CL) was encountered in boring B-2 from 2.0 to 3.5 feet below the existing ground surface.

Fill and possible fill soils exhibiting SPT N-values of 4 bpf or less are generally indicative of fill with poor compaction while fill soils exhibiting SPT N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted fill that does not contain gravel or deleterious materials, would typically exhibit SPT N-values of 9 bpf or higher. In general, it appears that the fill was moderately to well-compacted.

4.2.4 Coastal Plain Soils

Extending below the fill and possible fill soils, Coastal Plain Soils were encountered in both borings to the boring termination depths of 89.3 feet in boring B-1 and 89.9 feet in boring B-2. The Coastal Plain soils consisted of very soft to firm, low plasticity sandy silts and clays (USCS – ML and CL) with SPT N-values ranging from WOH ("Weight-of-Hammer") to 8 bpf; very soft to stiff highly plastic silty clays (USCS – CH) with SPT N-values ranging from 1 to 13 bpf; and silty and clayey sands (USCS – SM, SP-SC, and SC) with SPT N-values ranging from 16 to 100+ bpf.

Thick layers of very soft and/or soft Coastal Plain soils (SPT N-value less or equal to 4 bpf) were encountered in borings B-1 and B-2 at depths of 8.5 and 13.5 feet, respectively, and extended to depths of 73.5 feet in both borings.

A layer of very dense (SPT N-values greater than 50 bpf) sand with trace clay (SP-SC) was encountered in boring B-1 at a depth of 78.5 feet and extended to a depth of 83.5 feet below the existing ground surface. Deeper layers of very dense silty sands (SM) were encountered in both borings B-1 and B-2 at a depth of 88.5 feet, and extended to the termination depths of 89.3 and 89.9 feet, respectively.

The highly plastic silty clays (CH) were encountered in boring B-1 and B-2 at depths of 53.5 feet below the existing ground surface, and extended to depths of 73.5 and 78.5 feet below the existing ground surface, respectively. A deeper layer of highly plastic sandy clay (CH) was also encountered in boring B-1 at a depth of 83.5 feet, and extended to a depth of 88.5 feet.

4.3 Soil Moisture and Groundwater Conditions

Most of the soil samples recovered from the borings were observed to be in a wet condition (i.e., greater than 3 percentage points over the estimated optimum moisture content). Moist soil conditions (within 3 percentage points of the estimated optimum moisture content) were encountered in the boring B-1 at a depth of 3.5 feet in the soil profile and extended to a depth of 6.5 feet. A deeper layer of moist soils was encountered in boring B-1 from 88.5 to 89.3 feet. In boring B-2, moist soil conditions were encountered just below the surficial soils and extended to a depth of 8.5 feet. A deeper layer of moist soil was encountered in boring B-2 from 78.5 to 88.5 feet.

Groundwater level measurements were attempted at the termination of drilling in both borings. Immediately after drilling completion, groundwater was encountered at depths of 2.7 and 3.5 feet below the existing ground surface in boring B-1 and B-2, respectively. The groundwater level was recorded again in boring B-2 after a stabilization period of approximately 24-hours following the completion of drilling and was encountered at a depth of 0.6 feet.

It should be noted that the groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report. F&R notes that due to the presence of relatively impervious silty and clayey soils noted on the project site, trapped or perched water conditions may be encountered during periods of inclement weather and during seasonally wet periods.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 GENERAL GEOTECHNICAL CONSIDERATIONS

The conclusions and recommendations contained in this section of the report are based upon the results of the two (2) soil test borings and laboratory testing performed by F&R, the information provided to F&R regarding the proposed construction, and our experience with similar subsurface conditions and projects. It is our opinion that the subsurface conditions encountered at the project site pose significant restrictions to the proposed development from a geotechnical engineering perspective. The recommendations presented in subsequent sections of this report are likely to impact portions of the design and construction phases of this project. As the design progresses, we request that F&R be afforded the opportunity to review proposed civil and structural plans for further evaluation of geotechnical considerations, and determine if additional geotechnical exploration and/or revised geotechnical recommendations are needed.

The subsurface conditions revealed by the borings are relatively typical of this area and geologic setting. The options for support for the new raw water tank are primarily dictated by: 1) the thick layers of very soft to soft clays and silts present at depths ranging from 10.0 to 73.5 feet below the existing ground surface, 2) the large area loading of the proposed water tank, and 3) the presence of shallow groundwater within the upper 4 feet of the soil profile (approximately EL 6.4). A detailed discussion of different foundation options is presented the next section of this report.

It is F&R's understanding that the max allowable uniform total settlement of the proposed tank is 6 inches, with a max allowable uniform differential settlement of 2.93 inches, and max allowable angular distortion of 3.13 inches. Based on the results of the 2 soil test borings, it is our opinion that conventional shallow spread foundations are not well suited to support the proposed raw water tank due to potential for settlements greater than 24 inches at center of the proposed tank. As such, F&R is recommending that a ground improvement system consisting of rigid inclusions be utilized to support the structure.

