

WATER STORAGE TANK

ABOVE GROUND STORAGE TANK / NON-PRESSURE RATED

Construction

The above ground, steel, water storage tank shall be constructed in accordance with AWWA D100 specification (current edition) excepting roof hatch, outside ladder and manway size. Tanks shall be constructed of A263 steel plate and welded in accordance with AWWA D100. All insulating piping shall be threaded or flanged as noted.

The tank shall be fabricated with a standard steel pipe vent with vented cap and bird/insect screen. The vent shall be installed at the top, center of the roof. The tank shall also be constructed with a standard weight, steel overflow pipe. The overflow pipe shall be extended to within twelve (12) inches of grade as shown, terminating with a screened discharge. Adequate brackets shall be used to brace the overflow pipe at four (4) foot ± intervals. See plans for vent and overflow pipe size. A concrete splash pad shall be installed at grade under the overflow pipe discharge.

A reinforced manway opening sized 11" x 15" shall be installed near the bottom of the tank. A twenty-four (24) inch flanged, circular manway shall also be required at the bottom of the tank.

A twenty-four (24) inch square manway access shall be provided on the top of the tank. It shall be framed six (6) inches above the surface of the roof. The top shall be fitted with a solid, water-tight cover which overflows the framed opening and extends vertically above the side of the framed opening at least two (2) inches, i.e. shoe box design. The top shall be hinged at one side and fitted with a locking device or hasp on the opposite side. A circular, 24" manway access with a shoe box design lid shall be acceptable.

A flanged tank drain line shall also be installed where shown on the plan. A concrete splash block shall be installed under the tank drain.

An outside ladder with 2 - 3/8" side rails and 1/2" round bar rungs at 16" on centers, or similar construction, shall be installed as shown on the drawings. The ladder shall terminate 10'-0" above the base of the tank to provide ventilation. Ladder shall be designed to meet OSHA specifications and shall be equipped with a safety climb device as specified. An interior ladder with safety climb device shall also be provided. The inside ladder shall terminate 3'-0" above the floor of the tank.

Threaded or flanged openings shall also be installed where shown on the drawing and sized as indicated. The tank shall also be fitted with eight (8) anchors/brackets as shown on the plan.

WATER STORAGE TANK SURFACE PREPARATION AND PAINTING

PAINTING

1.01 GENERAL

- A. Painting materials specified herein are the coating systems of the Tnemec Company, Inc. Similar coatings manufactured by Pennsbury Coatings, Valpar Corporation, or equal may be used. Comparable product of other reputable manufacturers may be used when approved by the Engineer. When the Contractor desires to substitute paint products of another manufacturer, data on paint performance, composition, directions for use, and other required information shall be provided for review by the Engineer. Any and all interior paint used or substituted shall be approved for and use by the Virginia Department of Health or the National Sanitation Foundation Standard 61. No materials shall be used without the Engineer's approval. Material shall be delivered to the project in the manufacturer's sealed containers marked with their instruction for use. Painting operations shall be in accordance with AWWA D102 where applicable and the following instructions. All coatings shall be applied in accordance with the manufacturer's instructions.
- B. Coatings shall be applied during good painting weather. Air and surface temperatures shall be within limits prescribed by the manufacturer for the coating being applied. Work areas shall be reasonably free of airborne dust at the time of application and while the coating is drying.
- C. Materials shall be mixed, thinned and applied according to the manufacturer's printed instructions.
- D. Recommended recoat times specified by the manufacturer shall be adhered to closely. Allow each coat to dry thoroughly before applying next coat.
- E. The Contractor shall provide adequate ventilation during surface preparation and coating on the tank interior and during the drying phase to carry off solvents.
- F. Where applicable, the Contractor shall meet the requirements "Worker and Environmental Controls for Industrial Lead Paint Removal Projects" and perform all work having knowledge of the hazardous nature of lead removal projects.
- G. Finish coats shall be uniform in color and show without streaks, laps, runs, sags or mixed areas.
- H. Allow minimum of seven (7) days curing time after application of final coat on the interior before flushing, disinfestation or filling with water.
- I. It is imperative that coating operations, once begun are completed promptly. If approaching cold weather season is imminent, it will be necessary to consider coating system additives which will permit painting the tank when surface temperatures are expected to drop to a minimum of 35°F. All such additives or "accelerators" shall be NSF approved for surfaces to be in contact with potable water and compatible with the coatings specified.

