TILE SURFACE INLET REPLACEMENT

An Overview of Pipe Riser Surface Inlet Replacement

Prepared by:

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Surface inlet riser replacement removes a field obstruction, reduces sediment entering the tile system and improves water quality.

The following is a summary of a research / demonstration project conducted by the National Soil Erosion Research Laboratory in Indiana discussing the replace open surface inlets for tile drainage systems. Plan and specifications are included for the Indiana project along with similar information for Wisconsin prepared by Wisconsin NRCS.

BLIND INLET (FRENCH DRAIN) OPTION

Blind Inlets to Reduce Obstructions Sediment Loading from Farmed Depressional Areas

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

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: A 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 1½ year return period for Indiana in 36 hours.

Typically, 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. Therefore 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. Excessive sediment entry into the tile system can also result in plugging, while riser pipes can interfere with field operations.

The blind inlet can be used instead of a tile surface riser. To drain a 10 acre depression in Northeast Indiana, with a 2.5 inch (1½ 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 functionality.

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 primary benefit 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. In addition, the inlet could plug when high soil loss is occurring in the tributary area, therefore soil loss must be controlled

Effectiveness: The blind inlet should be able to remove at least 90% of the sediments from the drainage water along with adsorbed sediment contaminants. 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.

Construction Cost: 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 1½ 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.

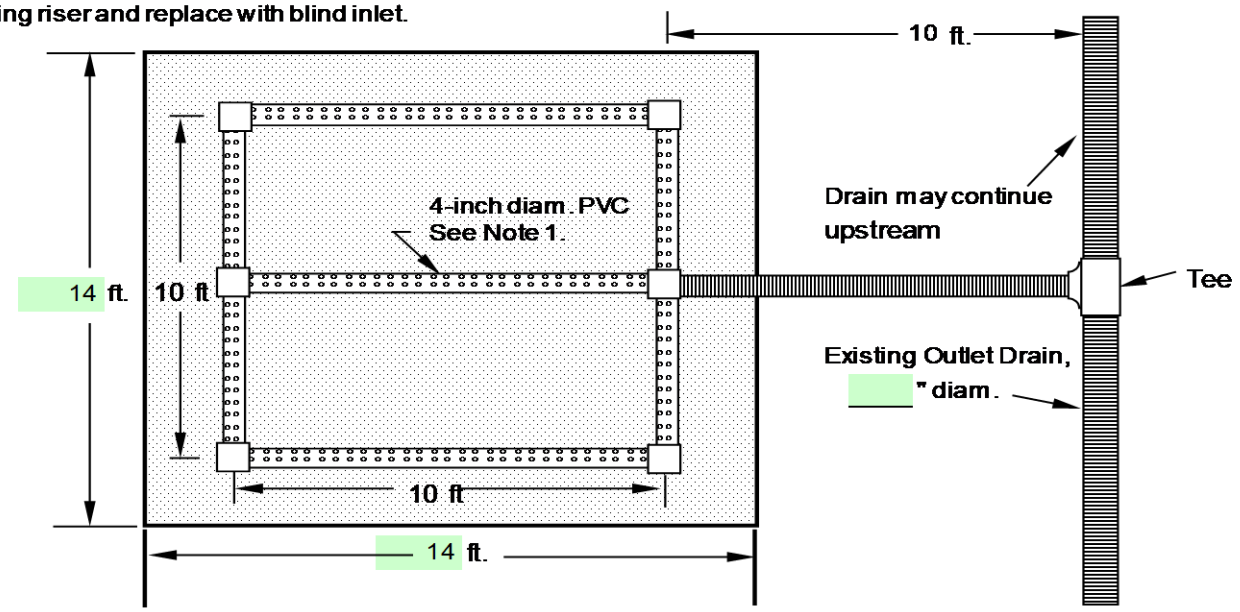
Operation and Maintenance: The cost of operating and maintaining this practice should be minimal. Producers can till directly over the blind inlet to ensure sedimentation does not inhibit infiltration. No-till producers may use gypsum at 1 to 2 ton/ac to improve infiltration after sedimentation. Excessive soil loss in the tributary drainage area can obstruct flow entering the structure. Controlling erosion and replacing all or a portion of the surface material may be needed to restore functionality.