Please contact F&R at your earliest convenience if you feel additional recommendations are warranted or if the recommendations in this report need additional clarification.

5.2 FOUNDATION DESIGN CONSIDERATIONS

Due to the presence of 60 to 65 feet of very soft to soft compressible clay soils below depths of approximately 8.5 to 13.5 feet, we have concerns that excessive settlements could develop if this structure is not supported through ground improvement techniques or a deep foundation system, such as piles. Due to discussions with the project team regarding preferred design of the tank slab and cost concerns, ground improvement consisting of rigid inclusions should be considered for this project. Alternatively, consideration may be given to concrete piles driven into the medium dense to very dense sands encountered below depths of approximately 73.5 to 78.5 feet, however it is F&R's understanding that a driven pile deep foundation system would require a redesign of the tank slab.

5.2.1 RIGID INCLUSIONS

Rigid Inclusions are a ground improvement technique that would transfer the loads from structures to more competent underlying soil layers so that the structure can be supported on conventional shallow footing/slab foundations, provide higher net allowable soil bearing pressure, and reduce the need for undercutting and repairs of the existing soils for foundation support. Examples of rigid inclusion techniques include Controlled Modulus Columns (CMC). Rigid inclusions are considered subgrade improvement elements and not a deep foundation system, and typically consist of vertical, grouted elements installed using displacement-type drilling equipment or driven casing to a target depth. The tooling is then retracted while grout is discharged at the base of the hollow tooling.

The rigid inclusions are typically 12 to 18 inches in diameter and spaced on a grid system, and may extend to a depth of 75 to 85 feet at this site. The rigid inclusion approach when combined with 3 to 4 foot-thick layer of compacted stone (i.e., a Load Transfer Platform) spanning across the top of the rigid inclusions would support the raw water tank floor slab.

Rigid Inclusions are designed, installed, and warranted by a specialty contractor. Menard USA is one such contractor that can provide final design and construction of rigid inclusion systems. We recommend that you contact them to review and analyze the subsurface data in this report, as

well as the proposed structural loads for the project, and provide you with an updated settlement estimate and a cost estimate for installation. It is anticipated that the rigid inclusions should be able to provide an allowable soil bearing capacity of 2,200 pounds-per-square-foot (psf), and limit structure settlements to less than the max allowable values listed in section 5.1 of this report; however, F&R recommends that more conservative allowable settlements be utilized in the design process by the specialty contractor. Menard USA should confirm and provide estimated maximum foundation settlements to the project team as their design progresses. In the event the proposed Finished Floor Elevation (FFE) is different than we assumed, the contractor should be made aware that new earth fill may be required to establish the slab subgrade since this may be a concern of the contractor and could impact the timing of rigid inclusion installation. A contact for Menard USA is provided below:

Menard USA (Controlled Modulus Columns)
Tel: 813-519-0069
Matt Mooney
mmooney@menardusa.com

We recommend the installer's quality control (QC) program be monitored full-time by the project geotechnical engineer. The QC program includes verification of rigid inclusion elements and pumped grout/concrete volume of the elements. These items should be documented for each element installed to provide a complete record of rigid inclusion quality.

5.2.2 Concrete Pile Alternative

As an alternative to rigid inclusions, a deep foundation system consisting of driven pre-cast pre-stressed concrete piles (16"x16") may be considered. Please note that a deep foundation system would likely require a redesign of the raw water tank's slab, and would likely be more cost prohibitive. For 16" x 16" concrete piles, it is expected that the piles will achieve a design working capacity of 90 tons when driven into the surface of the dense to very dense cemented sands/shell rock at depths of approximately 75 to 80 feet. A PDA analyses should be performed to confirm pile capacity during driving of the test piles. Alternatively, a pile load test may be performed to confirm pile capacity. The piles may be designed for individual uplift capacities of 20 tons. Additionally, 5 or 6 piles should be driven along the foundation alignment to establish production

pile lengths prior to ordering of production piles. It is recommended the piles have a minimum spacing of 3 pile diameters.

For any driven piles, a wave equation analysis should be performed to assist with the selection of the appropriate hammer type to be used for this project. We would be happy to aid the contractor in selecting an appropriate pile hammer and/or confirming the selected hammer will be able to drive the piles to the design load without damage to the pile. When the pile capacity has been achieved based on the PDA analysis, driving of the pile should be discontinued to prevent possible over-stressing and damaging of the pile.

Monitoring of the installation of the test piles as well as the installation of the production piles should be performed by the geotechnical engineer or personnel working directly under their supervision to verify that the piles are properly installed.