1.02 INTERIOR COATING SYSTEM

A. Interior Surface Preparation and Coatings

1. The interior surfaces shall then be pressure cleaned to remove any mud, silt or foreign debris. These contaminants and debris shall be removed from the tank and properly disposed at the County Landfill.
2. The interior surfaces shall then be sand blasted clean to an SSPC-SP 10 "near white" metal finish. This surface preparation shall include all ladders, interior piping as may be determined and other accessories. The underside of the roof deck and any new ladder or other appendages shall also be included in this surface preparation procedure.
3. All interior surfaces shall then be cleaned using compressed air to remove any dust buildup. Surface preparation and application of specified primer shall be completed incrementally to prevent rust development on prepared steel substrate prior to the application of specified primer.
4. All incremental surface area preparation shall overlap to prevent gaps in surface preparation or proper primer coat application.
- B. Preferred Interior Coating System
1. The preferred interior coating system shall be a three (3) coat system. The preferred interior coating system with a final dry film thickness of between 10.6 and 15.5 mils shall be applied in contrasting colors and per the manufacturer's recommendations.
2. Prime Coat:
- The green-gray primer coat shall be a two (2) component, moisture-cured, zinc-rich primer meeting the zinc-rich primer requirements of AWWA D102-97. The prime coat shall be Series 91-Hydro-Zinc 2000 as manufactured by Tnemec Company or equal. The primer shall be installed per the manufacturer's recommendations with a dry film thickness of between 2.5 to 3.5 mils.
3. Intermediate Coat:
- The intermediate coat shall be a polyamide epoxy certified by NSF International in accordance with ANS/NFPA Std. 61. The product shall be installed per the manufacturer's recommendations to a dry film thickness of 4.0 to 8.0 mils. The color of the intermediate coat shall be beige. The coating shall be similar to Series 20-1255, Pota-Pox as manufactured by Tnemec Company Incorporated or equal.
4. Finish Coat:
- The finish coat shall be a polyamide epoxy designed specifically as an interior finish coat and while in color to a dry film thickness of 4.0 to 6.0 mils. The product shall be certified by NSF International, NSF Company Incorporated as suitable for contact with potable water in accordance with ANS/NFPA Std. 61. The finish coat shall be Series 20-Pota-Pox (M902) (tinted white) as manufactured by Tnemec Company Incorporated or equal.

C. Alternate Interior Coating System

1. An alternate interior coating system shall be a two (2) coat system. The alternate interior coating system with a final dry film thickness of between 7.0 and 11.0 mils shall be applied in contrasting colors and per the manufacturer's recommendations.
2. Prime Coat:
- The beige prime coat shall be a two (2) component, epoxy primer meeting the primer requirements of AWWA D102-97. The prime coat shall be Series 20-Pota-Pox as manufactured by Tnemec Company or equal. The primer shall be installed per the manufacturer's recommendations with a dry film thickness of between 3.0 to 5.0 mils.
3. Finish Coat:
- The finish coat shall be a polyamide epoxy coating designed specifically as an interior finish coat and while in color to a dry film thickness of 4.0 to 6.0 mils. The product shall be certified by NSF International, NSF Company Incorporated as suitable for contact with potable water in accordance with ANS/NFPA Std. 61. The finish coat shall be Series 20-Pota-Pox (WH02 tank white) as manufactured by Tnemec Company Incorporated or equal.
- D. Additives
- Epoxy additives designed to accelerate the cure rate and allow for interior coating applications at temperatures down to 35°F shall be compatible with the coating system used. The product shall be similar to Series 44-710 Accelerator as manufactured by Tnemec Company or equal. These additives shall only be used when approved by the Engineer.

1.03 EXTERIOR COATING SYSTEM

A. Preferred Exterior Coating System

1. Exterior Surface Preparation and Coating
- The General Contractor shall prepare the exterior steel surface to an SSPC-SP8 commercial blast specification. The exterior three (3) coat system shall consist of a moisture-cured, zinc-rich urethane primer, an epoxy intermediate coat and a polyurethane (semi-gloss) finish coat with a total dry-film thickness of between 6.5 to 9.5 mils.
2. Prime Coat:
- The exterior prime coat shall be a two (2) component moisture-cured, zinc-rich urethane system applied to a dry film thickness of between 2.5 to 3.5 mils. The green-gray prime coat shall be Series 91-Hydro-Zinc as manufactured by Tnemec Company Incorporated or equal.
3. Intermediate Coat:
- The intermediate coat shall be a polyamide epoxy certified by NSF International in accordance with ANS/NFPA Std. 61. The coating shall be installed per the manufacturer's recommendations to a dry film thickness of 2.0 to 3.0 mils. The color of the intermediate coat shall be beige. The coating shall be similar to Series 65-H-Build Epoxiline as manufactured by Tnemec Company Incorporated or equal.
4. Finish Coat:
- The finish top coat shall be an aliphatic acrylic polyurethane coating highly resistant to abrasion, wet conditions, corrosive fumes, chemical contact and exterior weathering applied to a dry-film thickness of 2.0 to 3.0 mils. The coating shall have semi-gloss finish. The Owner shall select the color for the finish coating from the manufacturer's available colors for this series. The finish coat shall be Series 73, Endura-Shield as manufactured by Tnemec Company Incorporated or equal.
- The exterior finish coating shall be smooth without runs or laps.
- B. Alternate Exterior Coating System
1. The General Contractor shall prepare the exterior steel surface to an SSPC-SP8 commercial blast specification. The exterior three (3) coat system shall consist of an epoxy primer, an epoxy intermediate coat and a polyurethane (semi-gloss) finish coat with a total dry-film thickness of between 6.0 to 9.0 mils.
2. Prime Coat:
- The exterior prime coat shall be a two (2) component epoxy system applied to a dry film thickness of between 2.0 to 3.0 mils. The beige prime coat shall be Series 20-1255 as manufactured by Tnemec Company Incorporated or equal.
3. Intermediate Coat:
- The intermediate coat shall be a polyamide epoxy certified by NSF International in accordance with ANS/NFPA Std. 61. The coating shall be installed per the manufacturer's recommendations to a dry film thickness of 2.0 to 3.0 mils. The color of the intermediate coat shall be beige. The coating shall be similar to Series 65-H-Build Epoxiline as manufactured by Tnemec Company Incorporated or equal.
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- The exterior finish coating shall be smooth without runs or laps.
- C. Additives
- Epoxy additives designed to accelerate the cure rate and allow for exterior coating application at temperatures down to 35°F shall be compatible with the coating system used. The product shall be similar to Series 44-710 as manufactured by Tnemec Company or equal. These additives shall only be used when approved by the Engineer.

