

WATERING FACILITY (Code 614)

1. SCOPE

The work covered by this specification includes furnishing all equipment, materials, and labor and performing all operations in connection with the installation of stock tanks and storage tanks as shown on the drawings, as herein specified, or as staked in the field.

2. FOUNDATION PREPARATION

Clear all trees, brush, rocks, and rubbish from the foundation area to a distance of 10 feet beyond the edge of the stock tank in all directions.

Tank floors shall be placed on rock, fine gravel, or sand. Where these materials are not present, a minimum 6-inch leveled and compacted layer of fine gravel, sand, or stable well compacted, or undisturbed soils that will not settle differentially, shall be placed under the floor.

The area immediately surrounding the tank shall be smoothed and graded to drain away from the tank.

Unless otherwise designated on the drawings, a minimum 6-foot wide, 6-inch thick coarse gravel, scoria, concrete, or soil cement paving apron shall be provided around the tank perimeter.

3. PIPE MATERIALS AND INSTALLATION

Pipe and fittings shall be in accordance with Practice Construction Specification MT-516, Pipelines.

All stock tanks and storage tanks shall be installed in accordance with the manufacturer's recommendations and these specifications. In the event that these specifications are less restrictive than the manufacturer's recommendations, the

manufacturer's recommendations shall govern.

Backfill for inlets, outlets, or overflow pipes shall either be compacted to the density of the surrounding material or backfilled with fine gravel or sand.

4. TANK MATERIALS AND INSTALLATION

All tanks and associated materials shall be new unless specifically approved otherwise.

Bottoms and top edges of the tanks shall be installed to within one half inch across the tank.

Posts and Lumber

Posts shall be cedar, juniper, heart redwood, or treated with preservatives not prohibited by the EPA.

Lumber shall be new or approved used material of the minimum dimensions shown in the drawings. Knots, splits, or other imperfections shall not impair the strength or life of the structure.

Concrete

All concrete and reinforcing steel shall meet the requirements of construction specification MT-106, MT-106A, or MT-106B. Unless otherwise specified in the special provisions, concrete shall be Class 4000, air-entrained.

Where concrete walls are specified, the walls and floor shall be placed at the same time or the bond area between floor slab and wall shall be roughened, thoroughly cleaned and if specified, waterstops placed to ensure a watertight joint.

Minimum floor and wall thickness are specified below:

Floors: (maximum width or length – 15 feet)

- 6 inches thick – #4 bars at 12-inch centers.

Walls: (maximum height 36 inches)

- 4 inches thick – #3 bars at 9-inch centers.
- 5 inches thick – #4 bars at 12-inch centers.
- 6 inches thick – #4 bars at 9-inch centers.

Reinforcing bars shall be bent and spliced so they are continuous in the floor and walls. Splices shall be a minimum of 30 bar diameters.

Wall and floor thickness and steel configuration for concrete tank or trough components not meeting these minimums require appropriate structural analysis.

Concrete Masonry (Hollow-Tile Block)

Concrete block shall meet the requirements of ASTM-C 90.

Mortar for concrete masonry shall be freshly prepared and uniformly mixed in the ratio by volumes of 1 part cement, ½ part lime, 4-½ parts sand and enough water to make a workable mix.

Grout for the cells of hollow-tile blocks shall be of fluid consistency and mixed in the ratio by volumes, 1 part cement, 3 parts sand, or 1 part cement, 3 parts sand, and 2 parts pea gravel and enough water to make a workable mix.

Steel

All steel tank material shall be galvanized, stainless steel, or completely factory plastic-coated or epoxy-coated.

Top edges of tanks shall be reinforced with rolled pipe, galvanized tube, angle iron or other suitable reinforcement.

Tanks with steel bottoms shall be minimum 24 gauge for less than 6 feet diameter, and 20 gauge for larger diameters. The bottom and sides shall be joined in such a manner as to provide a locked and watertight seam.

Steel walls for concrete, bentonite or membrane bottom tanks shall be constructed of galvanized steel not less than 16 gauge. The tank shall include a reinforced rolled top edge. Galvanized steel shall meet the requirements of specification ASTM-A 444.

The galvanized steel shall not be in contact with reinforcing steel. Concrete chairs or non-electrical conducting materials shall be used to accomplish separation.

