

# UNDERGROUND OUTLETS

## Description and Benefits

Storm water that reaches your farm roads can be directed into an underground outlet (or pipe) and transferred down the slope without taking sediment and crops along with it. An underground outlet generally needs to be coupled with a sediment basin at its outlet to effectively handle the high flow volumes that underground outlets are designed to accommodate. An inadequate downstream conveyance can result in extreme erosion, sedimentation and/or flooding. When the concentrated water conveyed by the underground outlet are caught in a sediment basin, the outflow of water can be metered out gradually. This system is a permanent and highly effective solution.

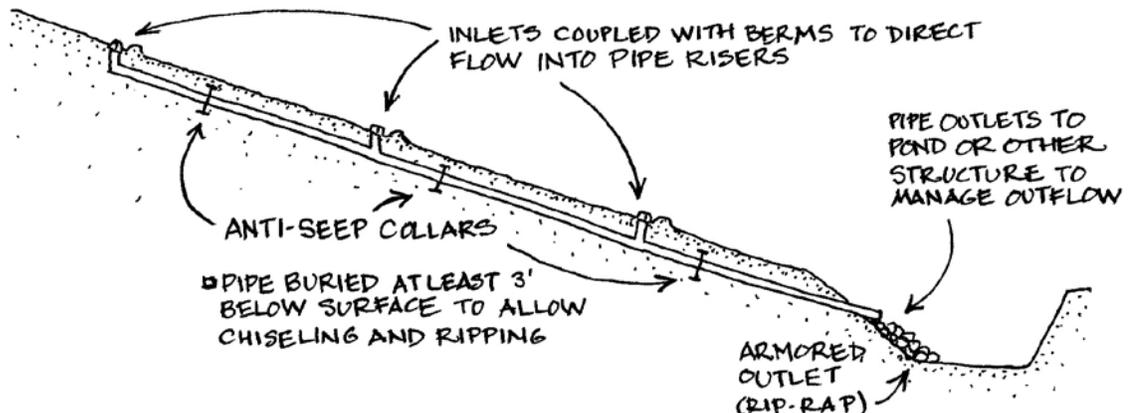


## When to use Underground Outlets

Underground outlets are cost-effective in settings with a permanent field configuration and should only be planned and implemented with guidance from a qualified professional. In general, such pipelines and their inlets are placed underneath permanent roads running through 'low' collection areas on slope steep enough to generate high concentrated runoff volumes. An underground outlet should be designed with a safe downstream outlet.

## Implementation

The design capacity of the underground outlet is based on the requirements of the structure or practice it serves. The capacity of the underground outlet for natural or constructed basins needs to be adequate for the intended purpose without causing inundation, damage to crops, vegetation, or works of improvements. Underground outlets may be designed for either pressure or gravity flow.



**Inlet** An inlet can be a collection box, a perforated riser, or other appropriate device. For perforated risers, use durable, structurally sound material that is resistant to damage by rodents or other animals. Inlets need

an appropriate trash guard to ensure that trash or other debris entering the inlet passes through the conduit without plugging.

Design collection boxes large enough to allow maintenance and cleaning operations. Use blind inlets where the installation of an open or above ground structure is impractical. Design the blind inlet with a graded granular filter around the conduit. Design the filter based on the particle size of the surrounding soil and the desired flow rate.

**Materials** Plastic, concrete, aluminum, and steel pipe shall meet the requirements specified in the applicable ASTM standard. Materials must meet applicable site specific design requirements for leakage, external loading, internal pressure or vacuum. Underground outlet conduits can be perforated or nonperforated, depending on the design requirements. Use a filter fabric wrap (sock) or appropriately designed granular filter if migration of soil particles into the conduit is anticipated. Design the filter based on the particle size of the surrounding soil to prevent rapid clogging of the filter. Protect all exposed plastic materials from degradation due to exposure to sunlight.



**Outlet** The outlet must be stable for anticipated design flow conditions from the underground outlet. Design the underground outlet for water surface conditions at the outlet expected during the design flow conditions. The outlet must consist of a continuous 10 foot section or longer of closed conduit or a headwall at the outlet. If a closed conduit is used, the material must be durable and strong enough to withstand anticipated loads, including those caused by ice. Do not design outlets to be placed in areas of active erosion. Use fire resistant materials if fire is an expected hazard. All outlets must have animal guards to prevent the entry of rodents or other animals. Design animal guards to

allow passage of debris while blocking the entry of animals that cannot easily escape from the conduit.

## Operation And Maintenance

A written operation and maintenance plan needs to address the following minimum requirements:

- Periodic inspections, especially immediately following significant runoff events, to keeping inlets, trash guards, and collection boxes and structures clean and free of materials that can reduce flow
- Prompt repair or replacement of damaged components
- Repair or replacement of inlets damaged by farm equipment
- Repair of leaks and broken or crushed lines to insure proper functioning of the conduit
- Periodic checking of the outlet and animal guards to ensure proper functioning
- Repair of eroded areas at the pipe outlet
- Maintenance of adequate backfill over the conduit
- To maintain the permeability of surface materials on blind inlets, periodic scouring or removal and replacement of the surface soil layer may be necessary

## References

USDA-NRCS. 2012. *Field Office Technical Guide*. Conservation Practice Standard. Underground Outlet. Code 620. Sacramento, CA

*This article is not intended to replace professional advice. Before implementing this practice, consult a professional to ensure the best outcome for your application*