For Further Information: For further information on this practice, contact your local NRCS or LCD office.

For more information on other aspects of tile drainage, visit the UWEX tile drainage web site at fyi.uwex.edu/drainage/.

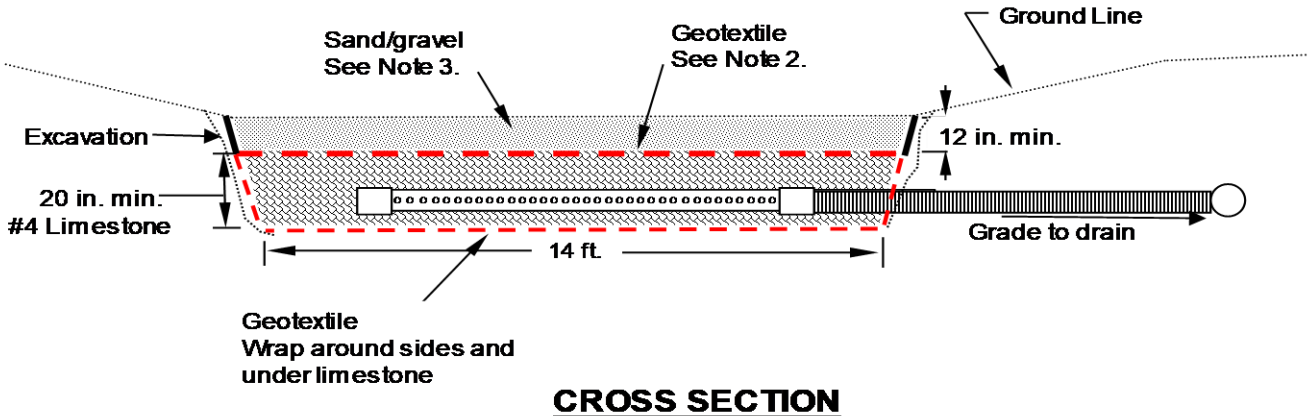
Remove existing riser and replace with blind inlet.