Fiberglass

The tank or trough shall be constructed with the mold on the inside to insure a non-porous interior surface.

Thickness

Fiberglass drinking tanks shall have a nominal minimum thickness of 3/16-inch.

Fiberglass for use in tanks with concrete bottoms shall have a minimum nominal thickness of ¼-inch.

Glass Reinforcement

Fiberglass content shall be 30-40 percent.

Resin

Resin shall meet the following specifications:

- Commercial grade orthophalic polyester except as specified under finish, below.
- Resin content shall be a maximum of 70 percent.

- Ultimate tensile strength of 13,000 psi minimum.
- Ultimate flexural strength 20,000 psi minimum.
- Cured compressive strength 24,000 psi minimum at break.
- Barcol hardness 36 minimum.

Finish

Finish shall meet the following specifications:

- Sand and fiberglass resin or sand and gel-coat resin final finish to tank interior bottom.
- Gel-coat, isophalic-interior.
- Barcol hardness 36 minimum.
- Thickness 14-20 mils minimum.

Top Reinforcement

Tank top edge shall be flange reinforced by: 2-inch straight flange, minimum of 3/8-inch thick or 2-inch curled or rolled flange, minimum of 1/4-inch thick.

Impervious Membrane Tank Bottoms

Impervious membranes used in tank bottoms shall be designed to last the useful life of the tank. Typical materials include concrete, steel, commercially-processed bentonite, fiberglass, or flexible sheeting material such as polyvinyl chloride (PVC), butyl rubber, high density polyethylene (HDPE), asphaltic-sealed fabric liner or other sheeting material specifically manufactured for use as a buried impervious membrane.

Minimum thickness or application rates shall be:

- Concrete: 6 inches
- Steel: 20 ga.

- Fiberglass: 3/16-inch
- Bentonite: 4 lbs./sq. foot
- Plastics: 10 mils
- Asphaltic-Sealed Fabric: 1.5 mm.

Concrete Placement

Concrete used for bases in rubber tire tanks shall be as specified above.

Steel and Fiberglass Plate Placement

Steel and fiberglass plates shall be sealed and fastened to the bottom of the rim using mastic sealant.

Flexible Membrane Placement

The flexible membrane shall be placed after the steel or fiberglass rim is in place. The soil materials at the bottom of the tank shall be excavated to a depth of approximately 6 inches below the bottom of the steel or fiberglass rim.

The size of the flexible membrane shall be such that it will lie loosely on the subgrade (approximately 10% slack) at all points around the tank, and extend up above the bottom of the rim a minimum of 9 inches.

The membrane shall be sealed to the inside of the rim using a sealer as recommended by the liner material manufacturer. The seal shall be at least 6 inches wide and continuous around the complete perimeter of the tank.

A minimum protective covering of 9 inches of sand or silty sand material shall be placed over the membrane.

Bentonite Placement

Bentonite shall be placed after the steel or fiberglass rim is in place. The bottom of the tank shall be filled to 3 inches above the bottom of the rim with compacted sand or finer-grained material. The fill surface shall

be smooth. Uniformly place the bentonite over the entire surface with particular attention to providing good contact with the tank walls.

A minimum protective covering of 6 inches of sand or silty sand material shall be placed over the bentonite.

5. WILDLIFE ESCAPE RAMPS

Many animals, including birds, bats, and other small mammals, drown in livestock water tanks unless there is an obvious escape route. All such tanks will have wildlife escape ramps installed with the following exceptions:

- Ritchie-style waterers used in corrals
- Covered fiberglass “frost-free” tanks where there is only an open water area of 3 square feet or less
- Covered stock tanks with small drinking ports
- Thermal sink-type drinkers with small drinking areas.

Escape ramps must flare from each edge to contact the sides of the tank so that trapped animals are forced to make contact with the ramp as they swim around the perimeter of the tank. Ramps must reach the bottom or very close to the bottom of the tank. See the attached “Wildlife Escape Ramp Design” for a suggested approach to ramp construction. Also see [Montana Biology Technical Note MT-47](#) for an alternative design and discussion of important wildlife considerations associated with livestock watering facilities.

For round tanks greater than 10 feet in diameter, and for rectangular tanks, install one escape ramp for every 30 feet of tank perimeter.

