708 – Sediment Traps & Basins

708.04 Perforated Riser Outlet (Dewatering Device)

Definition:

A temporary perforated riser is a dewatering device for the Temporary Sediment Basin (708.02) when practices that withdraw from the top of the water column are not feasible. It is a device configured as a perforated vertical riser pipe wrapped by wire mesh that is covered by an aggregate cone that discharges through a pipe system. The perforated riser outlet is not meant to be the principal spillway outlet.

The temporary perforated riser is a measure that allows for the withdrawal from below the surface of the water column.

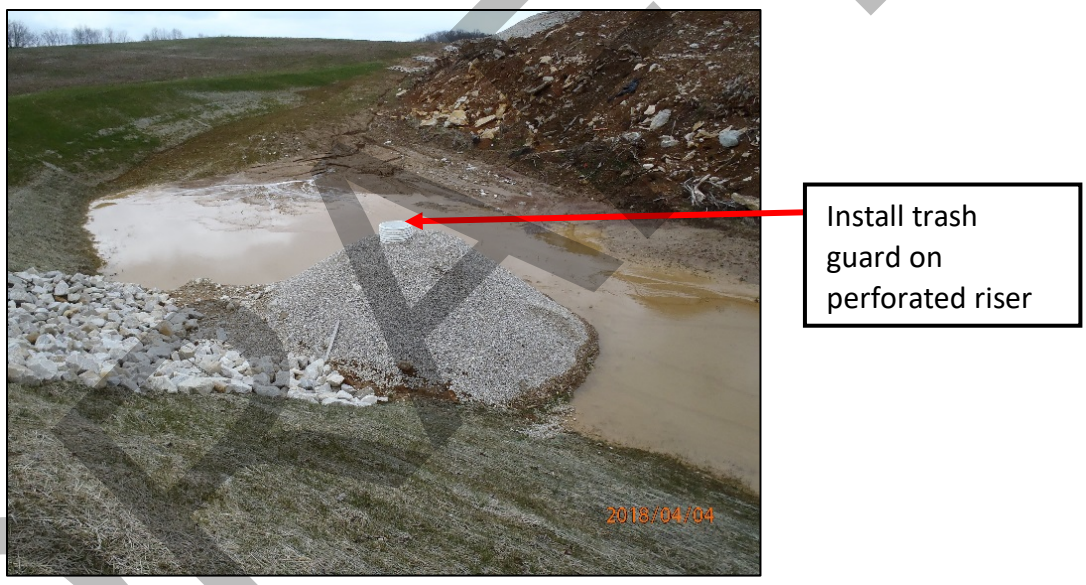


Exhibit 708.04-A.
Source: IDEM

Purpose:

To minimize sediment discharges from temporary sediment basins (708.02) implemented on construction sites when practices that withdraw from the top of the water column are not feasible or are inhibited/prohibited by freezing conditions. It is a temporary dewatering device that functions by causing sediment-laden stormwater to pool allowing retention time for the settling of suspended soil particles.

Specifications:

Structure Life:
Typically, less than 2 years.

Discharge Capacity:
The perforated riser shall meet discharge requirements for sediment basins.

Riser:

- The riser often attaches to the principal spillway outlet pipe. It must be able to withstand maximum external loading without yielding, buckling, or cracking.
- Height will be the top elevation of the dewatering zone. Refer to sediment basin design Temporary Sediment Basin (708.02).
    - Typically, the minimum height of 2 feet is preferred since shorter than 2 feet often results in minimally effective practice function.
- Perforated (1/2-inch holes spaced 3 inches apart vertically and horizontally or per design) for dewatering.
- Riser is wrapped with wire mesh (1/4 to 3/8-inch square metal mesh) or equivalent to a height above the perforations to prevent stones from the aggregate cone from plugging the perforations.
- The aggregate cone will be a minimum of 1-foot thick surrounding the riser. The aggregate will consist of INDOT CA No. 8 (refer to Appendix D).
- Anti-floatation block: Anchor the base of the riser pipe in at least a 1-foot cube of concrete to provide stability and resist floatation forces. The minimum factor of safety against flotation shall be 1.1. If concrete is used for the riser base, the formula shown below may be used in calculating the required volume of concrete.

