ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TEMPORARY SEDIMENT TRAP

CODE 960

Source:

DEFINITION

A small temporary stormwater storage "structure" designed to trap sediment.

PURPOSE

The purpose of this practice is to detain sediment-laden stormwater runoff from small disturbed areas for a sufficient period of time to allow a majority of sediment to settle out.

CONDITIONS WHERE PRACTICE APPLIES

1. In areas of concentrated flow or points of discharge during construction activities where physical site conditions, construction schedules, or other restrictions preclude the installation or establishment of other effective erosion and/or sediment control practices;
2. At the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment-laden water;
3. The size of the trap shall be based on a 1 to 5 acre tributary drainage area. For areas 5 to 30 acres, refer to practice standard **TEMPORARY SEDIMENT BASIN 957**;
4. Where access can be maintained for sediment removal and proper disposal and for periodic inspection and maintenance;
5. In the approach to a storm water inlet located below a disturbed area as a part of an inlet protection system;
6. The trap life can be limited to 18 months or less;
7. Structural failure of the trap will not result in loss of life, damage to homes, commercial or industrial buildings, main highways or railroads, or in the use or service of public utilities;
8. Trap is not located over utility lines;

9. Trap is not located over wells or septic fields;
10. Trap is not located over an area of known karst topography;
11. Trap is not to be constructed in streams, or within a delineated wetland.

CRITERIA

Construction projects may be subject to local, county, state and federal rules and regulations.

Traps shall be constructed according to the Storm Water Pollution Prevention Plan as approved by the Illinois Environmental Protection Agency.

Temporary sediment trap design plans and specs shall be signed and sealed by an Illinois licensed professional engineer.

The site superintendent and field personnel shall abide by the plans and specifications during the construction process of the trap.

Traps shall be constructed prior to disturbance of up-slope tributary areas and placed so they function during all phases of construction and not removed until tributary area is stabilized.

The trap design shall include the following components:

Storage capacity - Designs shall provide for both sediment storage and detention storage for the purpose of detaining runoff long enough to allow sediment deposition.

The trap shall have an initial storage volume of 134 cubic yards per tributary acre. One half of the total volume shall be in the form of “dead” storage or sediment pool to collect/capture sediment. The remaining upper half shall be active detention or “live” storage to provide additional settling time for larger, less frequent storm events.

The minimum length to width ratio of the constructed trap shall be 2:1. The total depth of live detention and dead storage shall be a minimum of 3 feet to minimize the resuspension of sediments.

Embankment - Ensure that embankments for temporary sediment traps do not exceed 5 feet in height measured at the centerline from the original ground surface to the top of the embankment. Construct embankments with a minimum top width of 5 feet and side slopes of 2:1 or flatter. Construct embankments according to the requirements in construction specification 23 EARTHFILL.

The earthen embankment shall be temporarily stabilized with erosion control blanket, turf reinforcement mat, geotextile fabric, and/or temporary seeding.

The structure shall be designed to fully utilize the required detention storage volume and draw down the storage within a 24-40 hour period at discharge rates, that at a minimum do not increase over pre-construction conditions for the 2-year frequency, 24-hour storm.

Construct the sediment trap outlet using either a, rock outlet or pipe outlet.

Rock Outlet:

Outlet - The outlet shall be located at the low point in the trap. The stone section serves two purposes: 1) the top section serves as a non-erosive spillway outlet for design discharge and flood flow, and 2) the bottom section provides a means of dewatering the trap between stormwater runoff events.

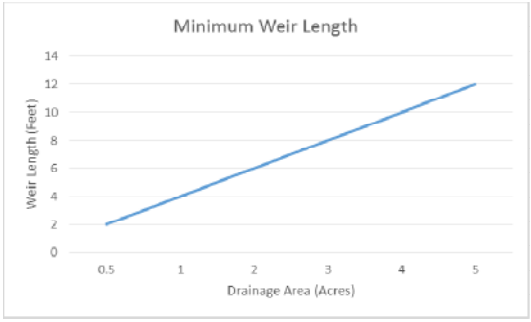
Stone size - A combination of coarse aggregate and riprap shall be used to provide for filtering/detention as well as outlet stability. Construct the outlet using rock sized equivalent to IDOT RR-4. A 12 inch thick layer of IDOT CA-3 should be placed on the inside face to reduce the drainage out (exfiltration) flow rate.

Side slopes stone layer thickness - The side slopes of the spillway shall be kept at least 22 inches thick.

Depth - The crest of the principal spillway outlet shall be a minimum of 1.5 feet below the settled top of the embankment.

Protection from erosion – Place geotextile fabric, according to the requirements in material specification 592 GEOTEXTILE Table 2, Class I between the bedding stone and the riprap to prevent erosion.

Principal Spillway – The spillway weir shall be at least 4 feet wide and sized to pass the peak discharge of the 10 year frequency, 24-hour duration storm without failure, overtopping of the basin or significant erosion. A design HWEL maximum flow depth of 1 foot, a minimum freeboard of 0.5 feet, and maximum side slopes of 2:1 are required. Weir length may be selected from the graph below:



Dimensions shown are minimum.

Discharges from both the principal and emergency spillways of the sediment trap must be conveyed to stable areas or a waterway with adequate capacity and stability. Where the trap outlet intersects with the waterway, the discharge velocity shall be 1 1/2 feet per second or less to prevent erosion or scour within the receiving waterway. Outlets to stormwater facilities must have adequate capacity to receive the discharge from the trap.

Pipe Outlet:

Outlet – The outlet structure shall be located at the low end of the trap. Outlet structures at a minimum must be accessible to inspectors, easy to maintain, and resistant to clogging by plant material, debris or sediment.