Escape ramp design considerations:

- Most bat species need an unobstructed water surface of 10 feet long by 2.5 feet wide. Whenever possible, use tanks having at least a 10-foot diameter or length.

- Avoid placing fences or cross braces over the water whenever possible. If a fence across the tank is necessary, place it off-center to maximize the length of un-obstructed water on one side of the fence. If feasible, locate cross-bracing under the rim of the tank.
- Orient the long axis of rectangular tanks with the prevailing wind direction if possible to maximize the “swoop” distance for bats.
- When livestock are absent from the pasture, leave the tank completely full of water or completely empty. Low water levels in tanks create a hazard for bats.
- Access ramps to the tank are not recommended. These ramps attract many wildlife species which could drown in the tank if the escape ramp is not functional.

6. FINISH AND CLEANUP

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

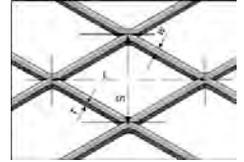
7. MEASUREMENT AND PAYMENT (Used only if applicable)

For items of work for which specific unit prices are established each item will be measured to the nearest unit applicable. Payment for each item will be made at the agreed-to unit price for that item.

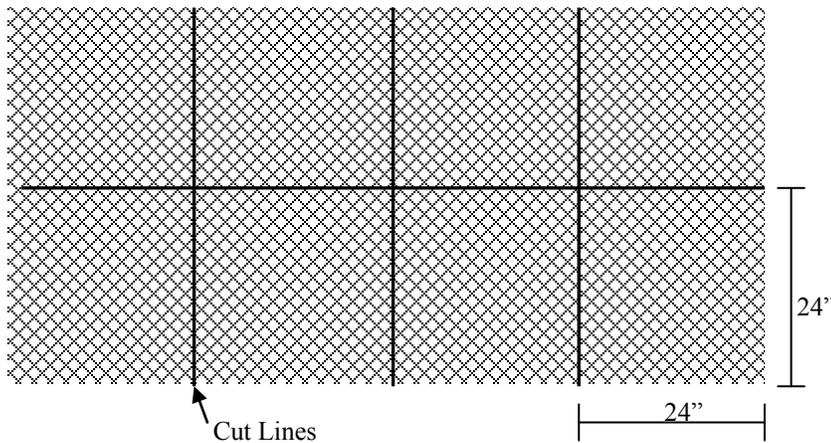
Such payment will constitute full compensation for all labor, equipment, tools and materials necessary for completion of the work.

Compensation for any item of work shown on the drawings or described in the special provisions but not listed on the bid schedule will be considered incidental to and included in the pay items listed on the bid schedule.