1.04 GUARANTEE

1. The Contractor shall deliver all surface coating work covered by these specifications to the Owner, complete and in first class condition in every respect and shall guarantee material and workmanship for a period of twelve (12) months after completion. If, during guarantee time, any defects should show up due to defective material, negligence or work of the General Contractor, the latter shall furnish new materials, labor and equipment as necessary for repairs at his own expense on receipt of notice of such defects from the Owner or the Owner's representative.
2. The Contractor shall also submit Certification that the coating system specified herein was applied in accordance with the Specifications and the manufacturer's recommendations.

EXECUTION OF THE WORK

2.01 Surface Preparation and Coating Systems

- a. Surface preparation and coating systems shall be implemented and installed as specified in Section 09520.

2.02 Safety Devices

The General Contractor shall also be required to install the safety devices outlined below.

- A. An OSHA approved, safety climbing device shall be installed on the inside and outside ladders. The safety climb device shall be of the flexible, stainless steel cable system type. The safety climbing system shall meet VOSHAs Regulation 1910.27 and other related ANSI regulations. The system shall be provided complete with all necessary attaching hardware such as galvanized mounting brackets, non-metallic cable guides, 3/8" galvanized cable on the outside ladder, 3/8" stainless steel cable on the inside mount. Two (2) workers harnesses shall be provided with detachable safety sleeves shall be provided. Both harnesses shall be universal sizing.
- Each harness shall also be equipped with a six (6) foot adjustable safety, shock absorbing lanyard.
- The safety climb system shall be similar to the tensioned steel cable system as manufactured by Luc-Safe, or equal. The universal harness system shall be the Luc-Safe® System as manufactured by D.B. Industries, Inc. or similar units manufactured by Miller Equipment or equal. The shock absorbing lanyards shall be similar to the Dyne-Break and Exposed™ shock absorbing lanyard manufactured by Rose, Inc., Miller Equipment or equal.
- B. One (1) telescoping extension, compatible with the safety climb device shall be provided at the top of the exterior ladder. The ladder safety extension shall be constructed of aluminum and stainless steel and be constructed similarly to the Series L1E Safety Extension as manufactured by Hatfield Products or equal.
- C. A locking ladder guard shall also be installed on the new access ladder. The ladder guard shall be approximately eight (8) feet in length as constructed of heavy-gauge (1/8" thick) non-slip aluminum. The unit shall have angled sides. All braces and hardware shall be fabricated from galvanized, heavy gauge steel.
- D. Ladder
- The interior and exterior ladders shall be dimensioned to meet VOSHAs Regulation Para. 1910.27 and properly installed. The ladder shall meet the dimensional characteristics shown in the standard ladder detail.
- E. Handrail System at Top of tank
- A VOSHAs approved handrail system shall be installed on the top and around the circumference of the standpipe. The handrail package system shall be constructed and installed per VOSHAs Regulation 1910.23 and generally detailed as shown on the standard detail on the Contract Drawings.
- A standard railing shall consist of a top rail, intermediate rail and post. The railing shall have a vertical height of 42 inches nominal measured from the upper surface of the top rail to the top of the tank. The top rail shall be smooth surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the surface of the top of the tank. The end of the rails shall stop at the entrance to the ladder providing a clear width opening of thirty (30) inches. The ends of the rails shall not overhang the terminal posts. The handrail system shall be constructed of pipe railing and post of at least 1 1/2" minimal diameter with post spaced at not more than eight (8) feet on centers. Each post shall be fitted with a bearing plate at least 3"x3" and such plate shall be welded securely to the top plate of the roof.
- The terminal post at the vertical access ladder shall be fitted with angled pipe supports extending from the top rail down to the roof plates at approximately 45°, each lateral support ending in a bearing plate, which shall be securely welded to the roof plate. The spacing shall be adjusted as necessary to rest on either side of the interior access roof hatch at the top of the tank.
- A standard toe board four (4) inches nominal vertical height and 1/2" thick plate shall be attached to the inside of the handrail post approximately 3/4" above the top of the roof deck. The toe board shall be securely fastened in place.
- As a separate fitting, a steel eye bolt with sufficient interior diameter to receive the lifting devices of the shock absorbing lanyard specified above shall be welded to the top rail of the handrail system at each post location. The eye bolt shall be dimensioned and welded to the top rail as necessary to support a 200# pull force.

2.03 Tank Structural and Appearance Improvements

1. The General Contractor shall provide the following structural and appearance improvements outlined below.

A. Shell Manway and Vent Manway

Shell manway shall be installed on the first ring of the tank shall where indicated on the Contract Drawings. If the manway cover weighs more than fifty (50) lbs., hinges shall be provided.

The size of the manway manhole shall be a circular at twenty-four (24) inches in diameter.

