Water Quality Best Management Practices

Blind Inlets to Reduce Sediment Loading from Farmed Depressional Areas

Authors: Douglas R. Smith and S.J. Livingston, USDA-ARS, National Soil Erosion Research Laboratory

Definition: A blind inlet, also known as a French drain, is a structure that is placed in the lowest point of farmed depressions or pot-holes to minimize the amount of sediment, and potentially other contaminants, that would be transported to receiving ditches or streams.

Purpose: The most common practice that is used to drain farmed depressions is a tile riser, which is essentially a pipe that acts as a direct conduit for water from the field to the receiving ditch or stream. A blind inlet or French drain is used to filter at least sediment from the water that is drained from the field. Additional filters can be installed in the blind inlet to remove additional contaminants (i.e. phosphorus or pesticides).

How This Practice Works: In fields where surface drainage patterns result in localized depressions, reduced trafficability or the loss of crops due to excessive moisture following rainfall. The most common practice to drain the surface water from these areas is known as a surface tile riser, which are designed to remove the runoff water from the depressional area that would occur from a storm with a 1 ½ year return period in 36 hours.

Most often, the tile risers are direct conduits for surface runoff to agricultural drainage ditches or streams. This can result in excessive loading of sediment and other contaminants to surface water from fields that are often several miles from the ditch or stream. This means that the runoff water quality from these fields that are relatively far from the stream can greatly impact the water quality, because there is no filtering or other type of processing that occurs during drainage of the excess water.

The blind inlet can be used instead of a surface tile riser. To drain a 10 acre depression in Northeast Indiana, with a 2.5 inch (1 ½ year return period storm) the following steps were followed: 1) a 14' X 14' hole was dug 30 inches deep; 2) approximately 2 inches of # 4 limestone gravel was added; 3) a septic tile was installed in a 10' X 10' section, with the holes located at 4 and 8 o'clock (see picture above); 4) # 4 limestone was added to

within 8 inches of the surface; 5) geotextile placed over the top of the gravel layer; and 6)added 8 inches of pit run (unsorted sand and small gravel mix) and compacted with a small tractor.

The size of the blind inlet should be determined by the acreage of the depressional area and local precipitation patterns. An engineer should be consulted in designing a blind inlet, to ensure adequate ability to remove excess runoff water.

Where This Practice Applies and Its Limitation: This practice is applicable to any landscape where surface drainage patterns result in isolated depressional areas (aka pot-holes), and the climate is sufficiently humid to result in reduced trafficability or the loss of crops due to excessive amounts of water in the depressional area.

One of the primary benefits to the farmer of using a blind inlet is the ability to drive equipment over the inlet, as opposed to having to drive around a standard tile riser. However, care should be taken to avoid applying pesticides within the designated setback area near the blind inlet.

Effectiveness: The blind inlet should be able to remove at least 90% of the sediments from the drainage water. Along with the sediment, contaminants adsorbed to the sediment should also be removed. Use of additional layers in the filtration system should improve the removal of dissolved constituents, however consideration must be given to ensuring proper hydraulic functioning with additional materials.

Cost of Establishing and Putting in Place: The cost of establishing a blind inlet will be dominated by the cost of purchasing gravel in your area. Proper engineering design should allow the removal of runoff water from a storm with a 1 ½ year return period in 36 hours. The size of the blind inlet may partially depend on the size of the gravel used. Other costs include the tile line within the gravel layer, the tile line to connect to a main tile, the geotextile used, and labor for installation.

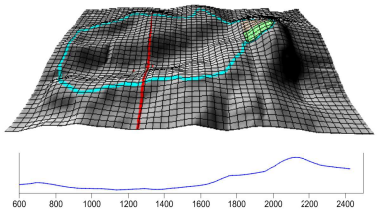
Operation and Maintenance: The cost of operating and maintaining this practice should be minimal. Producers can till directly over the blind inlet to ensure sedimentation does not inhibit infiltration. No-till producers may use gypsum at 1 to 2 ton/ac to improve infiltration after sedimentation.

For Further Information: For further information on this practice, contact your state cooperative extension service, or your state or local NRCS and SWCD personnel.

