

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATIONS**

**WATERING FACILITY**

**1. Scope**

The work shall consist of all construction operations and furnishing all materials as required by the drawings and specifications for the complete installation of a watering facility. The facility may be a tank, trough, manufactured waterer (fountain), or other suitable device.

**2. Location**

The location of the watering facility shall be as shown on the construction plans, as staked in the field, or as directed by the technician.

**3. Site Preparation**

The foundation area shall be cleared of vegetation, boulders, rubbish, or other materials not suited as subgrade material.

The foundation and surrounding area shall be smoothed and graded to permit free drainage of surface water.

Concrete shall be placed on well-drained, firm subgrade consisting of firmly compacted sand, gravel, or earth. If the soil is a highly plastic material subject to significant swelling, a minimum 4-inch layer of sand or fine gravel shall be placed between the sub-base material and the concrete.

Fiberglass tanks shall set on a base made of at least 4 inches of sand or fine gravel. Precast concrete tanks shall be placed on a smooth earth or sand surface capable of making contact with the entire base of the tank. The area around watering facilities shall be protected from undermining by an 8-inch layer of coarse gravel (1/2-inch diameter or larger) or crushed rock extending at least 4 feet away from the tank or a concrete apron that is 4 inches thick and extends at least 3 feet away from the tank.

**4. Waste Material**

Waste material from the construction operation such as rocks, frozen soil, mud, roots, logs, or rubbish shall be disposed of by piling or burying at locations outside the work area or as directed by the technician.

**5. Concrete**

The concrete design mix shall produce concrete that has a minimum design strength of 3500 pounds per square inch (psi) at 28 days.

Portland cement shall be Type I or II. An air-entraining admixture shall be used to provide an air content of 5 to 8 percent of the volume of concrete.

Coarse aggregate shall be hard; be free from dirt and organic materials; and consist of well-graded gravel, crushed stone, or other suitable materials larger than 3/8 inch. Maximum size shall be 1 inch.

Fine aggregate shall consist of well-graded natural or manufactured sand with particle gradation ranging from coarse (3/8 inch) to fine (#200 sieve).

Mixing water shall be clean and free from oil, alkali, or acid.

The proportions of the aggregates shall be such to produce a concrete mixture that will work readily into the corners and angles of the forms and around steel reinforcement when consolidated. The slump at the time of placing shall be 3 to 5 inches.

When nylon fiber mesh is used in the concrete mix, a minimum rate of 1.5 pounds per cubic yard of concrete shall be used.

Where a steel wall is used for a rim-type tank, the metal embedded in the concrete shall be protected by asphalt or similar coating.

When concrete walls are used, the entire tank should be poured at one time or the bond area between the floor slab and wall must be thoroughly roughened and cleaned to ensure a good bond.

Forms shall be wood, plywood, steel, or other approved materials and shall be mortar-tight. The forms shall be unyielding and shall be constructed so that the finished concrete conforms to the specified dimensions and contours.

Prior to placement of concrete, the forms and subgrade shall be free of chips, sawdust, debris, water, ice, snow, extraneous oil, mortar, or other harmful substances or coatings.

Inspection and approval of the forms and steel placement by designated personnel shall be made prior to the placement of concrete. Copies of the concrete delivery tickets shall also be furnished to verify that proper concrete was delivered and placed.

Concrete shall be conveyed from the mixer to the forms as rapidly as practical by methods that will prevent segregation of the aggregates and loss of mortar. Concrete shall not be dropped more than 5 feet vertically except where suitable equipment is used to prevent segregation.

Immediately after the concrete is placed in the forms, it shall be consolidated by spading, hand tamping, or vibration as necessary to ensure smooth surfaces and dense concrete.

All exposed surfaces of the concrete shall be accurately screeded to grade and then wood-floated.

Forms shall be removed in such a way to prevent damage to the concrete.

The minimum period from completion of the concrete placement to the removal of the forms shall be 12 hours.

After forms are removed from concrete walls, all exposed voids larger than  $\frac{3}{4}$  inch deep shall be filled with cement-sand mortar to accomplish a smooth surface.

Concrete shall be prevented from drying for a curing period of at least 7 days after it is placed. Exposed surfaces shall be kept continuously moist for the entire period or until curing compound is applied.

Concrete shall not be mixed nor placed when the atmospheric temperature is less than 40° F or more than 90° F unless facilities are provided to prevent freezing or for cooling as required.

If concrete is placed when temperatures may fall below 40° F during the curing period, it will be insulated or heated to maintain a temperature of 50° F for the first 3 days of the curing period.

## **6. Reinforcing Steel**

Reinforcing steel shall be cleaned to remove any loose, flaky rust; mill scale; oil; grease; or other coatings. The reinforcement shall be maintained in a clean condition until it is completely embedded in the concrete.

Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks, cracks, or improper bends will be rejected.

Reinforcing steel shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. Tack welding of bars will not be permitted. Metal chairs, metal hangers, metal spacers, plastic chairs, and concrete chairs may be used to support the reinforcement. Such hangers, spacers, and ties shall be placed in such a manner that they will not be

exposed in the finished concrete surface. Precast concrete chairs shall be moist at the time concrete is placed.

### **7. Fiberglass Tank**

The tank shall be made of glass-reinforced polyester to the manufacturer's design for the intended purpose. Minimum thickness of the walls or floor shall be 1/4 inch. All surfaces should be painted with white gel coat at the time of manufacture to prevent deterioration due to sunlight; otherwise, a coat of polyester resin may need to be applied after several years to keep the tank serviceable.

### **8. Precast Concrete Tank**

The tank shall be of the manufacturer's design for the intended purpose. The thickness of the floor shall be a minimum of 4 inches, and the sidewalls shall be a minimum of 4 1/2 inches. The inside of the sidewall shall taper at least 1 inch from the floor to the top.

The concrete shall have a minimum compressive strength of 4000 psi at 28 days. Minimum reinforcing steel shall be 3/8-inch diameter steel bars at 12 inches center to center.

### **9. Rim-Type Tank**

The rim shall conform to the material requirements in the standard. The floor shall consist of reinforced concrete meeting the requirements of Section 5. The rim shall be placed a minimum of 2 inches into the concrete floor.

### **10. Tire Tank**

The rubber tire shall be free of cuts, rips, and holes. The tread wear shall not be worn beyond the tread depth. The top sidewall of the tire shall be removed as needed for animal access to the water. The concrete plug shall meet the requirements of Section 5 or as shown on the detail drawings.

### **11. Frost-Free (Earth-Covered) Tank**

The tank shall be installed following the manufacturer's recommendations for placement and installation or as shown on the detail drawings.

### **12. Waterer**

The waterer shall be installed following the manufacturer's recommendations for placement and installation.

The concrete base shall meet the requirements of Sections 5 and 6 or as shown on the detail drawings.

### **13. Measurement**

Measurements of the completed watering facility shall be made to determine if the as-built dimensions are within reasonable tolerance of the design dimensions. The design storage volume in gallons will be determined using the depth at the installed overflow or 3 inches below the top if no overflow is used. The design storage will be used as the certified amount for all facilities except manufactured waterers and earth-covered tanks. Waterers and earth-covered tanks are certified as each.

### **13. Construction Details**