

**USDA
 NATURAL RESOURCES
 CONSERVATION SERVICE**
**MARYLAND CONSERVATION
 PRACTICE STANDARD**
UNDERGROUND OUTLET
CODE 620
(Reported by Feet)

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, roof runoff, 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 safely outletted;
2. A buried outlet is needed for another water or erosion control practice; or,
3. Surface outlets are impractical because of stability problems, climatic conditions, land use, or equipment traffic.

CONSIDERATIONS

Consider the following:

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 that might cause undesirable environmental, social, or economic effects;
3. Evaluate potential use for water management;
4. Effects of erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that would be carried by runoff;
5. Effects on the visual quality of downstream water resources;
6. Construction-related effects on the water quality of downstream watercourses;
7. Effects on wetlands or water-related wildlife habitats;
8. Evaluate potential impact on water quality due to agri-chemicals in outflow;
9. The depth of underground outlet in regard to tillage equipment depth and maintenance, if applicable.

CRITERIA

Capacity

Design the underground outlet alone or in combination with other practices and with adequate capacity to function as designed or as designed with other practices.

Inlet

An inlet can be a collection box, a perforated riser, or other appropriate device. Design the inlet to provide the maximum design flow in the conduit. Install flow-control devices as necessary. Perforated risers must be of durable material, structurally sound, and resistant to damage by rodents or other animals. If burning of vege

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

tation is likely to create a fire hazard, the inlet must 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.

Design and install pressure-relief or relief wells as needed to control pressure or relieve excess flows. Design and install junction boxes and other structures as needed, 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, recommended by the manufacturer. Design joints and tile or pipelines in pressure systems to withstand the design pressure, including surges and vacuum pressures. The maximum velocity must not exceed the safe velocity for the conduit materials, joints, installation technique, and backfill material used.

Design the outlet to carry the design flow when the outlet and all inlets are operating at design capacity. Maintain positive grade in all sections of an underground outlet. Base the capacity 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 except when used with a pumping system.

Materials

Materials must meet or exceed the design requirements for leakage, internal pressure or vacuum, and external loading. Meet the applicable ASTM standard for plastic, concrete, aluminum, and steel pipelines. All pipe materials specified in the Maryland conservation practice standard for Subsurface Drain (Code 606) can be used for underground outlets except that all corrugated plastic tubing (CPT) must be designated as heavy duty (HD). Conduits can be perforated or non-perforated, depending on the design require-

ments. A filter fabric wrap (sock) or equivalent should be used if migration of soil particles around the outlet is anticipated. Protect all exposed plastic materials from degradation due to exposure to sunlight.

Outlet

Design the outlet for all anticipated flow conditions. A minimum 10-foot section of steel, PVC, or metal conduit is required at the outlet. The outlet must be durable and strong enough to withstand all anticipated loads, including those caused by ice, earth or traffic. Do not place outlets in areas of active erosion. If fire is a hazard, the outlet must be fire resistant. All outlets must have animal guards to prevent the entry of rodents or other animals. Animal guards for any system with a surface inlet must be hinged to allow passage of debris.

Protection

Reshaped and regraded, all disturbed areas so that they blend with the surrounding land features and conditions. Establish vegetation on all disturbed areas. Disturb as little area as possible during construction and consider all visual resources during planning and design.

SPECIFICATIONS

Prepare plans and specifications to meet the requirements of this standard and to achieve its intended purpose.

Design for and ensure that construction operations minimize erosion, air, and water pollution. Any changes in the plans or specification must be approved by the local District/NRCS office. The landowner or his/her designated representative is responsible for obtaining approval for any changes.

OPERATION AND MAINTENANCE

Maintain underground outlets by:

1. Keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce the flow;
2. Repairing leaks and broken or crushed lines to insure proper functioning of the conduit;
3. Checking outlet conduit and animal guards to ensure proper functioning of the conduit;
4. Keeping adequate backfill over the conduit;
5. Repairing any eroded areas at the pipe outlet.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. Plan view sketch;
2. Profile of the underground outlet and other pertinent data as needed;
3. Special control or field features that must be considered in the design.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see chapter 5 of the EFH, Part 650. The following is a list of the minimum required design data:

1. Locate practice on farm plan map in the case file;
2. Plan view including, location map, all system components, material, utility notification, and construction specifications;
3. Determine soil type, and any special restrictions;
4. Design computations using the appropriate Engineering Field Handbook Chapter, Part 650 or by other approved method;
5. Show job class on plan;
6. Profile of the underground outlet;
7. Estimated quantities;
8. Details of outlet protection, animal guard, and/or other structural components needed;
9. Vegetative plan. This must meet the criteria, specifications, and documentation requirements of the Maryland conservation practice standard for Critical Area Planting (Code 342). Show on plan;

10. Written Operation and Maintenance plan.

Construction Check Data/As-Built

Record on survey notepaper, SCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted on plans in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the construction check, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Record check notes during or after completion of construction showing inlet and outlet elevations and depth of the underground outlet;
3. Statement on seeding;
4. Final quantities and documentation for quantity changes, and materials certification;
5. Sign and date check notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice Standards.

REFERENCES

1. Maryland Department of Environment, *1994 Maryland Standard and Specifications for Soil Erosion and Sediment Control*;
2. USDA, Natural Resources Conservation Service, *Maryland Field Office Technical Guide, Section IV, Standards and Specifications*;
3. USDA Natural Resources Conservation Service, *National Engineering Handbook*, Part 650, various chapters;
4. USDA Natural Resources Conservation Service, *National Handbook of Conservation Practices*.