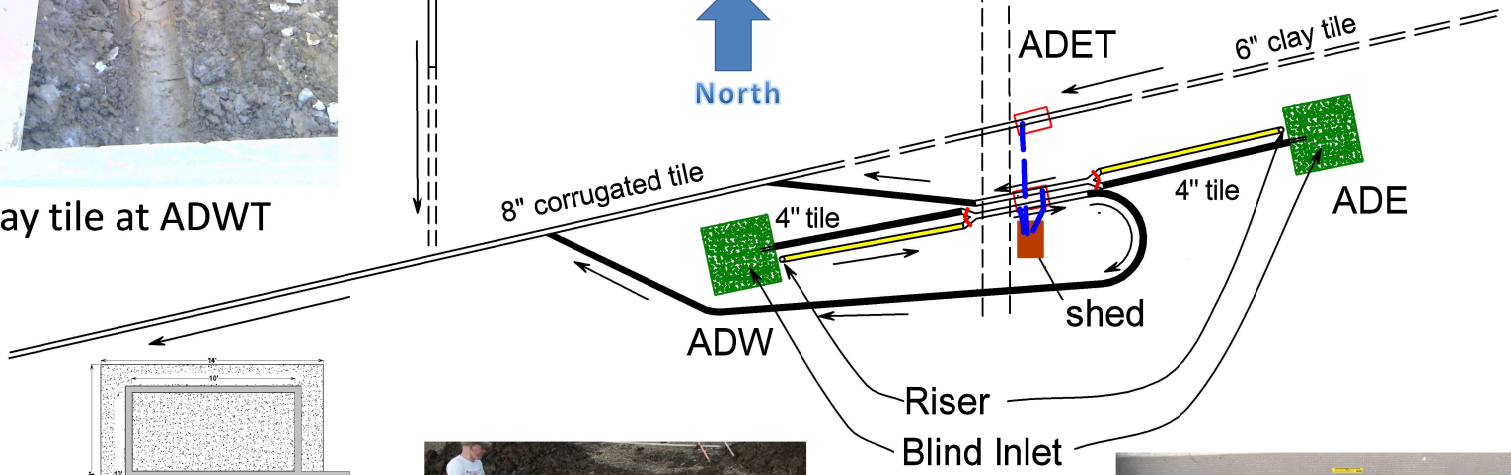
This practice may be eligible for cost share as USDA-NRCS Conservation Practice 620 (Underground Outlet), but this may require the addition of a Filter Strip.