5.3 Slab-on-Grade Design

The proposed raw water tank will be designed with a slab-on-grade floor. We recommend that a modulus of subgrade reaction (k) of 125 pounds per cubic inch (pci) be used for slab design. The subgrade soils for support of floor slabs should be prepared as outlined in subsequent sections of this report. Per information provided by the tank manufacturer, the slab should be supported on at least 6 inches of NCDOT #57 washed stone to provide a uniformly well-compacted zone of material immediately beneath the slab in order to permit free drainage without loss of fines. F&R also recommends that hydrostatic uplift be considered for floor slab design due to shallow groundwater conditions encountered during our exploration. Final slab design should be determined by the project structural engineer based on actual design loads, building code requirements and other structural considerations.

5.4 Site Seismic Classification

Our scope of services did not include site specific soil shear wave velocity testing. F&R has evaluated the data obtained from the soil test borings for assignment of Seismic Site Class to this site. In accordance with procedures outlined in the 2018 NC Building Code for determining Site Class, a weighted average of the soil conditions in the upper 100 feet was performed using SPT

N-values with the assumption that very dense soils are present below the approximate 90 foot exploration depth. **Based on this evaluation of the SPT N-values, the soil profile indicates a Site Class E is applicable to the project.** It may be beneficial to consider performing shear wave testing to evaluate whether the site class may be upgraded to Site Class D if the upgrade would provide significant cost benefits to the project. Additionally, F&R recommends further analysis of the soil profile be performed with input from the specialty contractor during the design of the ground improvement system to determine what impacts, if any, the ground improvement system will have on site seismic classification.

Although F&R has not performed a liquefaction evaluation, it is F&R's opinion that there does not appear to be a potential for liquefaction due to the presence of moderate consistency silty and clayey sands and sandy silts that typically exist over most of the site. In addition, the relatively high fines content of the finer grained silts and the silty and clayey sands encountered across the site also indicate that liquefaction is unlikely. If a detailed evaluation of liquefaction is desired, F&R would be available to perform such an evaluation at your request.

5.5 Site Soil Parameters for Design

F&R understands that soil parameters have been requested for the project as part of the design process for the proposed raw water tank. As the project design progresses and once final locations and design details are known, F&R should be contacted to provide additional input on the soil parameters to be utilized in design.

If the on-site low plasticity silty and clayey sands (USCS – SM and SW-SC) are utilized, an active earth pressure coefficient (K_a) of 0.36 may be utilized in design. F&R recommends that an active earth pressure equivalent fluid weight (EFW) of 41 pounds per cubic foot (pcf), be used in design if the on-site low plasticity sandy soils or approved imported structural fill are utilized. The on-site highly plastic clays and silts (USCS – CH and MH) should not be used as backfill for any portion of the project. The EFW is for structural elements that are below the groundwater table and subject to hydrostatic pressures.

For laterally loaded elements that are restrained from movement, such as walls that are braced on the top and bottom by structural framing, at-rest lateral earth pressures should be utilized in the design process. If the on-site low plasticity silty and clayey sands (USCS – SM and SW-SC) are used, an at-rest earth pressure coefficient (k_o) of 0.53 may be utilized. Assuming a moist backfill unit weight of 115 pcf, F&R recommends that an at-rest earth pressure equivalent fluid weight (EFW) of 61 pcf be used in design. The on-site highly plastic soils should not be used as backfill of any structural elements onsite.

For sliding resistance along the base of the slab, a friction factor (tan δ) of 0.55 should be utilized for concrete on a #57 stone and/or ABC stone base. For cases where passive earth pressure resisting forces are present, a passive earth pressure coefficient (k_p) of 1.38 can be used in design where foundation faces bear directly against undisturbed stiff native soils or well compacted structural fill; this coefficient incorporates a factor of safety of 2.0 to limit the amount of movement to mobilize the passive resistance. Assuming an in-situ density of approximately 115 pcf for native undisturbed soils, the passive earth pressure EFW would be 106 pcf. It is recommended that the upper 2.0 feet of soil not be considered as contributing to the passive resistance due to possible disturbances during construction (e.g., installation of utilities, re-grading, etc.).

Lateral earth pressures arising from surcharge loading, structural elements located in the backfill zone, earthquake loading, and groundwater should be added to the above soil earth pressures to determine the total lateral earth pressure, which the walls must resist. In addition, transient loads imposed by construction equipment should be taken into account during design.

Compaction of backfill should be on the order of 95 percent of the Standard Proctor maximum dry density in structural areas. In non-structural areas, backfill compaction can be reduced to 92 percent. Any retaining and/or foundation walls should be adequately braced during compaction of backfill. Heavy compaction equipment should not be allowed within 10.0 feet of the walls.