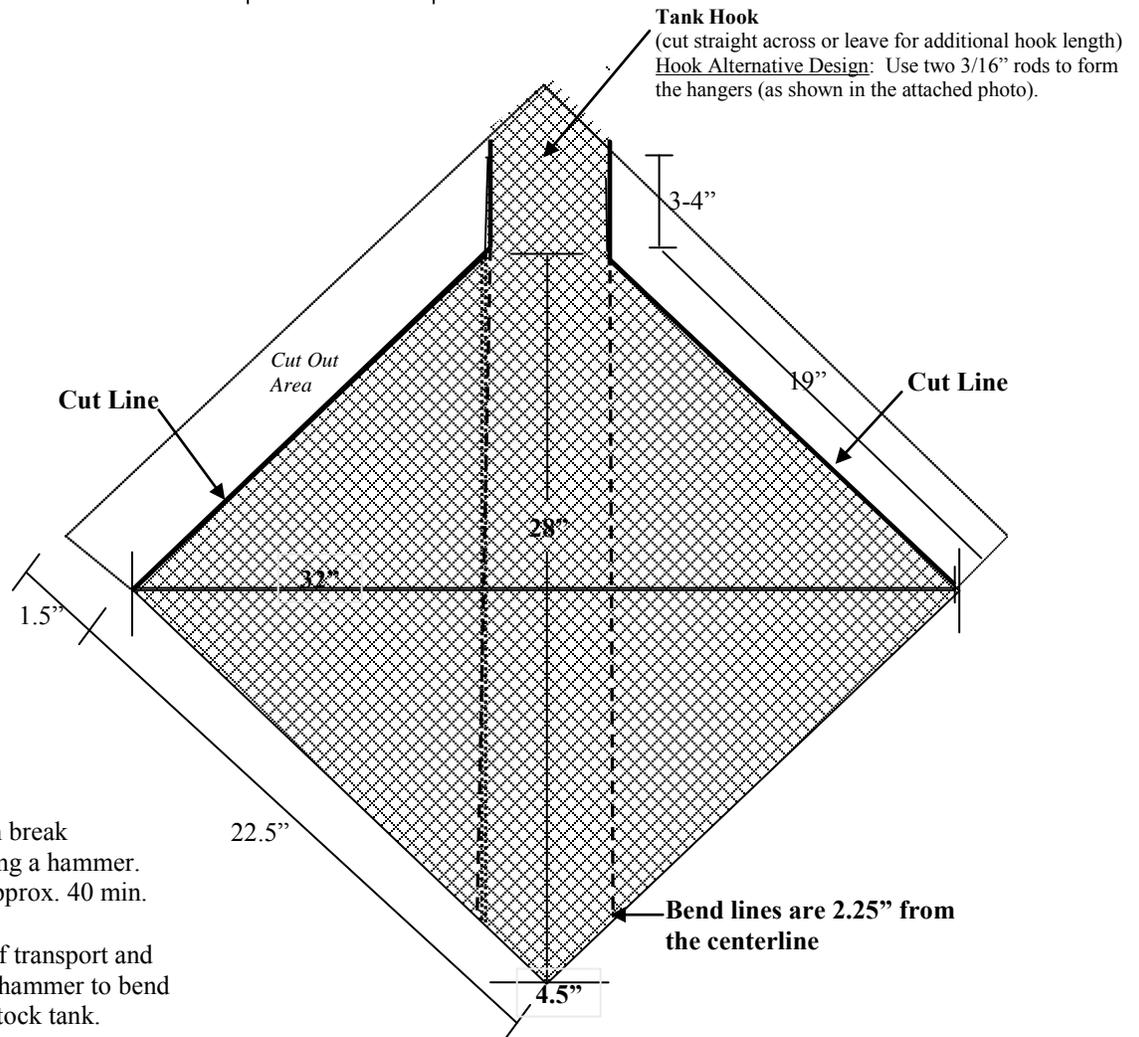
MATERIALS: 10-14 gauge, flattened or regular, expanded metal. Recommend flattened expanded metal $\frac{3}{4}$ " - #9.



4' x 8' Panel of Expanded Metal (yields 8 tank ladders)



1. Torch cut eight 24" x 24" squares. Total cutting length is 20'. Time: Approx. ½ hour.
2. Make a template of the cutout areas and mark the cut lines with permanent marker or soapstone.
3. Torch cut the cut lines. Total cutting length is 46" per ladder. Time: Approx. 40 minutes (8 ladders).



4. Mark the bend lines. Use a tin break or bend over a metal edge using a hammer. Bend at a 45° angle. Time: Approx. 40 min.
5. Leave the hook flat for ease of transport and storage. At installation, use a hammer to bend the hook over the rim of the stock tank.
6. Paint with a rust resistant, **non-toxic** neutral color. Two coats. Time: Approx. 40 min.

Cost to Fabricate Eight Ladders
 Cost estimate for materials \$45-60 (as of 11/06)
 Labor estimate is 2.5 hours

PURPOSE: Provides an approved design for wildlife escape ladders in watering facilities.

Because many species of wildlife drown in watering facilities, NRCS Standard, Watering Facility (Code 614), requires installation of a wildlife escape ladder in these facilities. This attached design was developed by Rocky Mountain Bird Observatory (RMBO) and may be used to meet the standard requirements. The design was revised by NRCS to provide dimensions for ease of fabrication.

The key design component is to provide a ramp with “holes”, which touches the sides of the stock tank. This makes it easier for the trapped animal to find the ramp. Designs that do not provide this, result in the trapped animal swimming along the perimeter of the tank, passing underneath the ramp, until exhausted and eventually drowning.

The design is somewhat diamond-shaped; the front ramp is 4.5 inches wide and 28 inches long, and will touch the bottom of a 24-inch deep stock tank. The wings are bent down to a 45° angle, and designed to touch the vertical wall of the stock tank. The top hook can be bent around the rim of the stock tank (metal or tire tank). No drilling is required.

