

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

UNDERGROUND OUTLET
CODE 620

DEFINITION

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

Scope

This standard applies to underground conduits designed to dispose of excess surface water. It does not apply to trickle tubes or to principal spillways in ponds or in subsurface drains (606).

PURPOSES

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 damage by erosion or flooding.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where: (1) excess surface water needs to be disposed of (2) a buried outlet is needed for diversions (362), terraces (600), or similar practices, (3) and underground outlet can be installed that will safely dispose of excess water; and (4) surface outlets are impractical because of stability problems, climatic conditions, land use, or equipment traffic.

CRITERIA

Capacity

The underground outlet shall be designed, alone or in combination with other practices, with adequate capacity to insure that the terrace, diversion, 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 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 devices. 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 if needed to prevent the entry of rodents or other animals.

Pressure-relief wells shall be designed and installed if 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.

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. 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 3 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 drains (606) can be used for underground outlets. Conduits, however, can be perforated or non-perforated, depending on the design 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 near ponds, outlet channels, or streams where water is normally present must have animal guards to prevent the entry of rodents or other animals. Animal guards must be hinged to allow passage of debris.

Anti-seep Collars

Consideration must be given to prevent piping in the backfill along the pipeline. Failure of the system can result if this is not considered. Piping is controlled at many sites by sloping of the trench banks and compacting the backfill (see figure 8-78, page 8-83 of the Engineering Field Manual). 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. Protection can be provided by the use of anti-seep collars to increase the path of percolation.

Sufficient anti-seep collars shall be installed on an underground outlet to prevent the surface and subsurface waters from flowing into and adjacent to the pipe. Particular locations of weakness are below inlets, bends, transitions and areas where compaction is difficult. They should be placed on a maximum spacing of 100 feet.

Anti-seep collars of concrete, sheet metal, or rubber can be used. The collars are to extend beyond the pipe on all sides at least 1 foot or the diameter of the pipe whichever is greater.

Compaction around the anti-seep collars must be equal to or greater than the adjacent in-place material.

Protection

Before the outlet is installed, 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.

CONSIDERATIONS

Water Quantity

This practice is installed in conjunction with terraces, diversions, sediment and water control structures, and waterways.

This practice will have a negligible effect on the quantity of surface and ground water.

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation and ground water recharge.
2. Effects on the volume of downstream flow might cause undesirable environmental, social or economic effects.
3. Potential use for water management.

Water Quality

This practice is used in places in which a surface outlet is impractical because of stability problems or because of the wishes of the operator. There may be a decrease in the sediment delivered to the receiving waters because there is no bank and channel erosion with the flow in the underground outlet. There is reduced infiltration of water within the reach the underground outlet occupies. This may reduce slightly the amount of soluble substances that percolate toward the ground water. Any substances entering the underground outlet will be delivered to the receiving waters, because there is no opportunity for substances attenuation by degradation, filtering, or adsorption within the underground outlet.

1. Consider effects on erosion and the movement of sediment, pathogens, and soluble and sediment attached substances that would be carried by runoff.
2. Consider effects on the visual quality of downstream water resources.

3. Consider sediment-attached and construction related effects on the quality of downstream water courses.
4. Consider effects on wetlands or water related wildlife habitats.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

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 achieve its intended purpose.

OPERATION AND 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.