We recommend laterally loaded walls that are not designed to resist hydrostatic forces be provided with a drainage system to maintain the wall backfill in a drained condition at all times

to prevent the build-up of hydrostatic pressures and intercept surface water (e.g., perched water) that could develop around the perimeter of the structure. We recommend that a 2-foot wide zone of free-draining washed stone be constructed adjacent to the back of the walls and extend down to a foundation drain (perforated drain pipe) located at the base of the footing. A geotextile filter fabric (Mirafi 180N or equivalent) should be placed between the washed stone drainage layer and the remaining backfill material. The foundation drain should be positively graded to allow drainage of any water that may collect in the wall backfill. It is assumed that the collection drain will be designed for gravity discharge of collected seepage in the backfill. It is recommended that the fabric-encased washed stone extend to within approximately 12 inches of the ground surface and be covered with more impermeable silty clayey soils in order to help prevent surface runoff or infiltration from rainfall being directed into the wall drain backfill.

5.6 CUT AND FILL SLOPES

While final project plans were not available at the time of this report, if slopes are to be constructed at the site, F&R recommends designing the permanent project slopes at 3H:1V or flatter for slopes less than approximately 10.0 to 15.0 feet in height. The tops of the slopes should be located a minimum of 10.0 feet from structural limits. If steeper or higher slopes are planned, F&R should be contacted during early grading plan development to perform slope stability analyses prior to finalizing the grading plans. It is F&R's opinion that 3H:1V slopes will be stable from a slope stability standpoint provided the fill slopes are constructed of properly-compacted and tested structural fill and on subgrades approved by the geotechnical engineer. However, seepage and surface runoff may cause the slopes to slough and erode resulting in shallow surface failures. The slopes should be vegetated as soon as possible to minimize surface sloughing and erosion. A swale or shallow ditch should be constructed near the tops of slopes to prevent surface water from flowing onto the slopes. We recommend that all cut and fill slopes be observed by a geotechnical engineer or their representative during construction. Additional slope drainage and protection measures may be required in certain areas depending upon conditions observed at the time of slope construction.

5.7 DRAINAGE & DEWATERING CONSIDERATIONS

F&R anticipates that groundwater will be encountered during excavation activities to establish slab bearing grade elevation for the proposed raw water tank. It is recommended that subsurface water levels be maintained at least 3.0 feet below subgrades during construction for the structure, and final excavation to mat bearing grade elevation should not be performed until the groundwater has been lowered. F&R anticipates that the use of well points will likely improve site and soil profile drainage, improve soil moisture conditions, and aid in draining/controlling groundwater during construction.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavations during construction, unstable and loosened/softened subgrade conditions could develop, which may cause excessive settlements to develop beneath the soil supported mat foundation or require additional subgrade repairs. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

6.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

6.1 SITE PREPARATION

Initial site preparation should include razing the existing structures and removal of the existing mat foundation and utility lines that are to be abandoned below finished grades. The resulting excavations should be backfilled with compacted, structural fill as recommended in a subsequent section of this report. It should be noted, as with any site where previous construction has occurred, there is some potential of encountering construction debris, unknown fills, or isolated soft soils in areas adjacent to the previous construction, in unexplored portions of the project, or in areas affected by demolition activities. As such, close observation of subgrade conditions should be performed across the site, especially in areas of the existing structures. If any existing utility lines are located within the proposed development areas that are below planned finished grades and are to be abandoned (e.g., stormwater lines, water lines, telephone, etc.), they should be removed. Open pipes or conduits, if left in-place, adjacent to the construction area should be

bulk-headed and grouted as they might serve as conduits for subsurface erosion.

After razing of the previous structures, all surficial organic soils, roots, vegetation, concrete, asphalt, aggregate base course, and any other deleterious materials should be stripped from the proposed construction area. The stripping should extend a distance of at least 5.0 feet beyond structural limits.

Thick layers of very soft/soft native soils were encountered within the soil profile in both borings B-1 and B-2. **These lower consistency soils are not suitable for support of the structure and need to be repaired. Ground improvement techniques (rigid inclusions) and/or a deep foundation system should be utilized to improve the soils present within the proposed raw water tank footprint in order to provide adequate foundation and slab support for the structure.**

Following the stripping of deleterious material from proposed structural areas, the exposed subgrade soils at the finished subgrade level should be proofrolled with a loaded tandem-axle dump truck, scraper, or other similar type of construction equipment to give an indication as to the stability of the subgrade soils. The proofroll operations should be observed by a geotechnical engineer or their representative. If proofrolling reveals unstable conditions, the method of repair should be as directed by the project geotechnical engineer. Methods of repair may include, but are not necessarily limited to drying and re-compaction; undercutting and replacement with suitable structural fill; use of geo-textiles and/or geo-grids with select fill; use of lime stabilization; or other methods deemed appropriate by the project geotechnical engineer. As previously indicated, some soft soils were encountered near the anticipated slab bearing grade for the new raw water tank. As such, F&R anticipates that subgrade repair may be required in some areas to establish stable subgrades.

The excavated soils will likely require moisture conditioning (most likely drying of wet soils, but possibly wetting of dry soils) in order to be successfully used as compacted structural fill. The most common method of soil drying is by discing and manipulating soil, which is most-readily accomplished during the seasonally dry periods of the year. Other methods of drying include mixing with drier soils, use of lime or cement, and mechanical heating.