The shell plate where such manway is indicated shall be reinforced to comply with AWWA D-100 paragraph 3.1.3 and all portions of the manway shall be reinforced to withstand the weight and pressure of the tank contents.

The vent manway may be sized as discussed previously.

2.04 Cleaning and Disinfection

1. Cleaning

- A. When the painting has been completed, the coatings are properly cured and the system accepted by the Owner, the interior tank surface and interior piping shall be thoroughly cleaned and flushed with clear potable water. The water shall be made available from the two (2) Class II B wells to be constructed under this Contract. The wells shall be completed per the Specification, disinfested and approved for use prior to initiating tank testing and disinfection procedures. Any waterline required to convey water to the storage tank shall also have been disinfested per the Specifications and related Virginia Department of Health criteria.

2. Disinfection

- A. The procedures used for the disinfection of the water storage shall be compliant with Virginia Department of Health regulations outlined in Waterworks Regulations, Section VR 355-18-01.1(2) paragraph 3.45.1(a) - Disinfection and applicable sections of AWWA C652.
- B. After the interior tank surfaces have been cleaned and flushed, water containing fifty (50) ppm (parts per million) of free chlorine shall be placed in the tank to such a depth that, when the tank is filled, the resultant chlorine concentration shall be no less than two (2) ppm. The water containing the fifty (50) ppm shall be used to spray the underside of the roof and the interior tank walls while the tank is being filled. The required solutions for chlorine residual shall be as outlined on the drawings. The depth of water with 50 ppm shall be approximately five (5) ft. The standpipe shall be allowed to stand with this solution for at least twenty-four (24) hours before the tank is filled to the overflow.
- C. The full tank shall then be allowed to stand with the two (2) ppm residual for an additional twenty-four (24) hours.
- D. When the tank disinfection process has been deemed satisfactory and acceptable, the General Contractor shall proceed with the bacteriological analysis outlined below.

3. Testing

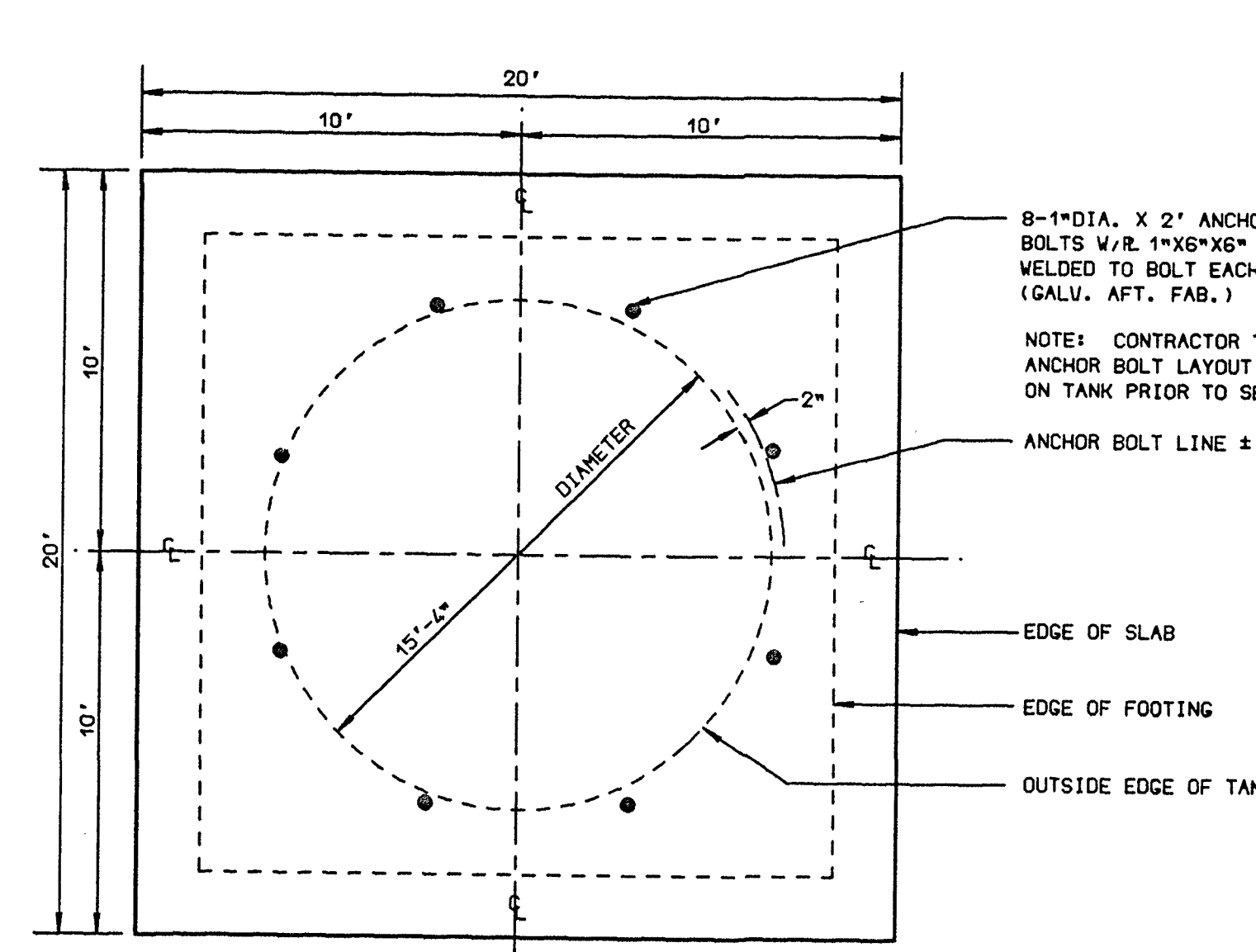
- A. Two (2) water samples of bacteriological analysis shall be collected at least twenty-four (24) hours apart and analyzed by an independent, certified laboratory. The results of these sample tests shall indicate no coliform bacteria before the tank can be considered acceptable for service.
- B. In the event that contamination is indicated, the procedure outlined above shall be repeated until satisfactory results are obtained.
- C. Placing the Tank Into Service
- A. After satisfactory bacteriological samples have been obtained, the tank may be placed into service without draining the water used to disinfect the standpipe.
5. Water used for cleaning and disinfection during the initial standpipe cleanup and fill procedures will be supplied by the Owner from the approved Class II-B well, and treated as necessary for use within the system.

