

CONSTRUCTION SPECIFICATION
WATERING FACILITY
ND-614

SCOPE

The work shall consist of all preparation, excavation, backfill, furnishing and installing materials, as required to construct a livestock watering facility.

LOCATION

The location of the watering facility shall be as shown in the drawings or as staked in the field.

MATERIALS AND INSTALLATION

The watering facility shall be installed to the dimensions and thickness (gage) specified. The installation shall follow the manufacturer's recommendations.

A. REINFORCED CONCRETE MATERIAL

All materials used in the concrete construction shall meet the applicable ASTM standards and/or ACI specification.

1. Design of the concrete mix

The proportions of the aggregate shall be such as to produce a concrete mixture that will work readily into the corners and angles of the forms and around reinforcement when consolidated but will not segregate or exude free water during consolidation. Concrete shall be uniform and thoroughly mixed when delivered to the work site.

Portland cement shall meet the requirements of ASTM C-150 for Type I or Type II. The concrete mix shall be class 3000M, minimum net water content of 6 gallons per bag of cement, and minimum 5.5 bags of cement per cubic yard of concrete.

Air entrainment must be used and the air content, by volume, shall be 4 to 7 percent of the volume of concrete. Other admixtures shall not be used unless approved in writing by the responsible Natural Resources Conservation Service Representative (NRCSR).

2. Batch ticket information

The contractor shall obtain from the supplier a delivery ticket for each batch of concrete before unloading at the site. The following minimum information shall be included on the ticket:

Name of concrete supplier.

Name of purchaser and job location.

Date of delivery.

Amount of concrete delivered.

Time loaded.

Design mix designation.

Quantity of cement on truck.

Quantity of water added at plant.

Time the concrete arrived at the site.

Water added by the receiver of the concrete.

Admixture(s) added on site –type, quantity, and time admixture was added to the concrete.

Time the concrete was unloaded.

Upon completion of the placement, copies of all batch tickets shall be provided to the landowner.

3. Concreting in cold weather

Concrete shall not be mixed nor placed when the daily minimum atmospheric temperature is less than 40 degrees Fahrenheit unless facilities are provided to prevent the concrete from freezing. The use of accelerators or antifreeze compounds is not allowed.

4. Concreting in hot weather

The contractor shall apply effective means to maintain the temperature of the concrete below 90 degrees Fahrenheit during mixing, conveying, and placing.

5. Reinforcement

Reinforcing steel shall be deformed bars manufactured specifically for concrete reinforcement and shall be a minimum of Grade 40.

Steel reinforcement shall be #3 bars at 12 inches center to center in both directions. Rebar shall have 3" end clearance all around.

Reinforcing steel shall be free from loose rust, concrete, oil, grease, paint, or other deleterious coatings.

All reinforcing steel shall be cold-bent, if bends are required.

Synthetic fibers or welded wire reinforcement are not a substitute for steel reinforcement.

6. Form and steel placement

Forms shall be of wood, plywood, steel, or other approved material and shall be mortar tight. The forms and associated falsework shall be substantial and unyielding and shall be constructed so the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags, or other irregularities.

Reinforcement shall be accurately placed and secured in position in a manner that will prevent displacement during the placement of concrete. Reinforcing steel shall be supported by precast concrete bricks or manufactured chairs. Except for dowel rods, placing steel reinforcement into concrete already in place will not be permitted.

7. Preparation of subgrade

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. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. Rock surfaces shall be cleaned by wire brush scrubbing, wet sandblasting, or air-water cutting, as necessary, and shall be wetted immediately prior to placement of concrete. All other subgrade

surfaces shall be firm and damp prior to placement of concrete. Placement of concrete on mud, dried earth, uncompacted fill, or frozen subgrade will not be permitted.

8. Placing

Concrete shall not be placed until the subgrade, forms, and steel reinforcement have been inspected and approved by the NRCSR. Reasonable notice shall be given to this person prior to the time of concrete placement. Such notice shall be far enough in advance to give adequate time to inspect the subgrade, forms, steel reinforcement, and other preparations for compliance with the specifications before the concrete is delivered for placing.

The concrete shall be deposited as closely as possible to its final position in the forms, and shall be worked into the corners and angles of the forms, and around all reinforcement and embedded items in a manner to prevent segregation of aggregates or excessive laitance. There shall be no excessive lateral movement of concrete by the use of a vibrator in either forms or slabs.

Immediately after the concrete is placed, it shall be consolidated by vibrating as necessary to ensure smooth surfaces and dense concrete. Each layer shall be consolidated to ensure monolithic bond with the preceding layer. If the surface of a layer of concrete in place sets to the degree that it will not flow and merge with the succeeding layer when vibrated, the placement of concrete will be discontinued and a construction joint will be made.