Based on observed groundwater elevations at the project site, F&R anticipates that groundwater will be encountered near the slab bearing grade elevation and that dewatering will be required prior to excavation in the area of the proposed raw water tank.

Well points are recommended to be installed outside the proposed new raw water tank area to improve site and soil profile drainage, improve soil moisture conditions, and aid in draining subsurface water that could be encountered during construction. F&R recommends that specialty dewatering contractors perform this work.

6.2 Structural Fill Placement and Compaction

It is expected that the low to moderate plasticity sandy silts and clayey and silty sands can be used as structural fill material. Low plasticity soils (USCS – ML, CL, SW-SC, and SM) are generally considered fair to good materials for use as structural earth fill. The highly plastic silty clays and clayey silts (USCS – CH and MH) are considered poor materials for re-use as structural fill, and it is generally recommended that these materials be used in non-load bearing areas if possible, or wasted.

A majority of the recovered soil samples were typically described as wet (greater than 3 percentage points over the estimated optimum moisture content). As such, it is anticipated that wet cut soils will likely be encountered during construction, and moisture conditioning (i.e., drying of wet soils, or wetting of dry soils) will likely be required in order to properly compact as structural fill. The grading contractor should be prepared to moisture condition soils prior to use as structural fill. As such, it is recommended that earthwork be performed during the seasonally drier late spring to early fall months when weather conditions are more conducive to moisture conditioning of fill materials.

Structural earth fill should be compacted at a moisture content within ±3 percentage points of the optimum moisture content. All structural earth fill (*i.e.,* fill placed in load bearing areas, beneath slabs, in paved areas, for slopes, etc.) should be placed in loose lifts not exceeding 8 inches and be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D-698. The top 12 inches of fill should be compacted to at least 100 percent of the Standard

Proctor maximum dry density. All areas requiring grade increases that are steeper than a slope of 4H:1V should be plowed, stepped and leveled to assure that fill is placed on near level surfaces. All structural fill material should be placed and compacted under the full-time observation of a qualified geotechnical engineer or engineering technician working under the direction of the geotechnical engineer. The placement and compaction of all fill material should be tested at frequent intervals in order to confirm that the recommended degree of compaction is achieved.

The on-site soils have sufficient silt/clay content to render them moisture sensitive. The on-site soils will become unstable (*i.e.,* pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than 3 percentage points above the optimum moisture content are generally considered to have excessive moisture. During earthwork and construction activities, surface water runoff must be drained away from the construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades. This is especially important considering the moisture sensitivity of the soils at this site.

6.3 Floor Slab Construction

The subgrade soils for support of floor slabs should be prepared as outlined previously in this report. Utility and other construction excavations performed in the prepared floor slab subgrade should be backfilled with properly compacted structural fill to aid in providing uniform slab support. Prior to base course placement, the subgrade should be evaluated by the project engineer and soft, wet or otherwise unsuitable subgrade soils should be removed. To reduce the risks of unsightly slab cracking, F&R recommends that concrete quality control testing be performed during concrete placement, control joints (as designed by the structural engineer) be cut into the slab as soon as possible after the concrete placement, and the slab be cured as appropriate for the prevailing weather conditions.

6.4 Dewatering

As previously mentioned, stabilized groundwater was encountered in boring B-2 at a depth of 0.6 feet below the existing ground surface. As such, it is expected that wet soils and/or groundwater will be encountered during construction, and dewatering will be necessary to maintain drained,

stable excavations, and to prevent softening/loosening of the excavation subgrades. However, groundwater elevations will likely vary throughout the year, and will be elevated especially during the seasonally-wet months (October through April). If groundwater is encountered, dewatering may be possible by utilizing sump and pumping techniques. During periods of inclement weather, sump pits and pumping may not be sufficient to control both groundwater and surface water, and more extensive drainage/dewatering measures may be required. The method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, sheet piling, or other means.

We emphasize the importance of dewatering during pile excavation so the bearing surface can be visually observed and confirmed to be free of loose material prior to pile installation, otherwise unpredicted settlement or instability may result. It is also possible that temporary casing may be necessary if the excavations become unstable during construction.

6.5 TEMPORARY EXCAVATION

Mass excavations and other excavations required for construction of this project should be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas and protective systems by a "competent person" for evidence of situations that could result in cave-ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of the excavation at a distance equaling or exceeding the depth of the excavation. F&R cautions that the actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site safety. F&R can evaluate specific excavation slope situations if we are informed and requested by the owner, designer or contractor's "competent person".