2.05 Watertightness

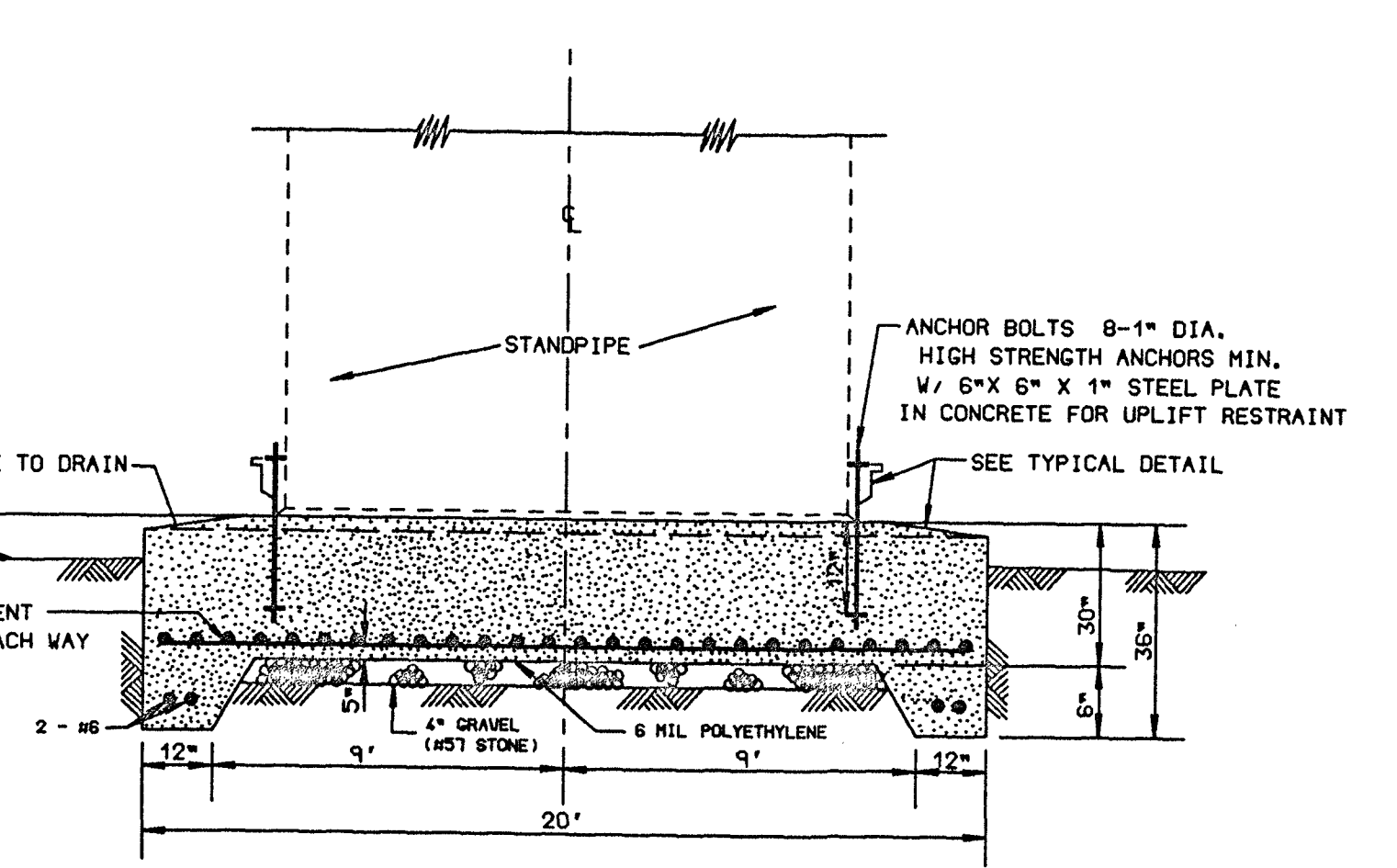
1. All work shall be accomplished by experienced workmen, using equipment best adapted to the specified scope of work. Upon completion of the tank, the standpipe shall be watertight. Under the provisions of AWWA D-100, the standpipe shall be filled with water to test for water tightness. The watertight inspectors shall be accomplished during tank disinfection.
2. Repair work as needed to eliminate leaks shall be neatly accomplished. Damaged coatings shall be repaired.