$$V = 0.62\,HD_R^2 - \frac{HW_R}{87.6}$$

Where: H = Height of Riser (ft.)
D_R = Diameter of Riser (ft.)
W_R = Weight of Riser (lb./ft.)
V = Volume of Concrete ($ft.^3$)

$V = 0.62\,HD^2_R - \frac{HW_R}{87.6}$ Where: H = Height of Riser (feet)
D_R = Diameter of Riser (feet)
W_R = Weight of Riser (lb./feet)
V = Volume of Concrete (cubic feet)

Exhibit 708.04-B

$V = 0.62\,HD^2_R - \frac{HW_R}{87.6}$ Where: H = Height of Riser (feet)
D_R = Diameter of Riser (feet)
W_R = Weight of Riser (lb./feet)
V = Volume of Concrete (cubic feet)Exhibit 708.04-B

- Anti-vortex baffle: If the riser is being used as a principal spillway then an anti-vortex baffle/device should be considered.
- Trash guard is required to prevent blockage from floating debris. Blockage may occur at the riser top or in the pipe itself. The trash guard maintains top of riser inflow but minimizes floating debris entry and structure blockages.

708.04 Perforated Riser Outlet (Dewatering Device)

Typical Materials:

- Perforated riser pipe made from rigid Schedule 40 PVC, corrugated metal pipe, dual wall drain tile or similar material.
- All pipe connections will be secure and tight.
- A tee connector between the riser and outlet pipe is preferred since this allows for embedding the unused part of the "Tee" into the anti-floatation block.
- Aggregate cone: INDOT CA No. 8 (Refer to Appendix D).
- Anti-floatation block (concrete).
- Square metal wire mesh: 1/4 or 3/8-inch openings.
- Trash guard.

Typical Installation:

Note: If the perforated riser dewatering device is to be implemented while the floating device is offline during freezing conditions; then provisions are needed that allow it to be installed or brought online that require the minimal use of heavy machinery and equipment that can be difficult to use during periods of inclement weather and difficult wet soil conditions.

(1) Install riser on a firm, even foundation.
(2) Perforate the riser pipe with 1/2-inch holes spaced 3 inches apart vertically and horizontally or per design. Perforations must extend from the top elevation to the bottom elevation of the dewatering zone.
(3) Attach the riser pipe to the outlet pipe with a watertight connector. Riser to have trash guard installed and if required, install an anti-vortex device.
(4) Embed the riser pipe in at least 1 foot of concrete and a minimum of 6 inches beyond the perimeter of the pipe (the concrete serves as an anti-flotation block).
(5) Wrap the perforated riser with wire mesh. Do not use geotextile filter fabric. The wire mesh wrap prevents perforation plugging by aggregate and allows for more efficient inflow to the riser perforations.
(6) Place an aggregate cone around the perforated riser consisting of INDOT CA No. 8 aggregate a minimum of 1 foot thick around riser.
(7) When the perforated riser is required to be replaced with the Floating Outlet (708.03); the perforated riser is to be installed with basin construction and kept offline until needed. If the basin requires draining to activate the dewatering device the following procedure shall be followed: Drain any water from the dewatering zone, see Water Pumping (713.02), without discharging sediment and remove any sediment deposits that prevents installation and function of the device.

Typical Maintenance:

- Inspect prior to predicted rain events and restore any practice elements as needed to maintain practice function.
- Inspect within 24 hours after a rain event.
- Periodically check riser to ensure adequate function of the anti-floatation block and that there is a tight riser/barrel pipe connection: repair immediately.