7.0 CONTINUATION OF SERVICES

As previously discussed, a Geotechnical Engineer should be retained to monitor and test earthwork activities, observe subgrade preparations for the foundation and installation monitoring of the rigid inclusions or piles. A geotechnical engineer should be employed to monitor the earthwork and foundation construction, and to report that the recommendations contained in this report are completed in a satisfactory manner. The continued geotechnical engineering involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Based on ACI recommendations, additional geotechnical exploration consisting of a minimum of three (3) additional borings should be performed at the site in the area of the proposed tank foundations. The additional exploration should focus on areas not investigated during this exploration;
- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before placing structural fill including proofroll observations;
- Observe the placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill; and
- Observe all foundation installation activities, foundation excavations/improvements, and footing bearing grades for compliance with the recommended design soil bearing capacity.

8.0 LIMITATIONS

This report has been prepared for the exclusive use of AECOM and/or their agents, for specific application to the referenced project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us; the data obtained from the previously described subsurface exploration program, and generally accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site.

Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon on-site observations of the conditions.

There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this GBA information.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, pavement, and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the design or location of the proposed structures, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES

Site Vicinity Map

0 100 200 400 600 800 Feet

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310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	AECOM		
Project:	Elizabeth City 3MG Tank		
Location	Elizabeth City, Pasquotank County, NC		
Project Number:	66D-0004		FIGURE No.: 1
Data:	Open Street		
Date:	July 2025	Scale: 1 inch = 400 feet	

Boring Location Plan

0 25 50 100 150 200 Feet

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310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	AECOM	
Project:	Elizabeth City 3MG Tank	
Location	Elizabeth City, Pasquotank County, NC	
Project Number:	66D-0004	FIGURE No.: 2
Data:	NCOne Map Aerial 2024	
Date:	July 2025	Scale: 1 inch = 100 feet

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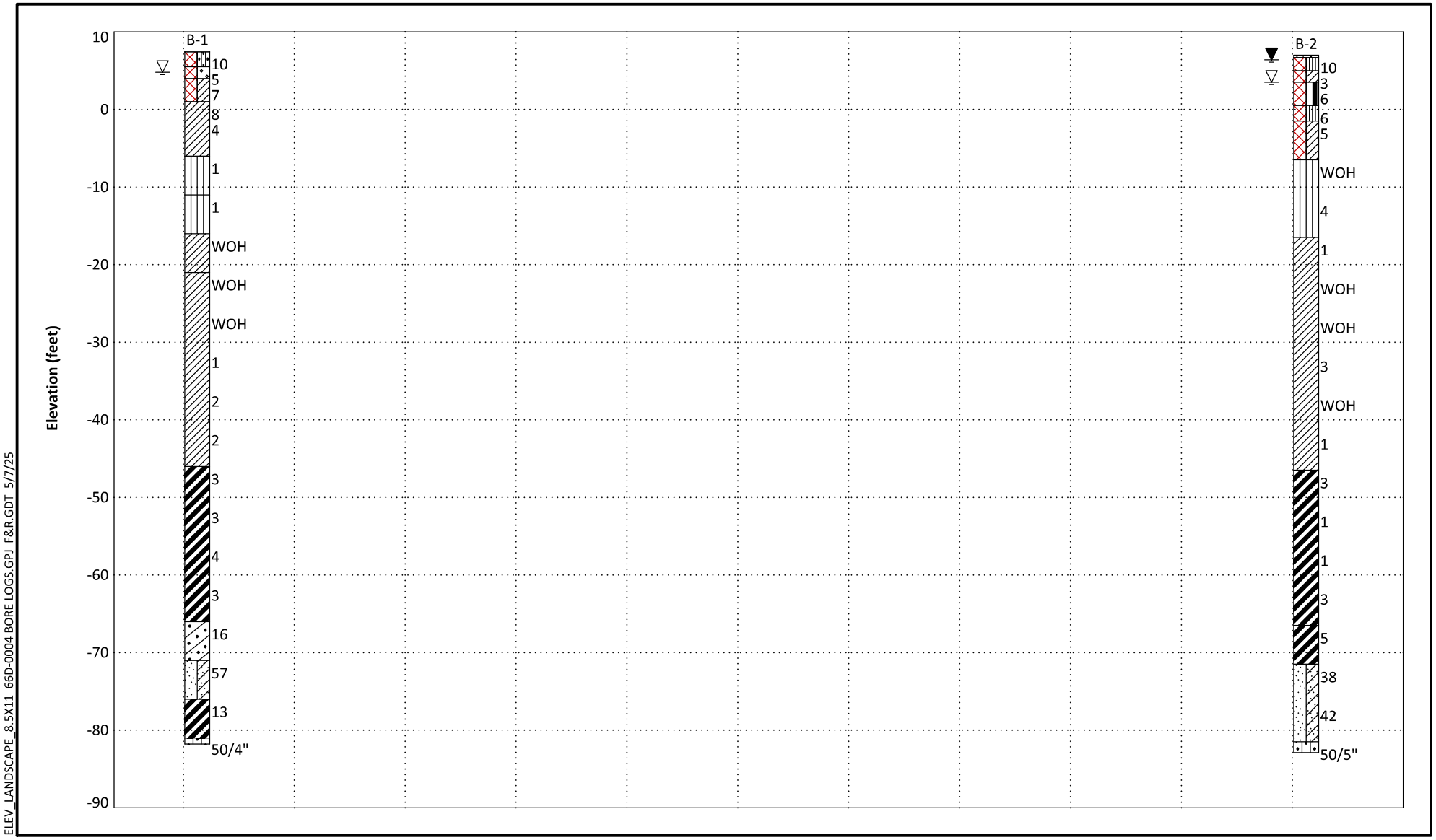
SUBSURFACE PROFILE