Concrete should be prevented from drying for a curing period of at least 7 days after it is placed. Exposed surfaces should be kept continuously moist for the entire period, or until curing compound meeting the requirements of ASTM C309, Type 2 is applied. Moisture should be maintained by sprinkling, flooding, or fog spraying, or by covering with continuously moistened canvas, cloth mats, straw, sand, or other approved material. Wood forms left in place during the curing period should be kept continuously wet. A formed surface should be thoroughly wetted immediately after forms are removed and should be kept wet until patching and repairs are completed. Water or covering shall be applied in such a way that the concrete surface is not eroded or otherwise damaged.

B. STEEL MATERIAL

Steel watering facilities will be galvanized. Top edges of watering facilities will be reinforced with rolled pipe, galvanized tube, angle iron or other suitable reinforcement. Minimum gauges will be as shown below. Facilities less than 10 feet in diameter will be constructed of 18 gauge or heavier steel. Facilities 10 feet in diameter or greater will be constructed of 16 gauge or heavier steel.

Steel watering facilities with steel bottoms will have the bottom side joined in such a manner as to provide a locked and water tight seam. The outside bottom and the side below grade will be coated with a plastic or asphalt based sealant prior to final placement.

Steel watering facilities with concrete bottoms will have concrete extending a minimum of 2 feet around the entire perimeter of the watering facility. Minimum reinforcement will consist of #3 bars on 12 inch centers both ways. Where steel rim and concrete floor join, the metal shall be protected by a plastic or asphalt based coating.

Cathodic protection is recommended to extend the life of the steel watering facility.

C. FIBERGLASS MATERIAL

One piece fiberglass watering facilities will have a minimum nominal wall and bottom thickness of 3/16 inch. The watering facility shall be of seamless laminate construction throughout, approximately 30 percent glass and 70 percent resin. The watering facility shall be constructed in a male mold to insure non-porous interior surface.

Top edge of watering facility will be reinforced with a minimum 2 inch radius flange.

Fiberglass watering facilities with concrete bottoms will have a minimum nominal wall thickness of 1/4 inch. The top edge of the rim will be reinforced with a minimum 2 inch radius flange. Concrete floors will be a minimum of 6 inches thick. Embedment of the rim will be a minimum of 2 inches into the concrete floor. Concrete shall extend a minimum of 2 feet around the entire perimeter of the watering facility. Minimum reinforcement will consist of #3 bars on 12 inch centers both ways.

D. WOOD MATERIAL

Wood watering facilities shall be constructed of tongue and groove timber, not less than 2 inches nominal thickness (1 1/2" finished). Lumber shall be new select boards. The lumber shall not deteriorate over the useful life of the watering facility. Wood in contact with the ground shall be treated with preservatives as recommended by industry standards.

Round watering facilities shall be circumferentially reinforced with 1/2 inch rods with adjustable lugs spaced at maximum 2 feet vertical intervals (except that a watering facility 2 feet high will have at least 2 reinforcing rods).

E. OTHER MATERIALS

Other materials may be used where long service life and adequate protection for the material will be provided. Use of manufactured materials must follow the manufacturer's recommendation or a design prepared by an engineer. Materials shall be ultraviolet resistant or shall have a durable coating to protect the structure from deterioration due to sunlight.

F. OTHER INSTALLATION CONSIDERATIONS

1. Site Preparation

Clear all trees, brush, rocks, and rubbish from the foundation or watering facility area.

Level and compact the area under the watering facility before placement. If the watering facility is to be constructed on a relatively impermeable soil (clay), 4.0 inches of sand or pea gravel shall be placed on the foundation, before installation of the watering facility. If the watering facility has a reinforced concrete bottom, it shall be set on a minimum 2 inch sand or fine gravel base. The area immediately surrounding the watering facility shall be smoothed and graded to drain away from the watering facility.

A minimum 6 foot wide, 6 inch thick apron of gravel, scoria, or other suitable material will be provided around the watering facility perimeter. This area will be filled next to the watering facility to an elevation that will allow small livestock to reach the water.

2. Backfill

All backfill for inlets, outlets, or overflow pipes shall be compacted to the density of the surrounding material. Moisture content of the fill material, when kneaded in the hand, will allow the soil to form a ball which does not readily separate.

3. Pipe

The pipe used shall be new material as specified. The pipe shall meet the appropriate ASTM's and AWWA standards. The pipe shall be thoroughly tested at the design working head or a minimum of 10 feet, whichever is greater.

Flanges, gaskets, sealants, tapes, and similar joining and water proofing materials shall be fully compatible with other system components.

Pipe and appurtenances shall be protected from damage by livestock.

4. Finish and cleanup

All construction shall be performed in a workmanlike manner, and the job site shall have a neat appearance when finished.

MEASUREMENT

Trenching is to be measured to the nearest linear foot. The sand, gravel, or scoria for bedding and apron is to be measured to the nearest cubic yard. Concrete is to be measured to the neat lines shown on the drawings and the volume of concrete is computed to the nearest cubic yard. Pipe, including appurtenances, is to be measured to the nearest linear foot. Lumber is to be measured to the nearest board foot. Posts are to be measured to the nearest linear foot. Water storage capacity is to be calculated to the nearest gallon.

ITEMS OF WORK AND CONSTRUCTION DETAILS

