Natural Resources Conservation Service
Conservation Practice Standard

WATERING FACILITY
(No.)
CODE 614

DEFINITION

A trough or tank, with needed devices for water control and wastewater disposal, installed to provide drinking water for livestock.

PURPOSE

To provide watering facilities for livestock and/or wildlife at selected locations in order to:

- protect and enhance vegetative cover through proper distribution of grazing;
- provide erosion control through better grassland management; or
- protect streams, ponds and water supplies from contamination by providing alternative access to water.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to all troughs or tanks installed to provide livestock watering facilities that are supplied by streams, springs, wells, ponds, or other sources.

This practice is used where there is a need for new or improved watering places to permit the desired level of grassland management, to reduce health hazards for livestock, and to reduce livestock waste in streams.

CRITERIA

General

A trough or tank shall have adequate capacity to meet the water requirements of the livestock and/or wildlife. This will include the storage volume necessary to carry over between periods of replenishment. Animal water requirements can be obtained from the NRCS Engineering Field Handbook, Table 11-1.

Where water supplies are dependable and livestock are checked daily, troughs with little water storage capacity may be used. Troughs or tanks must provide the daily water.

The site shall be well drained; if not, drainage measures shall be provided. Areas adjacent to the trough or tank that will be trampled by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion. Design of the protective surface around the trough shall be in accordance with NRCS Conservation Practice Standard 561, Heavy Use Area Protection.

Automatic water level control and/or overflow facilities shall be provided as appropriate. Valves or pipes shall be protected by shields or covers to prevent damage by livestock. Overflow shall be piped to a stable or suitable point of release. The trough and outlet pipes shall be protected from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

When a roof is placed over the trough to provide shade, the roof shall be designed for appropriate snow and wind loads and shall be durable to withstand anticipated livestock and wildlife activities.

The quality and durability of all materials shall be in keeping with the planned useful life of the installation. Common construction materials are reinforced concrete, steel, fiberglass, plastic and wood. All designs shall meet the industry standards for the material being used. Generally applicable design requirements and procedures can be found in the documents referenced at the end of this standard.

Design

Capacity/size. The trough or tank shall have adequate capacity to meet the water requirements of the livestock (50 to 100 percent of the cattle needs for the day). This will include the storage volume necessary to carry over between periods of replenishment. A plastic trough or tank (livestock waterers) shall be sized and provided in sufficient numbers according to the manufacturer's recommendations.

A trough or tank that is supplied by city or rural water systems or by gravity flow from a pond, the minimum capacity shall be 50 gallons.

The inside perimeter of an open top watering trough or tank shall provide a minimum of 1.5 inch of drinking space per animal unit (1 animal unit equals 1,000 lb. of animal).

The trough or tank height may vary from 22 to 36 inches for horses and, beef and dairy cattle. For sheep and goats, the minimum height shall be 8 inches.

The capacity of the water supply system to the trough or tank shall be based on the anticipated herd size served by the system and shall deliver the water in a relatively short period of time each day (6 hours or less). For supplying livestock water, the system shall have a capacity to provide at least 12 gallons per head per day for beef cattle and horses, 25 gallons per head per day for dairy cattle, and 1.5 gallons per head per day for sheep and goats. These requirements may need adjusting based on climatic conditions, type of feed, and other factors.

Gravity feed systems shall have sufficient head to supply the water for the design number of animals. Minimum elevation head shall be 4 feet (planned permanent water surface of pond or spring box to lip of trough or tank).

Location. The trough or tank shall be located to provide natural surface and subsurface drainage. The trough or tank shall not be located adjacent to any well head. A separation distance of at least 150 ft. is needed for well head protection. If possible, locate the trough or tank down gradient from the well head. The location shall have easy access by livestock and also provide good grazing distribution.

Heavy use protection. An area of at least 10 ft. outside of the trough or tank that will be trampled by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion according to Conservation Practice Standard Code 561, Heavy Use Area Protection. A portable trough or tank used in intensive rotational systems which can maintain vegetative growth around the trough or tank is not required to have heavy use area protection. When concrete is used as a heavy use protection, the surface shall have a roughened finish and slope away from the trough or tank to prevent ponding of water on the concrete surface.

Trough or tank materials. The quality and durability of all materials shall be in keeping with the planned useful life of the installation. Common construction materials are reinforced concrete, galvanized steel, wood, plastic, fiberglass, and large used equipment tires.

A reinforced concrete trough or tank shall be constructed of good quality concrete using sound, clean aggregates. The concrete mix shall be such that it will produce a compressive strength of 3,000 psi at 28 days. A concrete cast trough or tank shall have a minimum base thickness of 4 inches and a minimum wall thickness of 3 inches. Minimum steel reinforcement shall be one of the following:

- 3/8" bars spaced on 8-inch centers in both directions.
- 8 gauge welded wire mesh.

A galvanized steel tank shall have a wall thickness of at least 20 gauge.

