

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

UNDERGROUND OUTLET

(Ft.)
CODE 620

DEFINITION

A conduit installed beneath the surface of the ground to collect surface water and convey it to a suitable outlet.

PURPOSE

To dispose of excess water from terraces, diversions, subsurface drains, surface drains, trickle tubes, or principal spillways from dams (outside the dam area only), or other concentrations without causing erosion or flooding damage.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies where:

Excess surface (primarily) water needs to be disposed of;

An underground outlet is needed for Diversion (362), Terrace (600), Water and Sediment Control Basin (638), or similar practices;

An underground outlet can be installed that will safely dispose of excess water; and

Surface outlets are impractical because of stability problems, climatic conditions, land use, equipment traffic, or landowner preference.

It does not apply to trickle tubes or principal spillways of Pond (378) or Subsurface Drain (606).

CRITERIA

Capacity. The underground outlet shall be designed, alone or in combination with other practices, with adequate capacity to insure that the terrace, diversion, water and control sediment basin, or other practices function according to the standard for the specific

practice. For example, an underground outlet can be used in combination with a grassed waterway or a surface drain to carry part of the design flow. The capacity of the underground outlet for natural or constructed basins shall be adequate for the intended purpose without causing excessive damage to crops, vegetation, or improvements.

Inlet. An inlet can be a collection box, a perforated riser, or other appropriate device. Its capacity shall be adequate to provide the maximum design flow in the conduit. Flow-control devices shall be installed as necessary. Perforated risers must be of durable material, structurally sound and resistant to damage by rodents or other animals. If burning of vegetation is likely to create a fire hazard, the inlet shall be fire resistant. Blind inlets can be used where they are effective. Collection boxes must be large enough to facilitate maintenance and cleaning operations.

The inlet must have an appropriate trash guard to insure that trash or other debris entering the inlet passes through the conduit without plugging. It must also have an animal guard to prevent the entry of rodents or other animals.

Perforations in the inlet shall be smooth and without burrs or projections that will collect trash. Slots or holes in the perforated risers shall be adequate to provide twice the design flow in the conduit to compensate for possible plugging of some of the perforations.

Pressure-relief wells shall be designed and installed as needed to control pressure. If junction boxes and other structures are needed, they shall be designed and installed in a manner that facilitates cleaning and other maintenance activities.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide](#).

Hydraulics. Underground outlets shall be continuous conduits, tubing, or tile. Joints shall be hydraulically smooth, and the materials and methods used shall be recommended by the manufacturer. If a pressure system is used, joints shall be adequate to withstand the design pressure, including surges and vacuum. The maximum velocity must not exceed the safe velocity for the conduit materials and installation.

Lines shall be adequate to carry the design flow when the outlet and all inlets are operating at design capacity. Positive grade shall be maintained in all sections of the underground outlet. Capacity shall be based on the pipe size or on other flow control devices to prevent water from the upper inlets from discharging through the lower inlets. The minimum conduit diameter shall be three inches.

Materials. Shall meet or exceed the design requirements against leakage and shall withstand internal pressure or vacuum and external loading. Plastic, concrete, aluminum, and steel shall meet the requirements specified in the applicable ASTM standard. All materials specified for Subsurface Drain (606) can be used for underground outlets. Conduits, however, can be perforated or nonperforated, depending on the design and/or other requirements.

Outlet. The outlet shall be sufficiently stable for all anticipated flow conditions. It shall be designed for the maximum anticipated water surface at design flow. A continuous section of closed conduit or a headwall can be used at the outlet. If a closed conduit is used, it shall be durable and strong enough to withstand all anticipated loads, including those caused by ice. If fire is a hazard, the outlet shall be fire resistant. All outlets must have animal guards to prevent the entry of rodents or other animals. Animal guards must be hinged to allow passage of debris.

Backfill. Conduits shall be bedded and backfilled throughout the base width of the basin embankment or terrace ridge. Friable soil material shall be placed in 6-inch layers and compacted to a depth of 18 inches. The sides of the remaining trench shall be sloped no steeper than one horizontal to one vertical and backfill placed in six-inch layers and compacted. Mechanical compaction, water

packing or other means of compacting shall be used. Moisture content of the backfill should be adjusted to aid compaction. Highly angular material which may bridge should not be used for backfill where piping is a concern.

Consideration must be given to prevent piping in the backfill along the pipeline to avoid system failure. Protection can be provided by the use of anti-seep collars to increase the path of percolation.

Protection. All disturbed areas shall be reshaped and regraded so that they blend with the surrounding land features and conditions. Visual resources must be given the same consideration as other design features. Areas that are not to be farmed or covered by structural works shall be established to vegetation or otherwise protected from erosion as soon as practicable after construction.

All conduits and underground appurtenances shall be installed deep enough to prevent damage from tillage equipment (or be otherwise protected).

Maintenance. Underground outlets shall be maintained by keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce the flow. All leaks shall be repaired promptly to insure proper functioning of the conduit. Animal guards must be inspected periodically and maintained in proper working order.

CONSIDERATIONS

Consider effects on the water budget of the watershed, especially on runoff volume and rate, infiltration, evaporation, transpiration, and ground water recharge.

Evaluate potential use for water management.

Consider effects on wetlands especially if perforated pipe is used. Wetland areas must be minimally affected or the impacts must be mitigated.

Consider effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that would be carried by runoff.

Consider effects on the visual quality of downstream water resources.

Consider construction-related effects on the quality of downstream water courses.

Consider effects on water-related wildlife habitats.

Consider potential impact on water quality due to agri-chemicals in outflow.

Consider dept of underground outlet in regard to tillage equipment depth and maintenance, if applicable.

PLANS AND SPECIFICATIONS

Plans and specifications for installing underground outlets shall be in keeping with this standard and shall describe the requirements for installing the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

A maintenance program shall be established by the landowner to maintain the functional capacity of the underground outlet. Items to consider in the maintenance program are:

Keep inlets, trash guards, collection boxes, and structures clean and free of materials that can reduce the flow;

Repair all leaks and broken or crushed lines to insure proper functioning on the conduit;

Repair or replace inlets damaged by livestock or farm machinery;

Periodically inspect outlet conduit and animal guards for proper functioning;

Redistribute sediment buildup so the land drains to the inlet;

Keep adequate backfill over the conduit; and

Repair eroded areas at the pipe outlet.