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

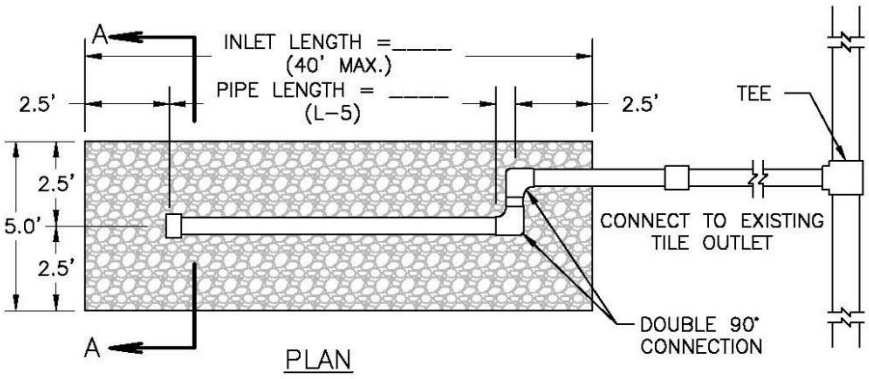
Section _____ T _____ R _____

Prepared _____ Date _____

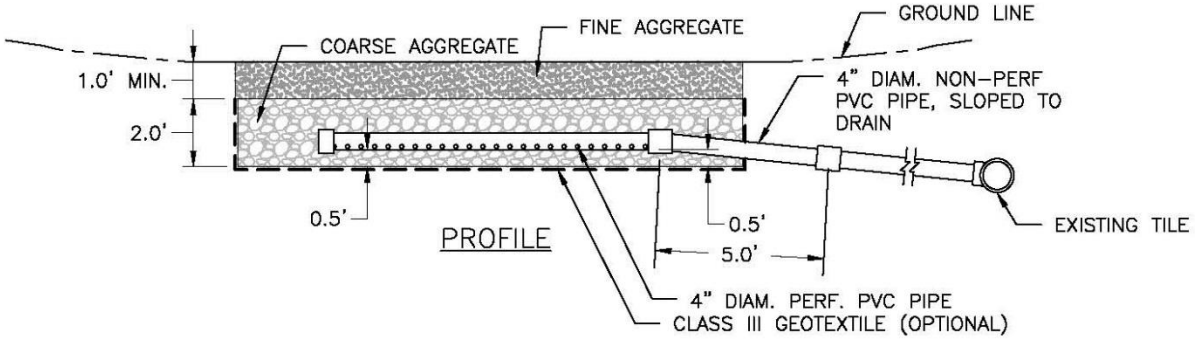
Checked _____ _____

Approved _____ _____

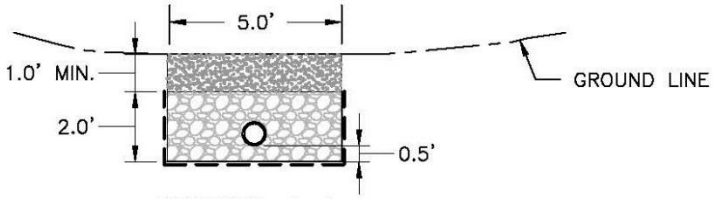
Sheet of



PLAN



PROFILE



SECTION A–A

NOT TO SCALE

QUANTITIES

EXCAVATION	_____	CU. YD.
GEOTEXTILE	_____	SQ. YD.
COARSE AGGREGATE – ASTM C33 SIZE 657	_____	CU. YD.
FINE AGGREGATE – ASTM C33 FINE AGGREGATE	_____	CU. YD.
4" DIAM. PERF. PVC PIPE	_____	LIN. FT.
4" DIAM. NON-PERF. PVC PIPE	_____	LIN. FT.
4" DIAM. PVC TEE	_____	EACH
4" DIAM. PVC 90° ELBOW	_____	EACH
4" DIAM. PVC END CAP	_____	EACH

NOTES:

PVC PIPE SHALL BE SCHEDULE 40 OR THICKER AND SHALL MEET THE REQUIREMENTS OF WISCONSIN CONSTRUCTION SPECIFICATION 15. PERFORATION SIZE SHALL BE 3/8" DIAM., POSITIONED AT 4:30 AND 7:30 O'CLOCK (90° APART), AND SPACED EVERY 3".

PROVIDE GEOTEXTILE IF SITE SOILS ARE KNOWN TO BE HIGHLY EROSIVE OR DISPERSIVE, OR IF NEEDED FOR SEPARATION DUE TO CONDITIONS DURING INSTALLATION.

THE ABILITY OF THE BLIND INLET TO REMOVE WATER AT THE DESIGN FLOW RATE IS DEPENDENT ON AN APPROPRIATELY SIZED OUTLET SYSTEM AND MAINTENANCE OF A CLEAN SAND SURFACE.