Principal Spillway - The outlet control structure design is to include:

- A pipe conduit and related outlet erosion protection that shall be placed under or through the embankment or boundary formed by excavation;
- Anti-clog device installed in advance of the orifice such as a

skimmer, perforated riser and other devices or combinations, thereof; and;

- Structures as necessary to provide for the interface and continuity between the anti-clog device, orifice restrictor and pipe conduit installations.

Outlet structures shall be constructed of corrugated metal, PVC, polyethylene, smooth steel, or other appropriate materials**.**

The emergency spillway crest elevation shall be at least 1.5 feet with 0.5 feet of freeboard below the settled top of the embankment. The spillway must be stabilized and/or armored as appropriate based upon overflow velocities.

Erosion protection shall be installed at the outfall to prevent scour. See practice standards, **PIPE OUTLET TO FLAT AREA 610, ROCKOUTLET PROTECTION 910.**

CONSIDERATIONS

Select locations for sediment traps during site evaluation. Note natural drainage divides and select trap sites so that runoff from potential sediment- producing areas can easily be conveyed into the traps.

Traps should be readily accessible for periodic sediment removal and other necessary maintenance. Plan locations for sediment disposal as part of trap site selection. Clearly designate all sediment disposal areas on the plans.

Provisions to protect the embankment from failure from storm runoff that exceeds the design capacity should be considered in the design. Utilize non-erosive emergency spillway areas, particularly if there could be unacceptable consequences from failure. If a bypass is not possible and failure would have severe consequences, consider alternative sites.

Sediment trapping is achieved primarily by settling within a pool formed by excavation, or by a combination of excavation and embankment. Installations that provide pools with greater than 2:1 length to width ratios reduce short-circuiting, enhance the water quality benefit and allow more of the pool surface area for settling.

A properly designed and maintained sediment trap is expected to allow settling of 70-80% of the coarser sediment (sand, heavy silts) from suspension. While some fine silt and clay soil particles will drop from suspension, the standard trap design will need to be supplemented with other practices if the goal is to remove fine particle sizes from suspension.

In order to remove fine silts and clay particles from the water column, the following supplemental practices may be used:

1. Anionic flocculent aids can be used on sites with particularly fine-grained and erodible soil (i.e. fine silt or clays). Refer to practice standard**; POLYACRYLAMIDE (PAM) FOR TURBIDITY REDUCTION AND SEDIMENT CONTROL, 894.**

2. Baffles can improve the sediment trapping performance of the trap by preventing short-circuiting of the trap (extend travel time) and through enhanced sediment

trapping and settling efficiency. Baffles help reduce water turbulence in the trap. Baffles can be used in combination with flocculants to increase the amount of sediment deposition. Baffles may be constructed with a permeable material such as jute or geotextile filter fabric such as a floating silt curtain. Geotextiles shall be selected according to material specification **GEOTEXTILE 592.**

The drainage area above the temporary sediment trap should be protected against erosion, to the extent practicable. A comprehensive treatment train approach (multiple Best Management Practices) is a design concept that incorporates a combination of erosion control and sediment trapping practices on a construction site to reduce the overall sediment load that enters the sediment trap. Using a treatment train approach can extend the life of a sediment trap and greatly reduce the need for maintenance (sediment removal) as well as improve the water quality that leaves the site.

For any site which discharges directly to an impaired water identified in the Illinois Environmental Protection Agency's 303 (d) listing for suspended solids, turbidity or siltation, the stormwater pollution prevention plan shall be designed for a storm event equal to or greater than a 90th percentile storm event. If required by federal regulation or the IEPA's Illinois Urban Manual, the Stormwater Pollution Prevention Plan should adhere to more restrictive design criteria.

PLANS AND SPECIFICATIONS

Plans and specifications for temporary sediment traps shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. At a minimum the plans and specifications shall include the following items:

1. Construction, sediment and erosion control plan outlining tributary drainage area;
2. Location of the sediment traps.
3. Size of the trap including width, length, depth and side slopes;
4. Minimum cross section of embankment;
5. Minimum profile through spillway;
6. Location and design of outlet(s);
7. Location of emergency spillway;
8. Gradation and quality of rock.
9. Dewatering plan for pumping operations;
10. Material specifications;
11. Plans shall detail conditions allowing trap removal, how excavated sediment is to be disposed of, such as placement on areas where it will be stabilized or removal to an approved off-site location;
12. Stabilization Plan

All plans and/or specifications shall include the installation, inspection, and maintenance schedules with the responsible party identified.

The standard drawing for **TEMPORARY SEDIMENT TRAP IL-660** may be used as the plan sheet.

OPERATION AND MAINTENANCE

Inspect temporary sediment traps after each period of significant rainfall. Remove sediment and restore the trap to its original design

dimensions when the sediment has accumulated to two thirds the design depth of the dead sediment storage. Place the sediment that is removed in the designated disposal area and replace stone facing as needed.

Check the embankment for damage from erosion or piping. Periodically check the depth of the spillway to verify it is a minimum of 1.5 feet below the low point of the embankment to slightly above design grade. Any riprap displaced from the spillway must be replaced as soon as practical. Remove any accumulated sediment, trash or debris from the outlet control structure.

After all sediment-producing areas have been permanently stabilized and properly dewatered, remove the structure and all sediment. Smooth the area to blend with the adjoining areas and permanently stabilize properly.

REFERENCES

Illinois Department of Transportation, 2016. Standard Specifications for Road and Bridge Construction. IL

North Carolina Sedimentation Control Commission, 2006. Erosion and Sediment Control Planning and Design Manual. NC

Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1992. Virginia Erosion and Sediment Control Handbook. 3rd ed., VA

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