- Replace aggregate cone if the basin dewatering zone does not dewater (drain) within the required time period (typically 48-72 hours) following a storm water run-off event.
- If basin drains too quickly consider implementation of an orifice to reduce the flow.
- Remove trash and other debris from riser top.
- Remove riser and/or sediment basin after drainage area has been permanently stabilized, inspected, and approved.
- When permanent stormwater basins have been modified to function as a temporary sediment basin and the contributing watershed has been permanently stabilized, remove sediment from the pooling area to meet the basin design requirements, remove all temporary dewatering devices, or features and make functional all required permanent outlet features.

Exhibit 708.04-C. A temporary perforated riser dewatering device has been installed on a post-construction storm water basin modified outlet structure so the basin can function as a sediment basin. Once construction and land disturbing activities are completed the riser can be removed and the permanent outlet features, orifice holes etc., will be implemented. Note basin banks require stabilization with seeding and mulching.
Source: IDEM

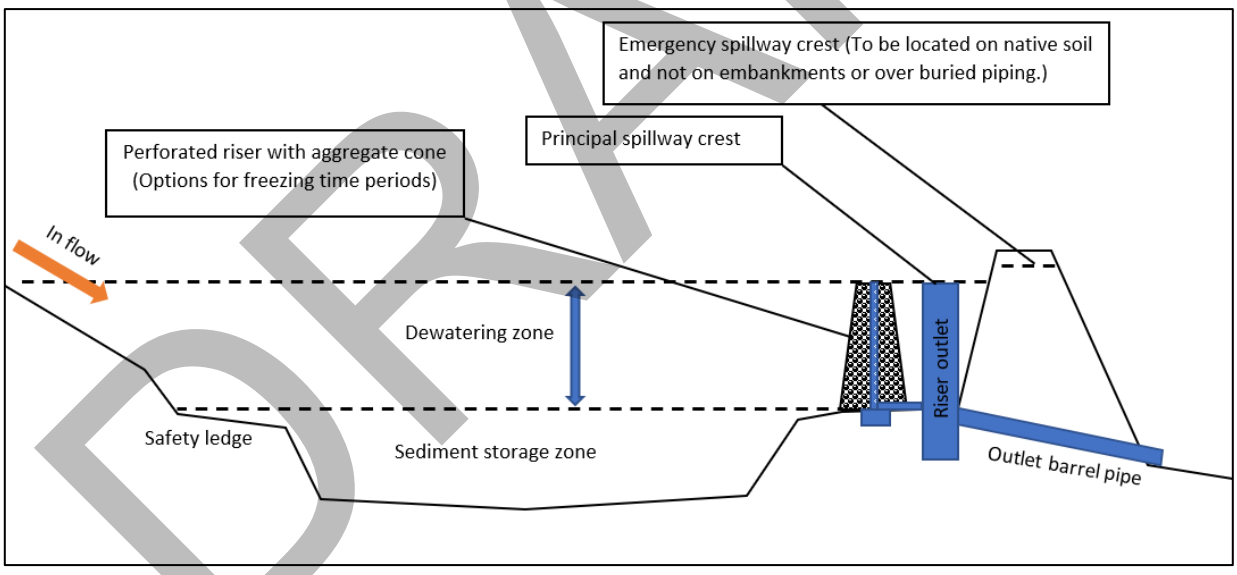


Exhibit 708.04-D. Typical sediment basin components when using the perforated riser dewatering device during freezing time periods. This drawing is intended to represent how the practice fits into the sediment basin practice and not intended to be a design drawing.
Source: IDEM file

EXHIBIT 708.04-E

Temporary Perforated Riser Outlet
Sediment Basin Dewatering Device
Design Data Sheet

Computed by: _____ Date:_____

Project Name: _____ Basin:_____

Location: _____

Latitude: _____ Longitude: _____

Top and bottom elevation of the dewatering zone: Top: ____ feet

Bottom: ____ feet

Riser crest elevation: _____ feet

Effective height of riser pipe: _____ feet

Riser diameter: _____ inches

Orifice diameter: _____ inches

Pipe diameter: _____ inches

Specifications for the connection of the riser to the barrel pipe: _____
(Provide construction details)