A fiberglass tank shall be made of glass reinforced polyester to the manufacturer's design for the intended purpose. Minimum thickness of the walls and floor shall be 1/4 inch. All surfaces shall be coated with either a white gel coat at the time of manufacture or a polyester resin at time of installation to prevent deterioration due to sunlight and to keep the tank serviceable. The top edge of the tank rim shall be protected with a 1 to 2 inch molded flange or other acceptable reinforcement.

A plastic trough (livestock waterers) shall be made of polyethylene material to the manufacturer's design for the intended purpose. A freeze-proof plastic trough shall be equipped with floating plastic balls, electric heat elements, or heat wells as needed to ensure the water in the trough do not freeze.

When a heavy equipment tire is used as a trough or tank, it shall be of suitable quality to perform as intended for the useful life of the practice. The tire shall be free of chemicals injurious to livestock. An approved standard drawing shall be used to prepare site specific designs for this type of tank.

Appurtenances. A trough or tank shall be equipped with a suitable water supply pipe, drainage outlet, and overflow outlet, either as individual outlets or a combination of outlets. Plumbing shall be new galvanized steel, copper, bronze, or plastic pipe and fittings in conformance with Conservation Practice Standard, Pipeline, Code 516. Water supply pipelines are to have a minimum inside diameter of 1 1/4 inch for gravity flow systems or 3/4 inches for pressurized systems. The supply lines shall be connected in a manner to prevent leakage.

A water level control valve or overflow pipe shall be used to maintain the water at least 1 1/2 inches below the top of the trough or tank. New galvanized steel or plastic pipe and fittings shall be used for the overflow pipe and shall have a minimum diameter of 1 1/2 inches.

Drainage outlets for systems with flow-through water must extend at least 10 feet from the trough or tank and outlet at a location to provide a safe and stable discharge. The outlet location must not be accessible to the livestock.

Provisions shall be provided in the plumbing for drainage of the tank or trough for maintenance.

CONSIDERATIONS

Water quantity

- Effects on components of the water budget.
- Effects on downstream flows or aquifers that affect other water uses or users.

Water quality

- Effects on erosion and movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.
- Effects on the visual quality of onsite and downstream water resources.
- Effects on wetlands and water-related wildlife habitats.

PLANS AND SPECIFICATIONS

Plans and specifications for installing troughs and tanks shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the trough and/or tank is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

Development of plans will be guided by Engineering Field Handbook, Chapter 5, and shall be in accordance with National Engineering Manual, Parts 541 and 542.

OPERATION AND MAINTENANCE

An O&M plan specific to the type of installed trough or tank shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- check for debris, algae, sludge or other materials in the trough which may restrict the inflow or outflow system;
- check for leaks and repair immediately if any leaks are found;
- check the automatic water level device to insure proper operation;
- check to ensure that adjacent areas are well protected against erosion;
- check to ensure the outlet pipe is freely operating and not causing erosion problems; and
- prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage.

Algae and iron sludge accumulation should be addressed in areas with water quality that is known to cause problems. Chemicals such as copper sulfate and chlorine can be recommended as needed, as long as local rules and regulations are followed.

REFERENCES

Engineering Field Handbook

National Engineering Manual

Manual of Steel Construction, American Institute of Steel Construction

Timber, National Design Specification for Wood, American Forest and Paper Association

Concrete, ACI 318, American Concrete Institute

Masonry, Building Code Requirement for Masonry Structures, ACI 530, American Concrete Institute

Natural Resources Conservation Service
Construction Specification

WATERING FACILITY

1. SCOPE

This item shall consist of the installation of a trough or tank to provide drinking water for livestock. Construction shall be carried out in such a manner that erosion, water, air, and noise pollution will be minimized and held within legal limits as established by state regulations.

2. LOCATION

The tank or trough shall be installed at the location shown on the drawings, or at the location designated by the NRCS technicians.

3. MATERIALS

The tank or trough shall be equal in size and quality to that specified or shown on the drawings. A concrete trough or tank shall be constructed from concrete per construction specifications for plain and reinforced concrete. All pipes and fittings shall be of the size and material shown on the drawings. Galvanized steel tanks shall have a minimum thickness of 20 gauge. Plastic and fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight.

4. INSTALLATION

The foundation area shall be cleared of all material not suitable for subgrade and be leveled to allow the trough or tank to be placed on firm ground. The area surrounding the trough or tank shall be smoothed and graded to permit free drainage of surface water away from it, yet allow access by the animals for which it is being installed. All backfill for underground pipes shall be compacted to the degree required to prevent caving after construction is completed.

5. HEAVY USE AREA

The trough or tank shall be located so that a dry surface is maintained around the base, extending 10 feet from all sides of the trough or tank. This area can be graveled, concreted, or paved. The minimum gravel mat thickness shall be 6 inches and concrete thickness shall be 4 inches. The mat may be pea gravel, chert, or clay gravel mixture. Concrete shall have a roughened finish.

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