Plot Based on Elevation
Profile Name: Figure No. 3

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC



ELEV_LANDSCAPE_8.5X11_66D-0004 BORE LOGS.GPJ F&R.GDT 5/7/25

APPENDIX II

BORING LOGS

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Table 1: Boring Coordinates		
Boring	**Northing**	**Easting**
B-1	944153	2817264
B-2	943999	2817284

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

Ground Water

▽ Water Level in Bore Hole Immediately after Drilling

▼ Static Water Level after 24 Hours

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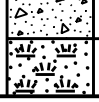
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

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BORING LOG

Boring: B-1 (1 of 2)

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC

Elevation: 7.5 ±
Total Depth: 89.3'
Boring Location: See Boring Location Plan
total unit weight; phi angle; cohesion

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/24/25
Driller: S. Davis

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
7.4	0.1	SURFICIAL ORGANIC SOILS	2-4-6	0.0		GROUNDWATER DATA: 0 Hr: 2.7', Caved at 6.9' Backfilled Immediately After Drilling
				1.5	10	
5.5	2.0	FILL: Loose, Wet, Brown and Gray, Silty Fine to Medium SAND (SM) 120 pcf; 29 degrees; 20 psf	2-2-3	2.0		
4.0	3.5	Loose, Wet, Dark Gray, Slightly Clayey Fine to Medium SAND (SW-SC) 115 pcf; 28 degrees; 5 psf	2-3-4	3.5	5	
				5.0	7	
1.0	6.5	POSSIBLE FILL: Firm, Moist, Gray, Silty CLAY (CL) with Trace Mica 115 pcf; 23 degrees; 200 psf	4-4-4	6.5		
		COASTAL PLAIN: Firm to Soft, Wet, Grayish Brown, Fine Sandy CLAY (CL) with Trace Mica		8.0	8	
			3-2-2	8.5		
		115 pcf; 25 degrees; 250 psf		10.0	4	
-6.0	13.5	Very Soft, Wet, Gray, Clayey SILT (ML)	1-0-1	13.5		
		105 pcf; 22 degrees; 50 psf		15.0	1	
-11.0	18.5	Very Soft, Wet, Gray, Clayey SILT (ML) with Slightly Fine Sand	WOH-WOH-1	18.5		
		120 pcf; 29 degrees; 5 psf		20.0	1	
-16.0	23.5	Very Soft, Wet, Dark Gray, Fine to Coarse Sandy CLAY (CL) with Shells	WOH-WOH-WOH	23.5		
		100 pcf; 20 degrees; 25 psf		25.0	WOH	
-21.0	28.5	Very Soft, Wet, Dark Gray, Fine to Coarse Sandy CLAY (CL) with Shells and Silty Sand	WOH-WOH-WOH	28.5		
		105 pcf; 21 degrees; 50 psf		30.0	WOH	
			WOH-WOH-WOH	33.5		
				35.0	WOH	
			WOH-WOH-1	38.5		
				40.0	1	
			WOH-WOH-2	43.5		
				45.0	2	
			WOH-1-1	48.5		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-1 (2 of 2)

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC

Elevation: 7.5 ±
Total Depth: 89.3'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/24/25
Driller: S. Davis

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
				50.0	2	
-46.0	53.5	Soft, Wet, Dark Gray, Fine Sandy Silty CLAY (CH)	1-1-2	53.5		
				55.0	3	
		110 pcf; 20 degrees; 200 psf				
			WOH-1-2	58.5		
				60.0	3	
			1-2-2	63.5		
				65.0	4	
			1-1-2	68.5		
				70.0	3	
-66.0	73.5	Medium Dense, Wet, Dark Gray, Clayey Fine to Coarse SAND (SC)	3-4-12	73.5		
				75.0	16	
		120 pcf; 30 degrees; 50 psf				
-71.0	78.5	Very Dense, Wet, Dark Gray, Fine to Coarse SAND (SP-SC) with Trace Clay	25-32-25	78.5		
				80.0	57	
		125 pcf; 40 degrees; 25 psf				
-76.0	83.5	Stiff, Wet, Dark Gray, Fine to Medium Sandy CLAY (CH) with Shells	9-6-7	83.5		
				85.0	13	
		120 pcf; 23 degrees; 600 psf				
-81.0	88.5			88.5		
-81.8	89.3	Very Dense, Moist, Dark Gray, Silty Fine SAND (SM)	43-50/4"	89.3	100+	
		125 pcf; 40 degrees; 25 psf				
		Boring Terminated at 89.3 feet.				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-2 (1 of 2)