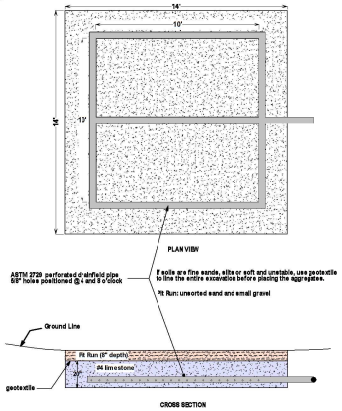
Blind Inlet Study Site

Clay tile at ADWT



Riser-Blind inlet valve



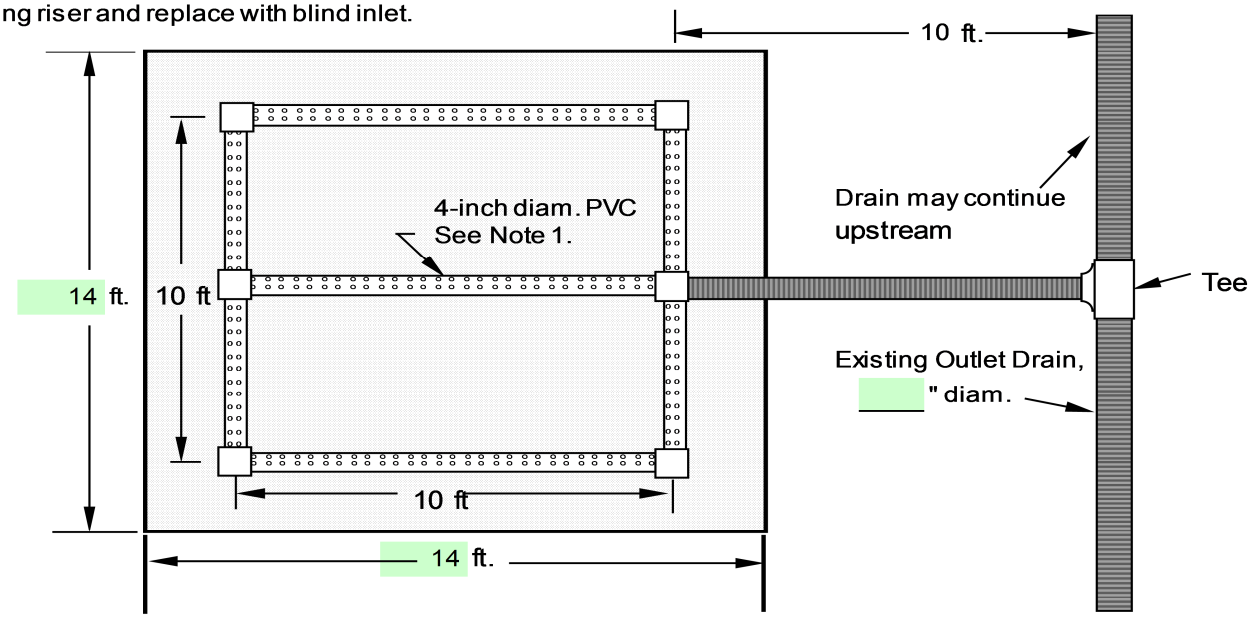


Blind Inlet schematic and photo

Tile monitoring vault

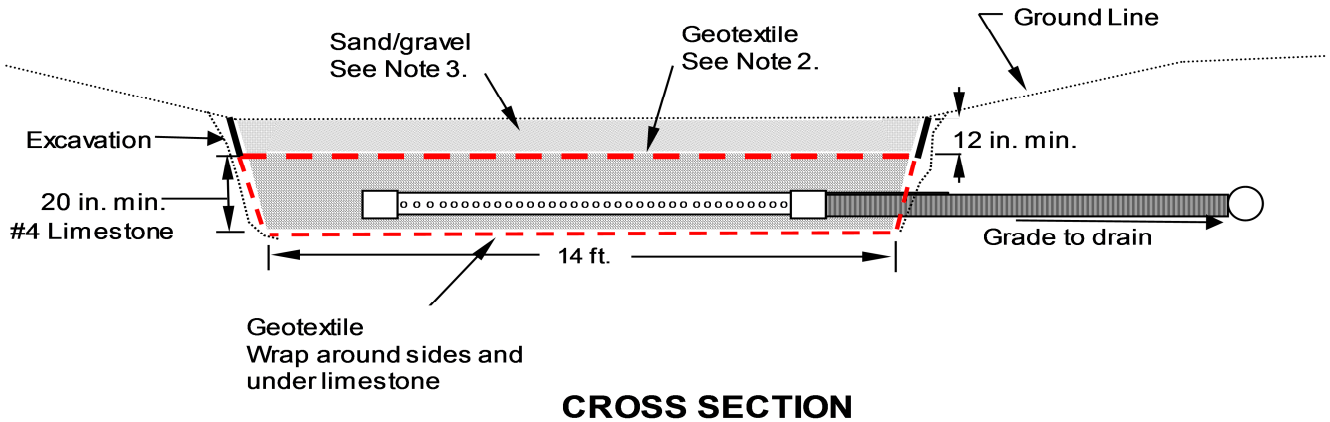
Remove existing riser and replace with blind inlet.

Inlet ID



PLAN VIEW

Not To Scale.



CROSS SECTION

#4 limestone=washed 3/4 to 1 3/4 in size

Not To Scale

Quantities (Estimated):

Sand/fine gravel	11	tons
#4 Limestone	18	tons
Geotextile Fabric	54	sq.yd.
4" Diam. SCH 40 PVC	50	feet
Excavation	17	cu.yd.
PVC Tees, Elbows, Stubs	as needed	

Construction Notes:

1 Cut 5/8" holes every 4-5 inches, positioned at **4 and 8 o'clock**. Lay pipe within 4 in. of bottom of limestone layer.

2 Geotextile shall be nonwoven, needle-punched fabric with minimum permittivity of 0.70/sec. Place between sand/limestone layers.

3 Sand/gravel may be pit run and shall consist of coarse sand and/or fine gravel.

4 Limestone may be 3/4" to 1-3/4 in diameter.

Contractor Completion:

I certify that I have installed this practice according to this drawing and specifications.

Signature of Contractor _____ Date _____

Printed Name _____

Existing Outlet Documentation:

List the limiting size/grade combination if multiple sizes or grades exist.

Material type: _____ *riser dia* _____ *inch*

Tile Diameter: _____ *inch*

Grade: 0.2 *%*

Drainage Area: _____ *Acres (est)* *Soil:* _____

NRCS
Natural Resources Conservation Service
United States Department of Agriculture

BLIND INLET

LANDUSER:

LANDOWNER

DE KALB COUNTY SWCD, INDIANA

LOCATION: Site ID 0

Section T R

Prepared Date

Checked

Approved

Sheet of