2.06 Guarantee

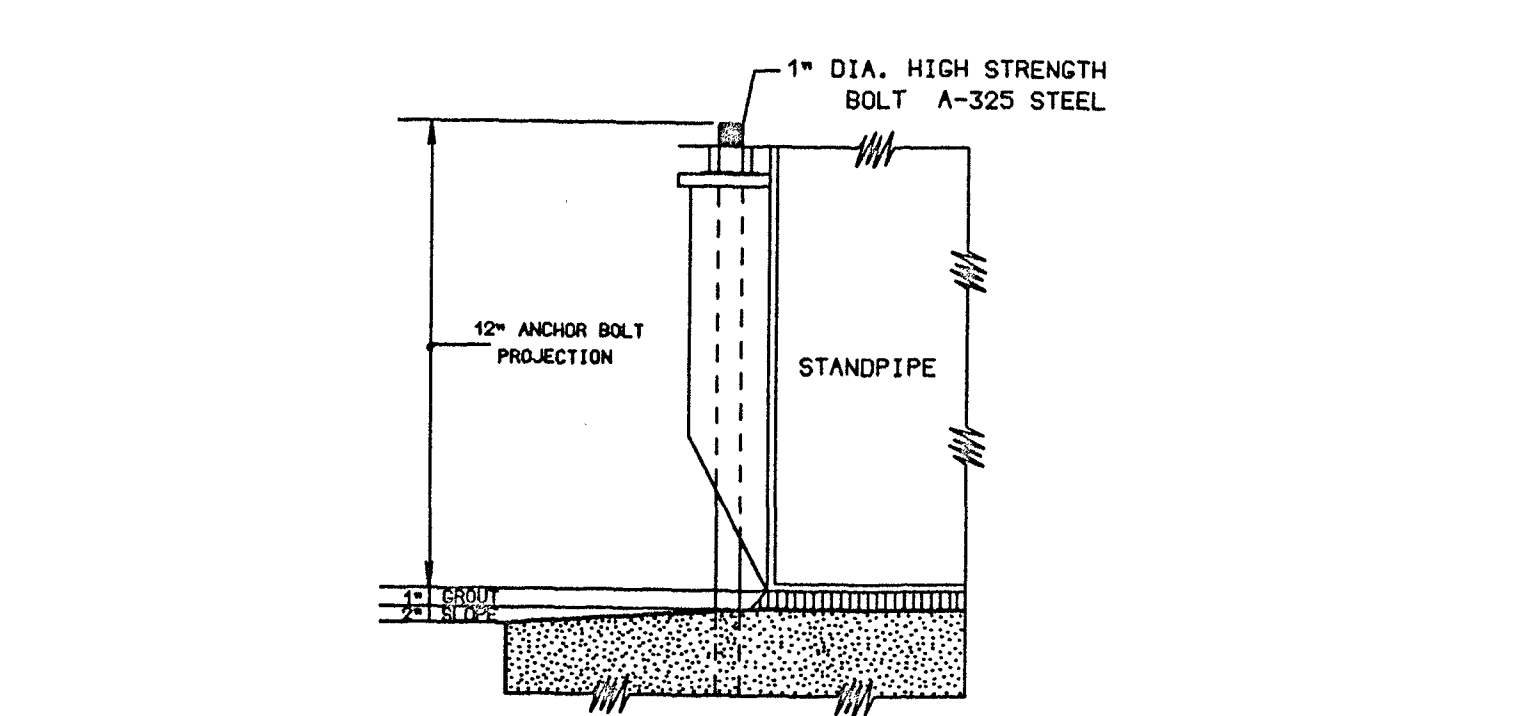
1. The General Contractor shall deliver the work covered by the Specifications in a complete, first class condition in every respect. The General Contractor shall guarantee the material and workmanship for a period of twelve (12) months after the established date of substantial completion. If, during the warranty period, any defects should be revealed due to defective material or paint, negligence or lack of proper care on the part of the General Contractor, the latter shall furnish new materials and the labor and equipment necessary for any such repairs, at his own expense. The warranty work shall be accomplished promptly upon receipt of written notice from the Owner or the various Representative of such defect.
2. The General Contractor shall also submit certification from the manufacturer's representative that the coating system installed was installed per the manufacturer's recommendation.