How is the riser shown to be imbedded in the anti-floatation block? _____

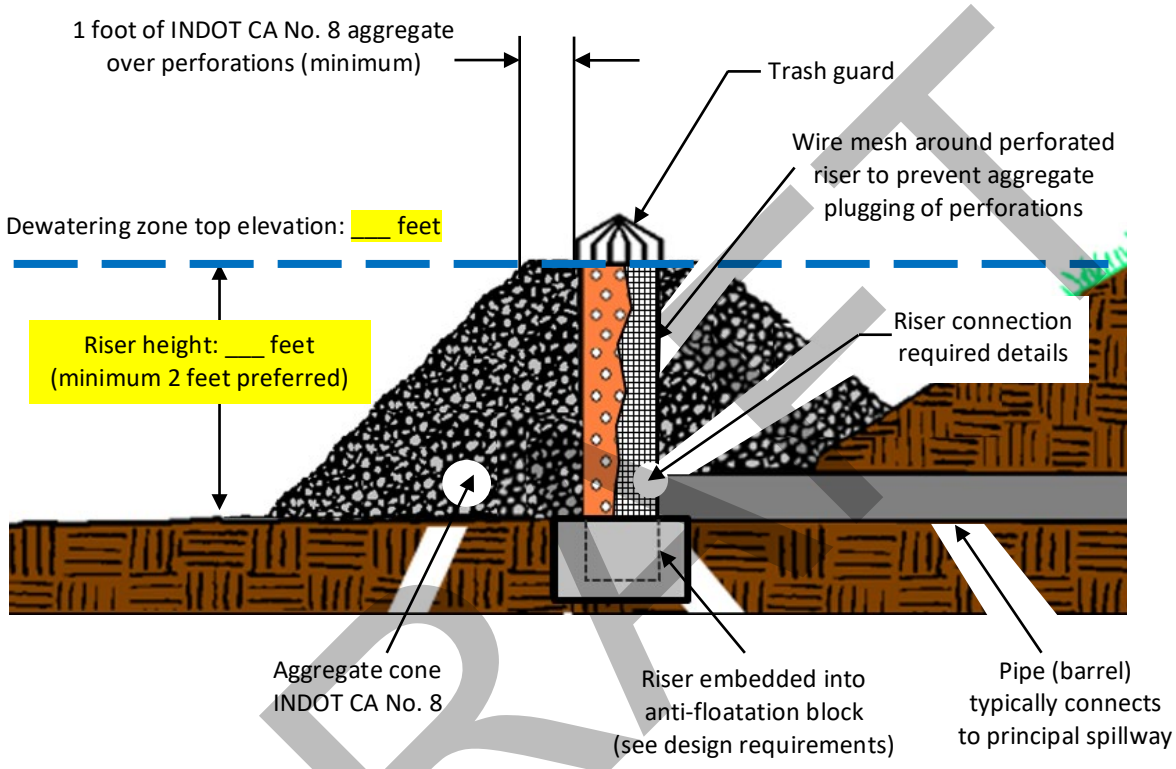
Anti-floatation block dimensions:

- Width: _____ inches
- Length: _____ inches
- Height: _____ inches

Note: If the perforated riser is to be implemented in a sediment basin that requires a change of dewatering devices to account for freezing conditions, then provide provisions that describe how this change over is to occur. Provisions must allow the perforated riser to be installed or brought online in such a way that requires the minimal use of heavy machinery and equipment that can likely be difficult to use during periods of inclement weather and difficult wet soil conditions.

Exhibit 708.04-F

TEMPORARY PERFORATED RISER
OPTIONAL SEDIMENT BASIN DEWATERING DEVICE
TYPICAL PRACTICE DIAGRAM
(NOT TO SCALE)



NOTES:

- For dimensions and construction information see the "Specifications" section of this practice and the practice Design Data Sheet
- Replace perforated riser with Floating Outlet (708.03) when weather conditions are appropriate.
- The illustrations in this exhibit are not intended to serve as construction drawings. The diagrams are to be used to communicate the concepts for implementation of this control measure.

Source: IDEM file