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC

Elevation: 7 ±
Total Depth: 89.9'
Boring Location: See Boring Location Plan

total unit weight; phi angle; cohesion

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/17/25
Driller: W. Shenberger

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
6.7	0.3	SURFICIAL ORGANIC SOILS	3-5-5	0.0		GROUNDWATER DATA:
		120 pcf; 29 degrees; 20 psf			10	0 Hr: 3.5' inside PVC
5.0	2.0	FILL: Stiff, Moist, Brown, Fine Sandy SILT (ML)	2-2-1	2.0		24 Hrs: 0.6' inside PVC
3.5	3.5	Soft, Moist, Brownish Gray, Fine Sandy CLAY (CL)	1-2-4	3.5	3	105 pcf; 23 degrees; 75 psf
		Firm, Moist, Orangish Gray, Clayey SILT (MH)		5.0	6	
		115 pcf; 21 degrees; 300 psf				
0.5	6.5	POSSIBLE FILL: Firm, Moist, Brownish Gray, Fine	2-2-4	6.5		
		Sandy SILT (ML) with Trace Mica		8.0	6	
		115 pcf; 24 degrees; 100 psf				
-1.5	8.5	Firm, Wet, Orangish Brown Fine to Medium	2-3-2	8.5		
		Sandy CLAY (CL) with Trace Mica		10.0	5	
		115 pcf; 23 degrees; 125 psf				
-6.5	13.5	COASTAL PLAIN: Very Soft to Soft, Wet, Dark	WOH-WOH-WOH	13.5		
		Gray, Clayey SILT (ML)		15.0	WOH	
		105 pcf; 23 degrees; 75 psf	1-2-2	18.5		
				20.0	4	
-16.5	23.5	Very Soft to Soft, Wet, Blackish Gray, Fine Sandy	1-0-1	23.5		
		CLAY (CL) with Shells		25.0	1	
		105 pcf; 23 degrees; 75 psf				
			WOH-WOH-WOH	28.5		
				30.0	WOH	
			WOH-WOH-WOH	33.5		
				35.0	WOH	
			1-1-2	38.5		
				40.0	3	
			WOH-WOH-WOH	43.5		
				45.0	WOH	
			WOH-WOH-1	48.5		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-2 (2 of 2)

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC

Elevation: 7 ±
Total Depth: 89.9'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" ID HSA
Hammer Type: Automatic
Date Drilled: 2/17/25
Driller: W. Shenberger

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
				50.0	1	
-46.5	53.5	Soft to Very Soft, Wet, Dark Gray, Silty CLAY (CH)	WOH-1-2	53.5		
				55.0	3	
		105 pcf; 20 degrees; 125 psf				
			WOH-WOH-1	58.5		
				60.0	1	
			WOH-WOH-1	63.5		
				65.0	1	
			WOH-1-2	68.5		
				70.0	3	
-66.5	73.5	Firm, Wet, Dark Gray, Silty CLAY (CH)	WOH-2-3	73.5		
				75.0	5	
		115 pcf; 21 degrees; 250 psf				
-71.5	78.5	Dense, Moist, Dark Gray, Slightly Clayey Fine to Coarse SAND (SC-SP)	25-18-20	78.5		
				80.0	38	
		125 pcf; 36 degrees; 25 psf				
			27-27-15	83.5		
				85.0	42	
-81.5	88.5	Very Dense, Wet, Dark Gray, Silty Fine SAND (SM)	44-48-50/5"	88.5		125 pcf; 40 degrees; 25 psf
-82.9	89.9	Boring Terminated at 89.9 feet.		89.9	100+	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

LABORATORY TEST RESULTS

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ASTM LABORATORY TEST SUMMARY SHEET

Project No: 66D-0004
Client: AECOM
Project: Elizabeth City 3MG Tank
City/State: Elizabeth City, NC

Sample No.	Boring/Location	Depth (ft)	Natural Moisture (%)	LL	PL	PI	USCS Class.	% GRAVEL	% SAND	% PASSING #200	-	-
S-3	B-1	3.5' - 5.0'	20.9	32	21	11	CL	0.0	0.0	89.0		
S-6	B-1	13.5' - 15.0'	37.8	NP	NP	NP	ML	0.0	0.0	94.8		
S-11	B-1	38.5' - 40.0'	40.4	39	22	17	CL	0.0	0.0	57.6		
S-4	B-2	6.5' - 8.5'	28.6	NP	NP	NP	ML	0.0	0.0	88.7		
S-7	B-2	18.5' - 20.0'	31.2	NP	NP	NP	ML	0.0	0.0	88.6		
S-15	B-2	58.5' - 60.0'	52.6	68	23	45	CH	0.0	0.0	93.2		

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

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