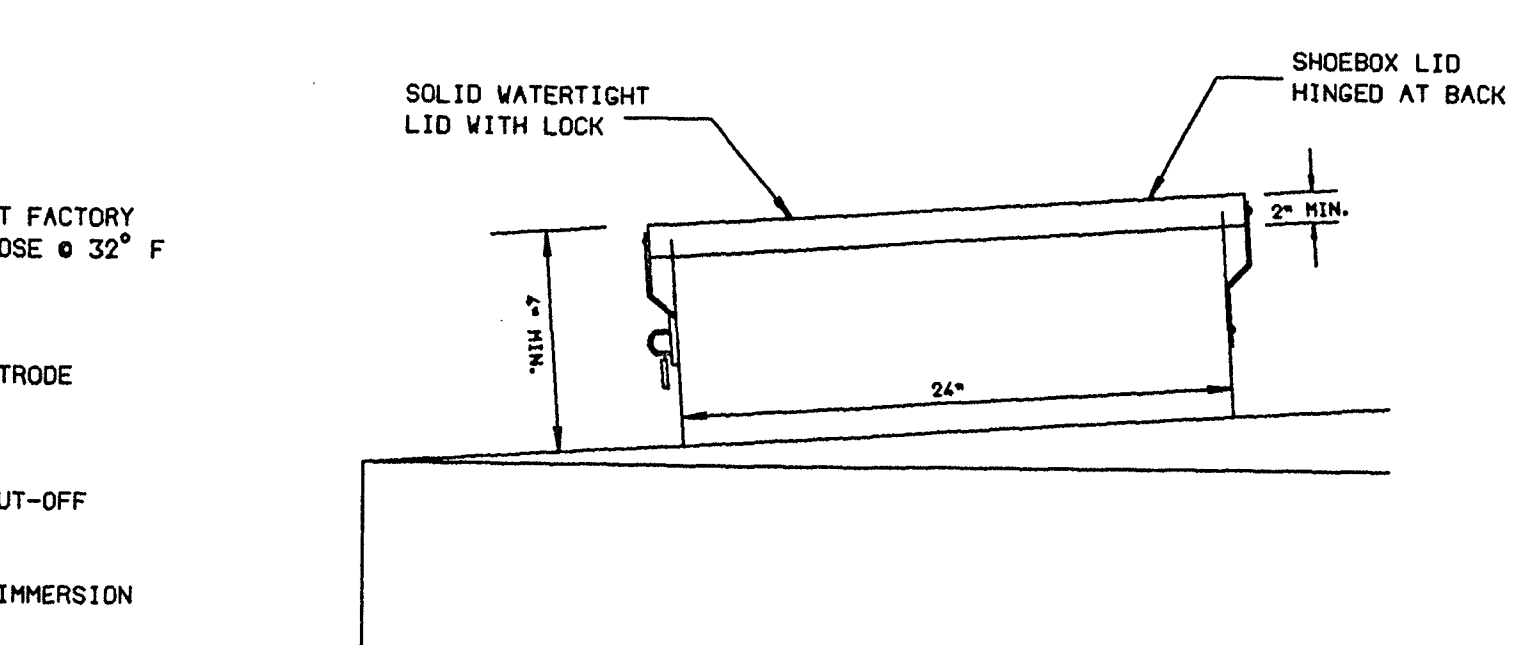
FOUNDATION PLAN
NO SCALE
NOTE: TANK MANUFACTURER TO VERIFY FOOTING DESIGN.