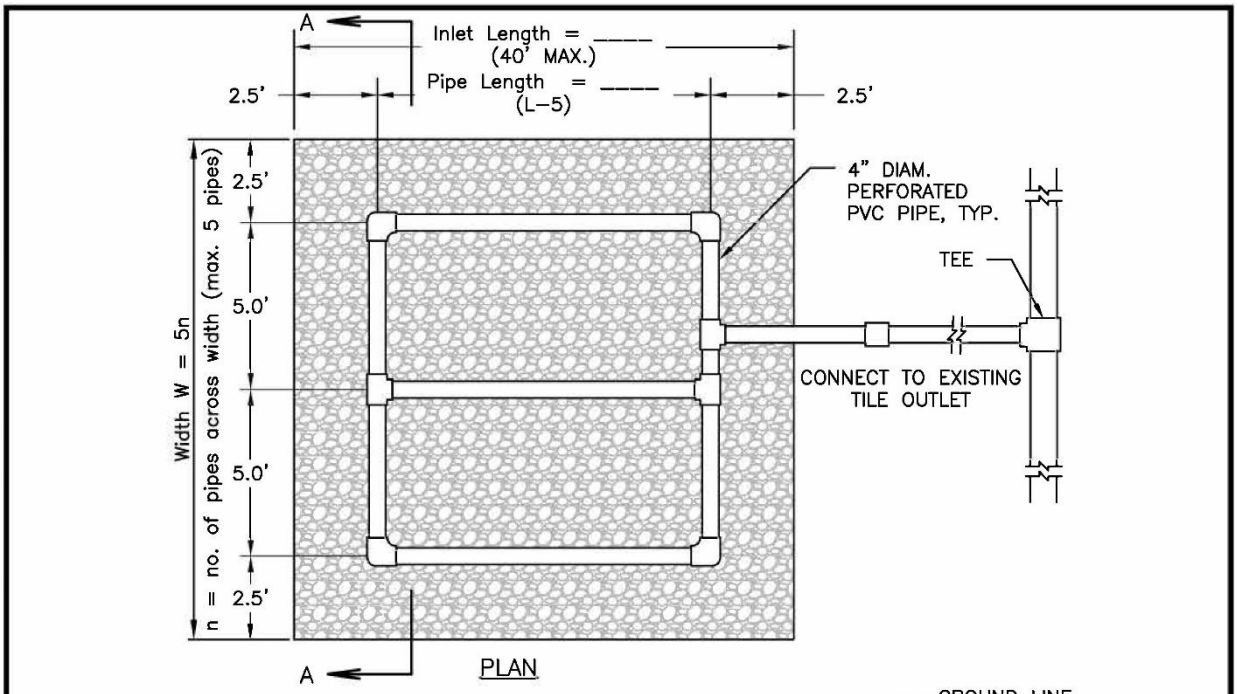
USDA United States Department of Agriculture
Natural Resources Conservation Service

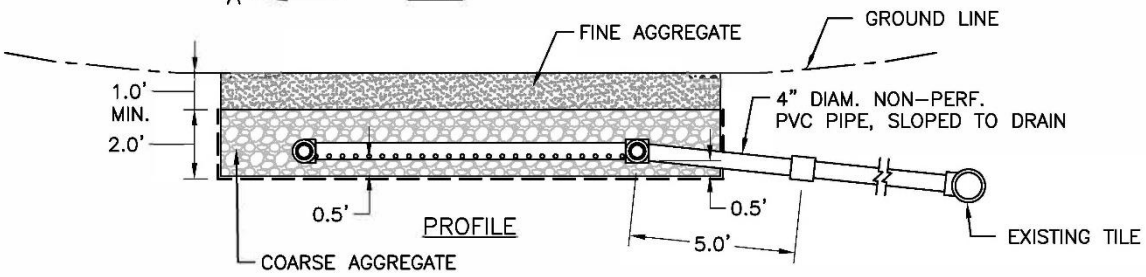
BLIND INLET
SINGLE PIPE LAYOUT

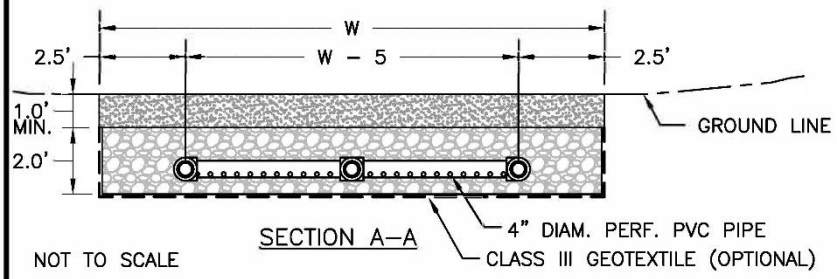
CLIENT: ____
COUNTY: ____

	Date	File Name
Designed	____ ____	WI–
Drawn		Date
Checked		06/2017
Approved		Sheet XX of ----

Prepared by Wisconsin NRCS







NOT TO SCALE

QUANTITIES

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FINE AGGREGATE – ASTM C33 FINE AGGREGATE	_____	CU.YD.
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4" DIAM. PVC TEE	_____	EACH
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USDA United States Department of Agriculture
Natural Resources Conservation Service

BLIND INLET MULTI–PIPE LAYOUT

CLIENT: -----
COUNTY: -----

	Date	File Name
Designed	---- ----	WI–
Drawn		Date
Checked		06/2017
Approved		Sheet XX of ---

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