# Blind Inlet Fact Sheet

**USDA Natural Resources Conservation Service – Iowa July 2015**

**Definition and Purpose** – Surface inlets are installed in the lowest point in a natural depression (pothole) or in tile outlet terraces and water and sediment control basins. Ideally, they function to rapidly (in less than two days) remove ponded water from these sites. A perforated riser connected to an underground outlet (UGO) is the predominant type of surface inlet found in Iowa. A blind inlet, also known as a "French Drain," is another type of surface inlet. Blind inlets are constructed by placing small aggregate and sand over perforated pipe which is connected to a UGO. Because the blind inlet acts as a filter, it can reduce the amount of sediment and other contaminants discharged through the UGO compared with perforated risers or flush inlets. Blind Inlets also provide obstruction free equipment operations because they eliminate the perforated riser inlet.

**Design and Installation** – Conservation Practice Standard "Underground Outlet" (Code 620, February 2015) allows the use of blind inlets as a component of the underground outlet system. The blind inlet is designed to prevent soil particle movement while achieving a desired flow rate. Design of blind inlets can be facilitated by using one of the standard drawings – IA-1550 and IA-1551 – available on the Iowa NRCS Engineering web page.

Blind inlets must be installed in dry conditions to minimize compaction by the hauling equipment.

Blind inlets are subject to plugging with sediment. It is important to control erosion in the watershed to maximize the life of the blind inlet. A set-back distance from the blind inlet should be observed when applying fertilizer and pesticides.

**Research and demonstration sites** – Researchers with the USDA's Agricultural Research Service in the National Soil Erosion Research Laboratory, West Lafayette, Indiana, and the National Laboratory for Agriculture and the Environment (NLAE), Ames, Iowa, have conducted research on the performance of blind inlets in Indiana and Iowa, respectively. The focus of this research has been the water quality benefits from using blind inlets.

*Photo 1. Newly installed blind inlet in Hardin County, Iowa. The perforated riser was left in place for research purposes. (Photo by Martin Shipitalo, ARS-NLAE)*

**Results** – In a field scale study in Indiana, Smith and Livingston (2013) found substantial decreases in discharge, total phosphorus (TP), and soluble reactive phosphorus (SRP) loading from the blind inlet compared with a perforated riser (Table 1).

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They reported that "*Reductions in sediment loading observed for the blind inlet undoubtedly occurred as a function of filtration, as the tile risers have 2-cm holes that offer only filtration of organic debris (i.e. corn stalks). Filtration of sediment was also a likely reason for decreases in TP loading, as the non-soluble portion of TP is generally considered to be the P that is adsorbed to particulates. Decreases in SRP and NO3-N loading owing to the blind inlet were likely a result of contact time with soil.*"

*Table 1. Reductions in discharge, sediment and nutrient loading from blind inlet relative to the tile riser at two field sites in Indiana. In 2009, the field with the blind inlet (corn silage in 2008) had much more erosion that the field with the riser inlet (corn grain in 2008) because of less ground cover, offsetting the effectiveness of the blind inlet to reduce sediment compared to the perforated riser inlet. (From Smith and Livingston, 2013)*

| Year | Discharge (%) | Sediment Load (%) | SRP Load (%) | TP Load (%) |
|---|---|---|---|---|
| 2009 | 56.8 | 8.8 | 65.1 | 50.1 |
| 2010 | 62.3 | 79.4 | 71.9 | 78.0 |

Martin Shipitalo with ARS-NLAE is conducting a study of blind inlets and other practices in the South Fork of the Iowa River in Hardin County. Three blind inlets were installed in early 2014. Mr. Shipitalo reports that "*The blind inlets … slowed infiltration and increased the duration of ponding. Additionally, clogging with fine particles may require removal and perhaps replacement of the sand layer at some sites due to excessive erosion in 2014 that reduced their lifespan.*"

*Table 2. Preliminary results showing contaminant concentrations at three blind inlet sites in Hardin County, Iowa, for 2014 runoff events. Depth of ponding at the MW site resulted in bypass of the blind inlet and made it ineffective in reducing P and sediment losses. (Table courtesy of Martin Shipitalo, ARS-NLAE)*

| Site | Position | Total P | Total Dissolved P | Total Suspended Solids |
|---|---|---|---|---|
| | | ---------- mg/L ---------- | | |
| **BM (2 events)** | Blind Inlet | 1.04 | 0.36 | 678 |
| | 1-inch Depth in pool | 4.44 | 0.52 | 3,757 |
| | | | | |
| **SD (1 event)** | Blind Inlet | 1.85 | 0.26 | 1,297 |
| | 1-inch Depth in pool | 11.33 | 0.33 | 13,172 |
| | | | | |
| **MW (2 events)** | Blind Inlet | 4.44 | 0.49 | 3,896 |
| | 1-inch Depth in pool | 3.09 | 0.47 | 2,110 |

**Financial and Technical Assistance** – Technical assistance with the planning and design of blind inlets is available through normal NRCS procedures using the Underground Outlet conservation practice standard. Planning must include erosion and sediment control in the contributing watershed, or practice life will be reduced. Financial assistance is available through EQIP and many watershed projects using other funds. The EQIP payment rate is based on the feet of pipe used in the blind inlet.

**References**

D. R. Smith and S. J. Livingston. 2013. *Managing Farmed Closed Depressional Areas Using Blind Inlets to Minimize Phosphorus and Nitrogen Losses*. Soil Use and Management, March 2013, 29 (Suppl. 1), 94-102.

M. Shipitalo. Iowa Falls Crop Clinic presentation, December 30, 2014.