SECTION
NO SCALE

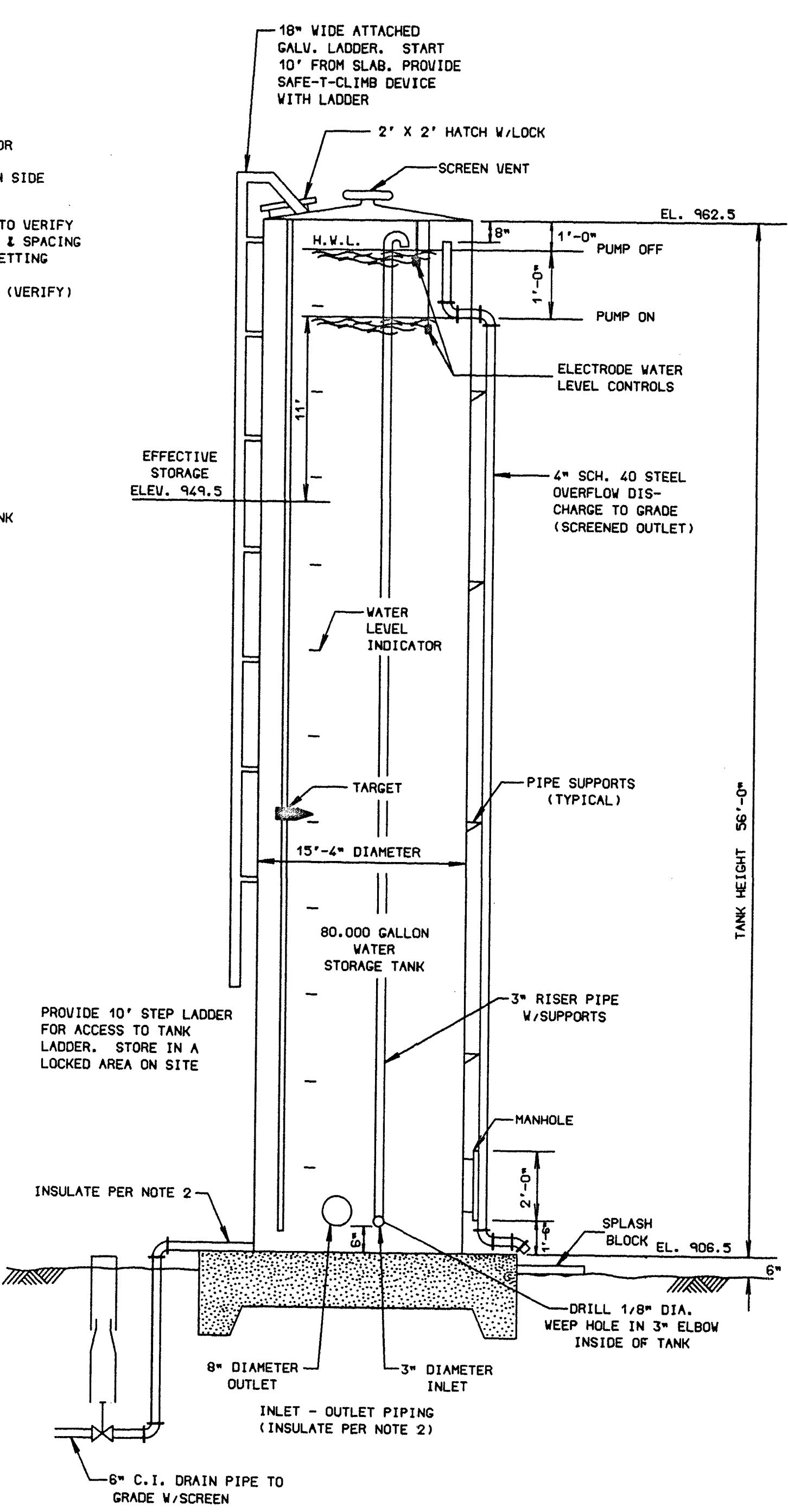


TYPICAL DETAIL
NO SCALE

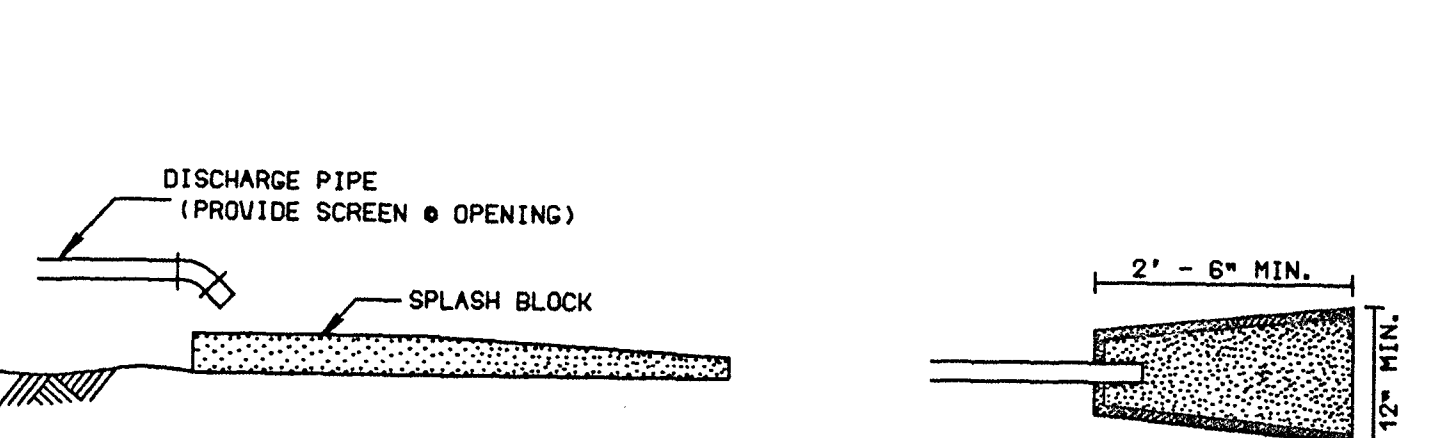


ELECTRODE HOLDER @
WATER STORAGE TANK

WATER STORAGE TANK
UPPER HATCH DETAIL



WATER STORAGE TANK ELEVATION



EROSION CONTROL

ALL BLOW-OFFS AND DISCHARGES EMPTY INTO
SPLASH BLOCKS

- NOTES:**
1. ALL PIPING BELOW GRADE AND UNDER CONCRETE SLAB SHALL BE GALVANIZED STEEL OR DUCTILE IRON.
 2. ALL EXPOSED PIPING SHALL BE INSULATED TO PREVENT FREEZING TO A DEPTH 3' BELOW GRADE WITH "CERTAINTED" WRAP OR APPROVED EQUAL.
 3. CUT OR FILE ALL THREADS FROM DISCHARGE OF SAMPLE TAPS.
 4. GALVANIZED STEEL OR DUCTILE IRON PIPE SHALL BE USED FOR ALL ABOVE-GRADE PIPING AT THE WELL AND AT THE STANDPIPE STORAGE TANK.
 5. FOUNDATION MATERIALS
a. CONCRETE: $f'_c = 4000$ PSI
b. REINFORCEMENT: $f_y = 60,000$ PSI
 6. SOIL BEARING CAPACITY: 3500 psf MIN.

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COMMONWEALTH OF VIRGINIA
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PROFESSIONAL ENGINEER

THE RETREAT WATER SYSTEM
UNION HALL DISTRICT FRANKLIN CO., VA.

DATE: 10-1-02
TECHNICIAN:
CHECKED BY:
REVISIONS
NO. DATE
2-26-03
SCALES
AS SHOWN
PROJ. NO. 020097 DIV.
SHEET NO. 13 OF 16
DRAWING NO.
DETAIL2

MANUSCRIPT DRAWING NUMBER:
VIEWS TO CREATE THIS DRAWING:
FIELDBOOK IDENTIFICATION: